Why Fly?

Stephen C. Ausband, M.D FACEP
Carilion Clinic
Medical Director, Carilion Clinic Patient Transport Service
Background

- College: Averett University
- Medical School: East Carolina University School of Medicine
- Residency: Categorical Emergency Medicine, Pitt County Memorial Hospital
- Specialty certifications: Emergency Medicine, Emergency Medical Services
- Flying stuff: Medical Director, EastCare, Medical Director CCPT LifeGuard, Flight Surgeon, USAF 438 hrs in C-17, private pilot, SEL, instrument rated.
Why Fly

- Risks
- Benefits
- Advantages
- Disadvantages
Questions?

- Who’s in the audience?
- HEMS experience?
Caveats

- Not a definitive answer for every case (it’s complicated)
- Not a justification or refutation of HEMS
- Interactive discussion
- Broad concepts
- Not every possible use of HEMS
- No fixed wing discussion
- Not every State, organization or research paper discussed
- Food for thought
Guidelines

- State guidelines
- National organization guidelines
- Peer reviewed literature
What do States say?

- Virginia Department of Health
- Maryland Institute for Emergency Medical Services Systems
VDH Trauma Triage Plan

- Lessen the time from on scene to a hospital compared to ground transport;
- Bypass a non-trauma designated hospital to transport directly to a trauma center;
- Meet the clinical triage criteria for transport to the closest Level I / II Trauma Center;
- Meet the greater level of care needed by the patient, provided that the Medevac unit;
- On scene in a time shorter than the ground unit can transport to the closest hospital;
- Extenuating circumstances such as safety, egress/access.
VDH Trauma Triage Plan

- Patient requires a level of care greater than can be provided by the local hospital.

- Patient requires time critical intervention, out of hospital time needs to be minimal, or distance to definitive care is long.

- Utilization of local ground ambulance leaves local community without ground ambulance coverage.
Maryland

- Consider utilization of a helicopter when the patient’s condition warrants
- Transport to a trauma or specialty referral center and the use of a helicopter would result in a clinically significant reduction in time compared with driving to a trauma/specialty center.
Consider air transportation if the patient will ARRIVE at the appropriate receiving facility more quickly than could be accomplished by ground transportation.

Provider should consider all of the following: Time for helicopter response
Patient turnover (loading time)
Flight time to appropriate facility

Weather conditions
Thoughts?

- Trauma only?
- Time to treatment facility only?
National Association Guidelines

• APPROPRIATE AND SAFE UTILIZATION OF HELICOPTER EMERGENCY MEDICAL SERVICES: A JOINT POSITION STATEMENT WITH RESOURCE DOCUMENT

• Douglas J. Floccare, MD, MPH, David F. E. Stuhlmiller, MD, Sabina A. Braithwaite, MD, MPH, Stephen H. Thomas, MD, MPH, John F. Madden, MD, Daniel G. Hankins, MD, Harinder Dhindsa, MD, Michael G. Millin, MD, MPH

• Air Medical Physician Association (AMPA), the American College of Emergency Physicians (ACEP), the National Association of EMS Physicians (NAEMSP), and the American Academy of Emergency
National Association Guidelines

- Clinical benefit can be provided by
- Meaningfully shortening the time to delivery of definitive care to patients with time-sensitive medical conditions
- Providing necessary specialized medical expertise or equipment to patients before and/or during transport
- Providing transport to patients inaccessible by other means of transport
National Association Guidelines

• National guidelines for appropriate utilization of HEMS must be developed.

• These guidelines should be national in scope yet allow local, regional, and state implementation.

• A National HEMS Agenda for the Future should be developed to address HEMS utilization and availability and to identify and support a research strategy for ongoing, evidence-based refinement of utilization guidelines.
Thoughts?

- Complex?
- Specific enough?
- Useful for scene responses?
- Useful for interfacility transfers?
Questions?
Peer Reviewed Literature

- Development and Validation of the Air Medical Prehospital Triage Score for Helicopter Transport of Trauma Patients.
The aim of this study was to develop and internally validate a triage score that can identify trauma patients at the scene who would potentially benefit from helicopter emergency medical services (HEMS).

Although survival benefits have been shown at the population level, identification of patients most likely to benefit from HEMS transport is imperative to justify the risks and cost of this intervention.
Peer Reviewed Literature

- Retrospective cohort study of subjects undergoing scene HEMS or ground emergency medical services (GEMS) in the National Trauma Databank (2007-2012).

- Points were assigned to these criteria to develop the Air Medical Prehospital Triage (AMPT) score.

- The score was applied in the validation set to determine whether subjects triaged to HEMS had a survival benefit when actually transported by helicopter.
Peer Reviewed Literature

- There were 2,086,137 subjects included.

- Criteria identified for inclusion in the AMPT score included GCS <14, respiratory rate <10 or >29, flail chest, hemo/pneumothorax, paralysis, and multisystem trauma.

- The optimal cutoff for triage to HEMS was ≥2 points. In subjects triaged to HEMS, actual transport by HEMS was associated with an increased odds of survival (AOR 1.28; 95% confidence interval [CI] 1.21-1.36, P<0.01).

- In subjects triaged to GEMS, actual transport mode was not associated with survival (AOR 1.04; 95% CI 0.97-1.11, P=0.20).

- CONCLUSIONS: The AMPT score identifies patients with improved survival following HEMS transport and should be considered in air medical triage protocols.
Peer Reviewed Literature

- Is there a benefit to flying patients?
  - Not all patients are the same
  - Not all locations are the same
  - Not all benefits are the same
  - Not able to randomize or control patients
  - Informed consent issues
Peer Reviewed Literature


- Helicopters improve survival in seriously injured patients requiring interfacility transfer for definitive care.

- Brown JB, Stassen NA, Bankey PE, Sangosanya AT, Cheng JD, Gestring ML
Peer Reviewed Literature

- The benefits of HT over ground transport (GT) in this setting are unclear. By using a national sample, the objective of this study was to assess whether HT impacted outcomes following interfacility transfer of trauma patients.

- Patients transferred by HT or GT in 2007 were identified using the National Trauma Databank (version 8).

- Injury severity, resource utilization, and survival to discharge were compared.

- Stepwise logistic regression was used to determine whether transport modality was a predictor of survival after adjusting for covariates. Regression analysis was repeated in subgroups with Injury Severity Score (ISS) ≤15 and ISS >15.
Peer Reviewed Literature

• There were 74,779 patients transported by helicopter (20%) or ground (80%).

• Mean ISS was higher in patients transported by helicopter (17±11 vs. 12±9; p<0.01) as was the proportion with ISS>15 (49% vs. 28%; odds ratio [OR], 2.53; 95% confidence interval [CI], 2.43-2.63).

• Patients transported by helicopter had higher rates of intensive care unit admission (54% vs. 29%; OR, 2.86; 95% CI, 2.75-2.96), had shorter transport time (61±55 minutes vs. 98±71 minutes; p<0.01), and had shorter overall prehospital time (135±86 minutes vs. 202±132 minutes; p<0.01).

• HT was not a predictor of survival overall or in patients with ISS≤15. In patients with ISS>15, HT was a predictor of survival (OR, 1.09; 95% CI, 1.02-1.17; p=0.01).
Peer Reviewed Literature

**CONCLUSIONS:**

- Patients transported by helicopter were more severely injured and required more hospital resources than patients transported by ground.
- HT offered shorter transport and overall prehospital times.
- For patients with ISS>15, HT was a predictor of survival.
- These findings should be considered when developing interfacility transfer policies for patients with severe injuries.
Peer Reviewed Literature


- Ground emergency medical services requests for helicopter transfer of ST-segment elevation myocardial infarction patients decrease medical contact to balloon times in rural and suburban settings.

This investigation models potential time savings of ground EMS requests for helicopter EMS (HEMS) transport of a STEMI patient directly to a PCI center, rather than usual transport to a local hospital with subsequent transfer.

Data from a multicenter retrospective chart review of STEMI patients transferred for primary PCI by a single HEMS agency over 12 months were used to model medical contact to balloon times (MCTB) for two scenarios: a direct-to-scene HEMS response and hospital rendezvous after ground EMS initiation of transfer.
RESULTS:

Actual MCTB median time for 36 hospital-initiated transfers was 160 minutes (range = 116 to 321 minutes). Scene response MCTB median time was estimated as 112 minutes (range = 69 to 187 minutes).

The difference in medians was 48 minutes (95% confidence interval [CI] = 33 to 62 minutes).

Hospital rendezvous MCTB median time was estimated as 113 minutes (range = 74 to 187 minutes).

The difference in medians was 47 minutes (95% CI = 32 to 62 minutes).

No patient had an actual MCTB time of less than 90 minutes; in the scene response and hospital rendezvous scenarios, 2 of 36 (6%) and 3 of 36 (8%), respectively, would have had MCTB times under 90 minutes.
Peer Reviewed Literature

- In this setting, ground EMS initiation of HEMS transfers for STEMI patients has the potential to reduce MCTB time, but most patients will still not achieve MCTB time of less than 90 minutes.
Peer Reviewed Literature

- HEMS benefits the sickest?
- HEMS benefits those who are time critical?
- HEMS benefit varies?
- HEMS outcome research difficult?
Risks

- Crash (air > ground? Ground > air?)
- Limited patient access
- Limited patient assessment
- Limited diversion opportunities
- Altitude / flight effects
Benefits

- Increased # providers
- Increased medical interventions
- Increased monitoring / treatment
- High skill level / experience
- Fast
Advantages

- Shortened transport times
- Shortened time of critical care to patient
Disadvantages

- Mishap risk
- Flight limitations
Patient #1

- 43 y/o w/f restrained driver of single MVC
- Extensive damage to vehicle
- Estimated extrication time = 45 minutes

- Open femur fracture
- Abdominal Pain
- Large scalp laceration with uncontrolled bleeding
- Vital Signs Stable
Patient #1

- What if no prolonged extrication?
- What if scalp bleeding controlled?
- What if ATV mishap in inaccessible location?
- What if only 2 available Ems units in the county?
- Trauma center 15 min away vs 45 min away?
Patient #2

- ATV rollover down embankment
- No LOC
- + ETOH
- C/O leg pain, face pain, headache
- Vital Signs Stable
Patient #2

- What if GCS 15?
- 13?
- 10?
- 8?
Patient #3

• 35 y/o w/m in bucket truck made contact with high voltage line

• 1\textsuperscript{st}, 2\textsuperscript{nd}, 3\textsuperscript{rd} degree burns to face, neck, left upper extremity, and lower extremities

• Respiratory Distress

• HR normal

• HTN
Patient #3

- Air vs ground transport?
- Transport to trauma center vs burn center?
Patient #4

- Restrained passenger of rollover MVC
- Minimal extrication time
- No LOC
- C/O neck and back pain
- GCS 15
Patient #5

- 26 y/o female pregnant
- Overdose on Tylenol
- No LOC
- C/O abd pain, n/v
- Vital signs stable
Patient #5

- How pregnant?
- Local hospital with no OB / gyn?
- Tertiary center?
Patient #6

- 71 y/o male with chest pain (9/10) and bilateral arm pain / numbness
- 12 Lead EKG reveals ST elevation in leads II, III, AVF
- Significant cardiac history
- AAO and maintaining own airway
- HR, RR, SpO2 normal
- HTN
Patient # 6

- What if EKG normal?
- What if MVC, chest pain and EKG changes?
  - Local hospital?
  - Helipad rendezvous?
  - Larger Level III trauma center?
  - Level I tertiary care center?
Conclusion

- Why fly?
- Clear benefit for certain patients
- Probable benefit for others
- Not a risk free intervention
- Complex decision making process
- Think about it ahead of time
Questions?