The Future of Mission: Lifeline

AHA Systems of Care: Moving Regionalized Systems to Encompass Time Critical Diagnoses

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March 15th, 2016
• Conflicts:
  – None but looking

• Disclosures:
  – Vice-Chair of the NAEMSP Standards and Practice Committee
  – Medical Advisory Committee of the Kansas Board of EMS
Objective

• “Discuss how statewide Emergency response systems are moving towards coordination of Stroke, STEMI, Trauma, and Resuscitation and how to organize key stakeholders to create efficient delivery and adherence to the current standards of care.”
My REAL Objective

• Lets talk logistics…and from the patient’s perspective.

Amateurs talk strategy.
Professionals talk logistics.

— Omar N. Bradley —
The Issues

• What’s this story about? Has it got any sports in it?
  – Are you kidding? *Fencing, fighting, torture, revenge, giants, monsters, chases, escapes, true love, miracles.*

• Doesn’t sound too bad. I’ll try to stay awake.
Fencing, fighting, torture, revenge, giants, monsters, chases, escapes, true love, miracles
Who’s Hungry?
What’s a “System of Care”

• Basically, we've finally realized that none of our individual programs can get the job done alone — and we need to work together.

...and we need to work together.
What’s a “System of Care” anyway?

• It’s the whole collection of what our programs do to meet the patient’s needs
When does time matter?

- The cool kids are calling these “Time Critical Diagnoses” (TCDs)
  - STEMI
  - Stroke
  - Cardiac Arrest
  - Trauma
STEMI
STEMI

• Systems of Care in STEMI
  – Direct to cath lab
  – Transmission of EKGs
  – What counts as the first EKG
  – Time, time, time
STEMI

• Direct to cath lab
  – Who’s doing it? Who’s not?
  – What do you do with short activation times?
  – What’s the role of a hospital that doesn’t?
  – How about facilities without 24/7 availability?

• What barriers do you have
  (or have overcome?)
STEMI

- Transmission of EKGs
  - Who’s doing it?
  - Do you know your...
    - EMS over/under call rate?
    - ED over/under call rate?
  - What’s your under-triage goal?
    - How high does your over-triage rate need to be to achieve that?
• What counts as the first EKG?
  – EMS EKG?
    • How do you record it?
    • Does it go into the computer?
    • Do you repeat it in the ED?
  – Hospital EKG?
    • Does it help the patient?
    • Is it in the way of direct to cath lab?
  – What about transferring facilities?
STEMI

- What times do you record?
- What do they mean?
  - Symptom onset
  - 911 call time
  - First Medical Contact
  - First EKG
  - Door to ___ time

What time matters to the patient?
Stroke
Stroke

• Systems of Care in Stroke
  – Direct to CT programs
  – Mobile CT ambulances
  – TPA vs retrievers
  – Comprehensive stroke center certification
Stroke

• Direct to CT
  – Who’s doing it?
  – What are you measuring?
    • Is it patient centered or treatment orientated?
Stroke

• Mobile CT Scanners

…but these are not a new idea...
Stroke
Stroke

• The STEMO (STroke Emergency MOBILE)
  – Built in Berlin Germany in 2011
  – Cost $1.4 million (US)
    • That’s only $1.0 million euros
    • <The 24/7 neurologist on board cost a bit extra>
  – Found that they could decrease time from the 911 call to administration of tPA by 25 minutes
    • And found no increase in symptomatic head bleeds
Stroke

• However…
  – Of the 25 minutes
    • Only 15 min was saved from 911 call to CT Scan
    • And 10 min was from CT Scan to tPA
  
  – And they weren’t able to show that any of the patients had better outcomes
Stroke

• So what’s going on here?

...part of the problem is likely that there is significant variation among strokes but we’re trying to measure them all together.
tPA success rates by location

Saqqur et al, Neurology 2008
Stroke

- TPA vs Retrievers
Stroke

Positive Endovascular Stroke Trials 2015

- **MR CLEAN**: 33% (P<0.05)
- **REVASCAT**: 44% (P<0.05)
- **ESCAPE**: 53% (P<0.001)
- **SWIFT PRIME**: 60% (P<0.001)
- **EXTEND-IA**: 71% (P<0.01)
- **THERAPY NS**: 38%

Endovascular vs. Control:
- **Endovascular**: 33% vs. 19%
- **Control**: 28% vs. 29%
  - **MR CLEAN**: 33%
  - **REVASCAT**: 44%
  - **ESCAPE**: 53%
  - **SWIFT PRIME**: 60%
  - **EXTEND-IA**: 71%
  - **THERAPY NS**: 38%
Stroke

• Primary vs Comprehensive Stroke Center Certification
  – What are you doing?
  – What are our targets?
  – Where does the evidence stand?
  – What is the role of a primary center if a comprehensive center comes to town?
Care in stroke centers was associated with lower 1-year case fatality and reduced institutional care compared with General Hospitals. NNT to prevent 1 death or institutional care at 1 year was 29 for comprehensive centers and 40 for primary centers vs General Hospitals when tPA was licensed for use in Finland. 

Results—Care in stroke centers had lower mortality during the entire follow-up of up to 9 years and their median survival was increased by 1 year.

Conclusions—This study shows a clear association between the level of acute stroke care and patient outcome and supports use of published criteria for primary and comprehensive stroke centers. (Stroke. 2010;41:1102-1107.)

Key Words: acute stroke ■ organized stroke care ■ stroke units
Comprehensive Stroke Centers May Be Associated With Improved Survival in Hemorrhagic Stroke

James S. McKinney, MD; Jerry Q. Cheng, PhD; Peter Rybinlik, MD; John B. Kostis, MD and for the Myocardial Infarction Data Acquisition System (MIDAS 22) Study Group*

Background—Comprehensive stroke centers (CSCs) provide acute neurological and neurosurgical services to treat complex stroke patients. CSCs have been shown to mitigate disparities in ischemic stroke patients. It is believed that CSCs also improve outcomes for hemorrhagic stroke patients.

Methods and Results—We used the Myocardial Infarction Data Acquisition System (MIDAS) database, which includes data on patients discharged with a primary diagnosis of intracerebral hemorrhage (ICH; International Classification of Diseases, Ninth Revision [ICD-9] 431) and subarachnoid hemorrhage (SAH; ICD-9 430) from all nonfederal acute care hospitals in New Jersey (NJ) between 1996 and 2012. Out-of-hospital deaths were assessed by matching MIDAS records with NJ death registration files. The primary outcome was in-hospital mortality. The primary independent variable was CSC versus primary stroke center (PSC) admission. Multivariate logistic models were used to measure the effects of available covariates. Overall, 42,211 patients were admitted, of which 35% were admitted to CSCs. Patients admitted to CSCs were more likely to have neurosurgical or endovascular procedures performed (22.0% vs. 19.8%). CSC admission was associated with lower mortality (36.0% vs. 40.3%; odds ratio, 0.93; 95% confidence interval, 0.89 to 0.97) for hemorrhagic stroke patients compared with those admitted to SAH.

Conclusions—Hemorrhagic stroke patients admitted to CSCs are more likely to receive neurosurgical and endovascular treatments and be alive at 90 days than patients admitted to other hospitals. (J Am Heart Assoc. 2015;4:e001448 doi: 10.1161/JAHA.114.001448)

Key Words: comprehensive stroke center • intracerebral hemorrhage • subarachnoid hemorrhage
Stroke

• So what does this all mean for us as we try to build a “System of Care?”

...let's do a scenario
Stroke

Two hospitals
(Competitors)
2.5 miles apart
(7 minutes)
One Primary
One Comprehensive
Cardiac Arrest
Cardiac Arrest

• Systems of Care in Cardiac Arrest:
  – Field termination and when to transport
  – Mechanical CPR/Active Decompression
  – Intra-arrest cath lab
Cardiac Arrest

• Same game as before...
  ...lets build a system of care
Cardiac Arrest

• Under what circumstances should a cardiac arrest case be transported?
Cardiac Arrest

• When should we terminate efforts in the field?
Cardiac Arrest

• So what’s the role of Mechanical CPR?
Cardiac Arrest
Cardiac Arrest

Compression:
- Sternum
- Heart
- Lungs

Decompression:
- Pulls more blood back to the heart
- Heart
- Lungs
Cardiac Arrest

Airway Pressures During CPR

Credit: RJ Frascone, MD
Cardiac Arrest

• Intra-arrest cath lab
  – Who’s doing it?
  – What are the barriers?
Trauma
Trauma

• Systems of Care in Trauma:
  – Regional and statewide protocols
  – Alert Criteria
  – Pre-hospital trauma alerts
Trauma

EMS Trauma Triage & Transportation Flowchart

December 2009

Compromised and unsecure airway resulting from a traumatic event?

Yes

No

Altered level of consciousness <"A" on AVPU resulting from a traumatic event?

Yes

No

Respiratory distress resulting from a traumatic event?

Yes

No

Shock or diminished perfusion resulting from a traumatic event?

Yes

No

Severe burns?

Yes

No

Critical Trauma Patient Indicators MAJOR Trauma Only

- Transport to the closest designated trauma hospital within 30 minutes.
- Consider helicopter emergency medical services if within 15 minutes of scene
- Consider ALS intercept

1. Transport to a designated level I or II trauma hospital that is within 30 minutes transport time.

2. If no level I or II within 30 minutes transport time, transport to closest designated trauma hospital within 30 minutes transport time, or to a more appropriate higher-designated trauma hospital if predetermined by local medical directions. Initiate transfer arrangements according to local protocol.

3. If no designated trauma hospital is within 30 minutes transport time, transport to the closest hospital. Initiate transfer arrangements according to local protocol.

Other considerations
- Severe multiple injuries (2 or more systems) or severe single system injury?
- Cardiac or major vessel injuries resulting from blunt or penetrating trauma?
- Injuries with complications (e.g., shock, sepsis, respiratory failure, cardiac failure)?
- Severe facial injuries?
- Severe orthopedic injuries?
- Comorbid factors (e.g., Age < 5 or > 65 years, cardiac or respiratory disease, insulin-dependent diabetes, morbid obesity)?
- Evidence of traumatic brain injury & or spinal cord injury (e.g. new paralysis)?

Transport according to local protocol.
Trauma

• What about trauma alert criteria?
  – Why do we call trauma alerts?
  – What resources come with a trauma alert?
  – Who decides? Why?
The moral of the story…

• Patients with a Time Critical Diagnosis should do better with a well organized system of care where everyone from the 911 call through the post discharge care works together to meet the patients needs.

…but there’s one more thing:
How do we behave when we believe time is critical?

- Throw out the protocol?
- Communicate less?
- Take risks?
Lights and Siren
Lights and Siren

• When does it make sense?
Lights and Siren

• STEMI
  – Always?
  – What if close to hospital?
  – Rural setting with no traffic or stoplights?
Lights and Siren

- Stroke
  - Always?
  - What if outside “the window?”
  - What if stroke score is very low?
  - No “direct to CT scanner” program?
Lights and Siren

• An approach:
  – Unstable
  – Need for intervention unavailable in the field
  – The time that can be saved using L&S (compared to regular driving) is meaningful in the clinical circumstances
Lights and Siren

• How much time can be saved?

• You can estimate this with your EMS system:
  – Transport time through Destination time
  – Take the average for each transport mode and to each facility you transport to

• In Wichita it’s 90 seconds on average
Let’s wrap it up...

- Regionalized programs (like Mission:Lifeline) are just the beginning
- Healthcare is now becoming focused on patient centered outcomes (finally!)
- We need to evolve into Systems of Care that bridge the gaps between our individual programs and focus on the patient’s needs
What gets in the way

- Payment models that require low value actions (ambulances get paid by the mile)
- Competition (hospitals, departments)
- Restrictive policies on communication and teamwork
- How we measure ourselves (death in cath labs)
We need a plan...

- “To succeed in America, you need three things: A smile, a gun, and a plan. If you have to give up one, give up the smile. If you have to give up two, give up the gun – whatever you do, don’t give up your plan.”

- Al Capone
The Plan and the Trap 1/5

Plan

Systems of Care focused on the patient

Trap

Pursuing outcomes or metrics that are directed at profits, recognition, market share, or personal advancement
The Plan and the Trap 2/5

Plan

Measuring high-quality metrics

Trap

Selecting easy to measure metrics that are poorly tied to patient outcomes
The Plan and the Trap 3/5

Plan

Eliminate waste, implement quality

Trap

“The way we’ve always done it.”
The Plan and the Trap 4/5

**Plan**

Right care for the right situation

**Trap**

Large scale sorting protocols that don’t account for the details of our complex work
...and last but not least...
Forgetting why we got into this game in the first place

To take simply the best care of our families, friends, neighbors, and loved ones
Questions?

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