DO HELICOPTERS SAVE LIVES IN TRAUMA?

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Are these useful medical devices?
Do Operating Theatres Save Lives in Trauma?

Often “yes” but ... dependant on:

- Appropriate staffing
- The right equipment
- Used for the right patient
  - (Within the right time frame)

Is the same true for helicopter emergency medical services (H.E.M.S.)?
Helicopter ≠ Panacea!

- Most trauma patients not severely injured.
- Urban trauma patients best served by rapid delivery to trauma centre.
  (Usually possible by road)
- H.E.M.S. (& pre-hospital A.T.L.S.) are of little or no value in these patients.

Question now: “Can helicopters save enough lives to warrant their use, or is money better spent on other measures?”
So are helicopters good for anything?


Literature Survey - Conclusions

- Helicopters may be of value for outlying patients with severe (blunt) trauma.
- Value may depend on having an advanced (ATLS capable) clinical crew.
- Helicopters cannot be viewed in isolation from the trauma system they serve.
Helicopters & Trauma Centres

- Have developed in parallel over past 25 years.
- Centralisation of trauma care has placed more trauma victims further from definitive care.
- HEMS only as good as trauma centres they support.
- But for remote patients, trauma centre may only be as good as the HEMS that they utilise.

Trauma centre <-> Hospital network

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H.E.M.S. <-> Ambulance network
Clinical Standards

- HEMS should provide clinical up-skilling.  
  (Again: the parallel with trauma centre concept)
- ATLS/EMST capability should be minimum standard
- In the Australasian/European domains implies a team incorporating an appropriate physician.
  - North American model more often nurse with physician control.
  - Physician based team may still be superior (controversial)
  - Proven effectiveness only with hospital based teams
  - Prehospital expertise also required -> mixed team.
But what about speed of transport?

- Helicopters are (2-3x) faster than road ambulances
- But few helicopters vs many ambulances & centrally based vs dispersed ambulances
- So helicopter has further to go
- And helicopter may be secondary responder (i.e. called in by ambulance already at scene)

*:Helicopter may be no faster at getting many patients to hospital.*
Prehospital Times: Ground vs Air (#1)

Time (mins)

Callout  10  20  30  40  50  60

Km from Hosp

Ambulance (75km/hr)  Helicopter (180km/hr)
Utilisation vs Clinical Standards

- Without advanced clinical crew HEMS can only offer speed of transport.
- But (as earlier) this may be illusory if ambulance on scene.
- So tends to lead to pre-emptive tasking (HEMS utilised as first responder)
- Leads to significant over utilisation, with:
  - Economic implications
  - Potential unavailability for genuine tasking
Helicopters as Ambulances?

- Tend to be used like regular ambulances
  "Launched early & launched often"
- Majority of patients not severely injured
  Smith T (2001)
- No improvement in predicted survival
  Baxt & Moody (1987a)
  Cameron et al (1994)

"A helicopter staffed and utilised like an ambulance is just an expensive noisy ambulance."
Helicopters as mobile emergency medicine departments?

- Advanced measures at scene & in transit:
  - Elective airway control (RSI & alternatives)
  - Respiratory: Tube thoracostomy, mechanical IPPV
  - Circulatory: Venous cutdown/CVL; blood trx.

- Rationalises resources
- Shortens “effective” prehospital time
- Reduces over utilisation
The ideal response to major trauma:

- Transport capability to rapidly deliver patient to trauma centre
- Clinical skills to provide semidefinitive (EMST level) care where indicated . . . or forced.
- The judgement to balance these two approaches.

The helicopter borne, critical care medical team satisfies all these criteria.
But does it work?

- Demonstrable improved survival
- Versus predicted by MTOS
  - multiple studies as per above
- By direct comparison with ambulance helicopter:
  - 13 extra survivors per 100 major trauma patients, 
    \( p<0.01 \) – Garner, Rashford et al (1999).
- Improved outcomes in head injury patients

“If you can’t take patients to hospital quickly enough, then take the hospital to the patient”
“A Tale of Two Dogmas”

“Swoop & Scoop” Pre-Hospital
VERSUS VERSUS
“Stay & Stabilise” In-Hospital

Alternative Integrated Approach:
“Time to Definitive Care”
The Integrated Approach

- "Swoop & Scoop" versus "Stay & Stabilise" is not an either/or question.
- It is a continuum where different patients lie at different points, depending on:
  - (a) Injuries
  - (b) Distance to definitive care
  - (c) Resources
- Applies to prehospital and interhospital transports
  A trauma patient in a small hospital is not usually stabilised
  Category (scene or hospital) may even be uncertain initially
Integrated Performance Based Approach:

e.g. Head injury patient, GCS<9.

Suggested benchmark: Airway control in <30mins

Three groups created:

- Patient intubated by paramedics prehospital.
- Patient unintubated but within (say) 25 min of trauma centre
- Patient >25 mins prehospital & not amenable to paramedic intubation - respond ATLS team to scene (or take patient to local hospital & respond ATLS team to there).
Role of Helicopter

- To assist in achieving benchmarks for remote patients
  i.e. Group 3 patients in previous example

- Helicopter enables single ATLS team to cover wide area rapidly
  60+ km radius or >12,000 sq km within 30 mins

- More economical than multiple ground units (or multiple trauma hospitals)
  - Bruhn et al (1993)
Equipment

- Least controversial, but still vital.

- Defined by:
  Patients - critically injured trauma victims
  Staff - What an ATLS team needs to care for the above

"HEMS needs to be half an ambulance and half a trauma hospital resuscitation room."
(and the best half of both)
Suggested minimum specifications for HEMS for trauma.

- Fitted with (at least 1) stretcher.
- Seating for critical care team of 2+.
  (at head & side.)
- Main & portable O2 & suction systems.
- MICU equipment:
  - Ventilator/alarm.
  - Monitors: ECG, SaO2, NIBP, ETCO2.
  - Infusion pumps.
- Cabin storage for full ATLS supplies/equip.
- Defibrillator certified for inflight use.
- Overhead IV hooks & pressure infusion system.
- Appropriate lighting for cabin layout.
- Hands free intercom system with isolate.
- Emergency service radios & cellular phone system.
"The H.E.M.S. Caduceus"
The Luftrettung Experience
The German Air Rescue System

- Luftrettung network integrated into trauma system
- HEMS units based at regional trauma centres
- Physician/paramedic medical team
- Legislated performance benchmark: >85% of seriously injured patients to be in medical care within 15 minutes of emergency call
- Over 25 years experience with system
The German Air Rescue Experience:

- HEMS trauma patients have (c.f. ground ambulance):
  - Improved survival
  - Shorter ICU stays
  - Fewer complications
  - Annual budget for each HEMS unit can be recouped by decreased expenditure in a single bad head injury.
  - Each DM ($)$ expended on HEMS generates >12DM in overall economic benefit.
  - Lifesaving & economic benefits of HEMS > seatbelts
CONCLUSION:
Do Helicopters Save Lives?

- Can be lifesaving in a (significant) subset of the trauma population.
- Can provide trauma centre outreach.
- Dependant on adequate staffing, equipment & utilisation.
- Many HEMS programs substandard & overutilised.
- Some areas need fewer but better HEMS.

"Could do better if they (we) tried"
THE END

QUESTIONS?