

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 \neq 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?

1. Baxt WG & Moody P (1983). Impact of a Rotorcraft Aeromedical Care Service on Trauma Mortality *JAMA* 249: 3047
2. Oestern HG (1985). The German Model for the Rescue of Trauma Patients. *Can J Surg* 28: 486.
3. Baxt WG, et al (1985). Hospital Based Rotorcraft Aero-medical Services & Trauma Mortality: A Multi Centre Study *Ann Emerg Med* 14: 859.
4. Moylan J, et al (1986). Factors Improving Survival in Multisystem Trauma Patients. *Ann Surg* 207: 679
5. Nicholl JP, et al (1995) Effects of London Helicopter Emergency Medical Service on Survival after Trauma. *Br Med J* 311: 217.
6. Cunningham P, et al (1997). Comparison of Helicopter & Ground Ambulance in Trauma Patients Transported from the Scene. *J Trauma* 43: 940.
7. Bartolacci RA, Munford BJ, et al. (1998) Air medical scene response to blunt trauma: effect on early survival. *Med J Aust* 169: 612.
8. Garner A, et al. (1999) Addition of Physicians to Paramedic Helicopter Services Decreases Blunt Trauma Mortality. *Aust NZ J Surg* 69: 697.

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

=

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

Clinical Standards

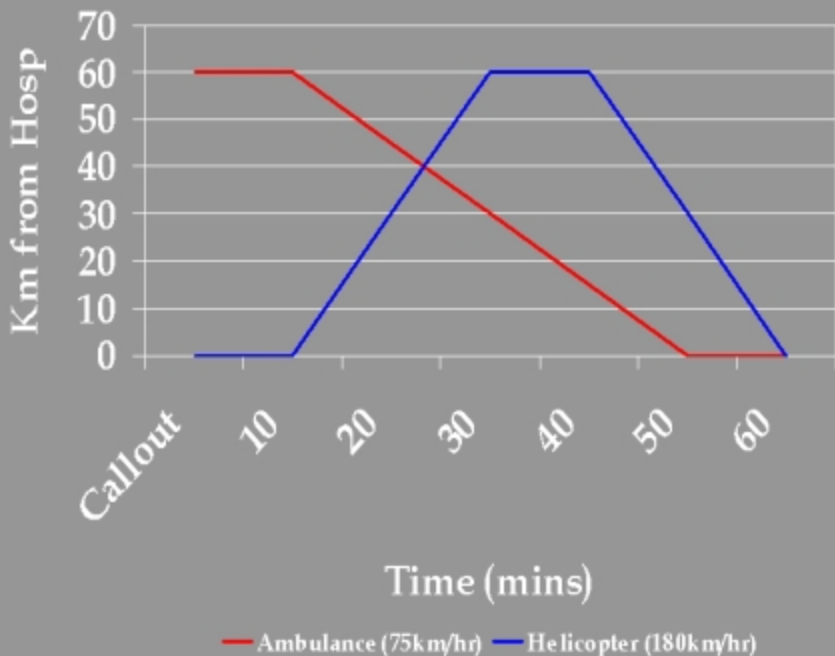
- ❖ HEMS should provide clinical up-skilling.
(Again: the parallel with trauma centre concept)
- ❖ ATLS/EMST capability should be minimum standard
- ❖ In the Australasian/ European domains implies a team incorporating an appropriate physician.
 - North American model more often nurse with physician control.
 - 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)

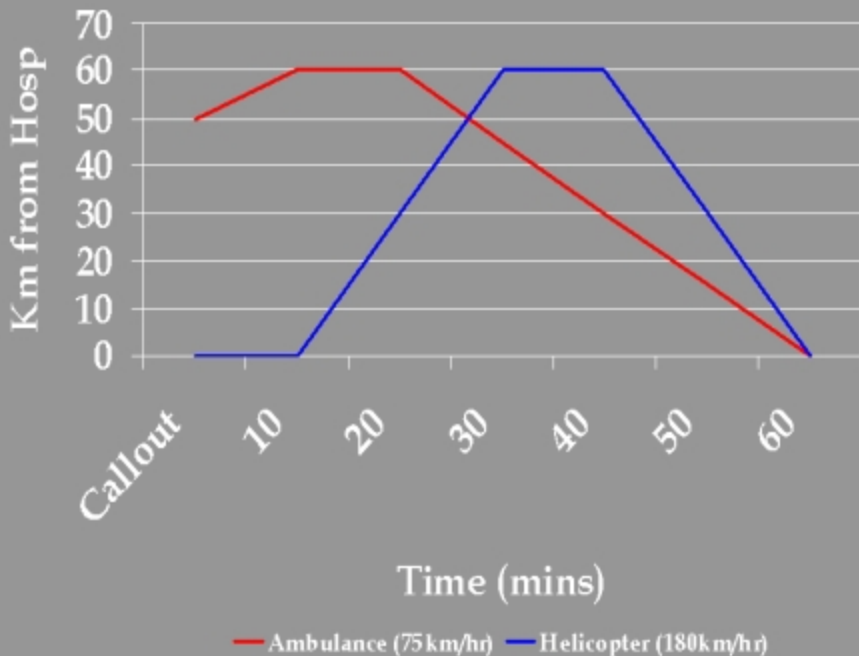


Utilisation vs Clinical Standards



- ❖ 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

Prehospital Times: Ground vs Air #2



Helicopters as Ambulances?

- ❖ Tend to be used like regular ambulances
 - “Launched early & launched often”
- ❖ Majority of patients not severely injured
 - Wills V, et al (2001)
 - Smith T (2001)
- ❖ No improvement in predicted survival
 - Baxt & Moody (1987a)
 - Cameron et al (1994)
 - Garner et al (1999)

“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 semidefinite (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
 - Baxt & Moody (1987b); Garner, Crooks et al (2001)

"If you can't take patients to hospital quickly enough, then take the hospital to the patient"

"A Tale of Two Dogmas"



"Swoop & Scoop"

VERSUS

"Stay & Stabilise"

Pre-Hospital

VERSUS

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 in-flight use.
- Overhead IV hooks & pressure infusion system.
- Appropriate lighting for cabin layout.
- Hands free intercom system with isolate.
- Emergency service radios & cellular phone system.



Helicopter

Utilisation

Equipment

"The H.E.M.S. Caduceus"

The Luftrettung Experience



The German Air Rescue System

Oestern HG (1985). The German Model for the Rescue of Trauma Patients. *Can J Surg* 28: 486.

- ❖ 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

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QUESTIONS?