Is there a role for a doctor in pre-hospital care?

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Impact of advanced prehospital care in severe head injury

- 104 Consecutive patients treated over 50 months
- Blunt traumatic brain injury
- Protocol
  - Intubation/Cric if GCS 8 or less
  - "Hyperventilated"
  - Mannitol
  - Diazepam & Phenytoin
- 128 controls - oesophageal obturator

Baxt WG et al. *J Trauma* 1987;27:365-9

- Similar demographics as regards age, sex, GCS and site of injury
- Probabilitiy of survival (TRISS) lower in aeromedical group
- Mortality
- Time to hospital
  - Land 23min
  - Aeromedical 57min

	Aeromedical	Land
Probability of survival	0.62	0.75
Mortality	32/104 31%	51/128 40%
Glasgow Outcome Score	44%	36%

Baxt WG et al. *J Trauma* 1987;**27**:365-9

Helicopter services in trauma – addition of a physician

- NRMA Careflight (Medic) to Westmead/Nepean
  - 28 months
  - ISS $\geq$ 10
  - Transported directly from scene
- Westpac (Paramedic) to John Hunter
- Pre-hospital case sheets for RTS
- TRISS observed and predicted mortality

Garner, A et al. Aust NZ J Surg 1999;69:697-701

	Paramedic team (n = 140)	Physician team (n = 67)	Significance level
Number of patients who received > 50 mL intravenous fluids	104	53	$P = 0.45$
Median volume of fluid (mL) infused in patients who received > 50 mL (range)	825 (100–4500)	2500 (200–14 380)	$P < 0.001$
Median volume of fluid (mL) infused in patients with initial hypotension* (range)	1475 (0–4500)	5035 (1000–14 380)	$P < 0.001$
Number of patients intubated	14	34†	$P < 0.001$
Proportion of patients with Glasgow Coma Score < 9 intubated	14/36	23/23	$P < 0.001$
Thoracic decompressions	2 (both needle)	8 (6 tube, 2 needle)	$P < 0.01$

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R29 GSG

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Median RTS (range)	7.55 (0.58–7.84)	6.90 (0.00–7.84)	$P = 0.21$
Median GCS (range)	14 (3–15)	13 (3–15)	$P = 0.05$
Median ISS (range)	18 (10–66)	25 (10–59)	$P = 0.05$
Outcomes by TRISS methodology			
Predicted to die and died	16	5	
Predicted to die and lived	4	9	
Predicted to live and died	11	5	
Predicted deaths	23	16	
Observed deaths	27	10	

Garner, A et al. Aust NZ J Surg 1999;69:697-701

London HEMS effect on survival after trauma

- 2 year period
- All missions attended by HEMS
- 20 primary receiving hospitals within London
- Compared to paramedic care during daylight hours
- Excluded death at scene if no intervention
- Sample stratified to increase power (include only 1 in 3 from Royal London)

Nicholl JP et al. *BMJ* 1995;**311**

Demographics

	HEMS (n=337)	Paramedics (n=466)
RTC	159 (47.5%)	253 (54.3%)
Fall	62 (18.5%)	64 (13.7%)
Male	242 (71.8%)	334 (71.7%)
0-64yr	277 (82.6%)	380 (82.2%)
=/>65yr	58 (17.4%)	82 (17.8%)
Major trauma (ISS>15)	140 (42.7%)	131 (28.4%)
Severe Injury (ISS≥25)	83 (26.9%)	51 (16.6%)
GCS ≤9	103 (32.5%)	65 (18.6%)

Nicholl JP et al, BMJ 1995;311

Outcome

Mortality

- 92/337 (27.3%) in HEMS
- 77/466 (16.5%) in Paramedic
- With ISS≥ 16 there was little difference
- Severe head injury similar outcome
- More minor injuries suggested a poorer outcome (but unscored compounding)

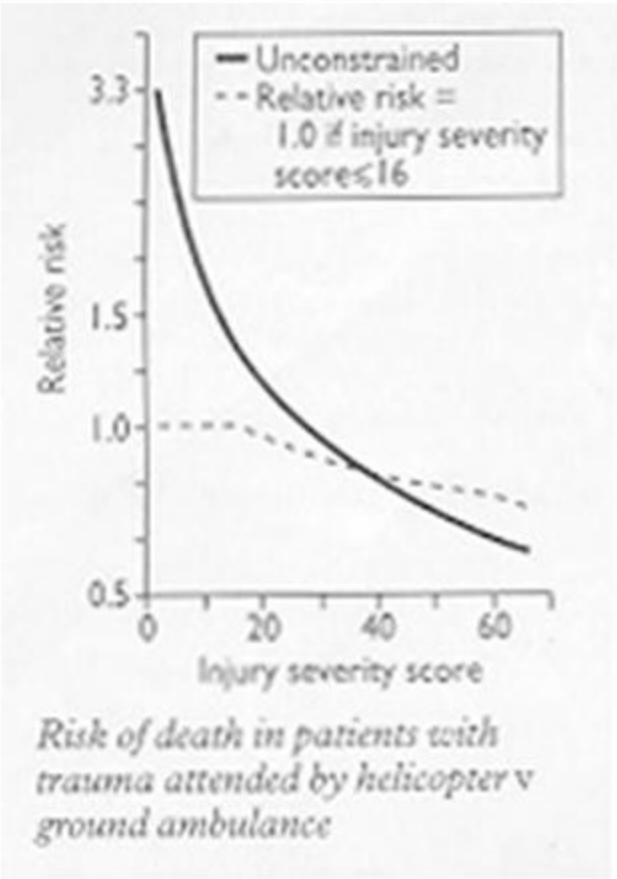
Nicholl JP et al, BMJ 1995;311

Outcome

Multivariate analysis

- 17.2% more in helicopter group
- 0.5% in ambulance cohort

- Arrival at hospital 10-20min later
- 6 min on scene



Risk of death in patients with trauma attended by helicopter v ground ambulance

Nicholl JP et al, BMJ 1995;311

Swiss Model

- 6 year observational cohort study of one trauma centre in eastern Switzerland
- Lack of protocol
- Helicopter or road based with EP deployed with severe injuries
- Compared with EMT +/- Paramedic +/- anaesthetic nurse
- ASCOT score to compare observed and predicted mortality

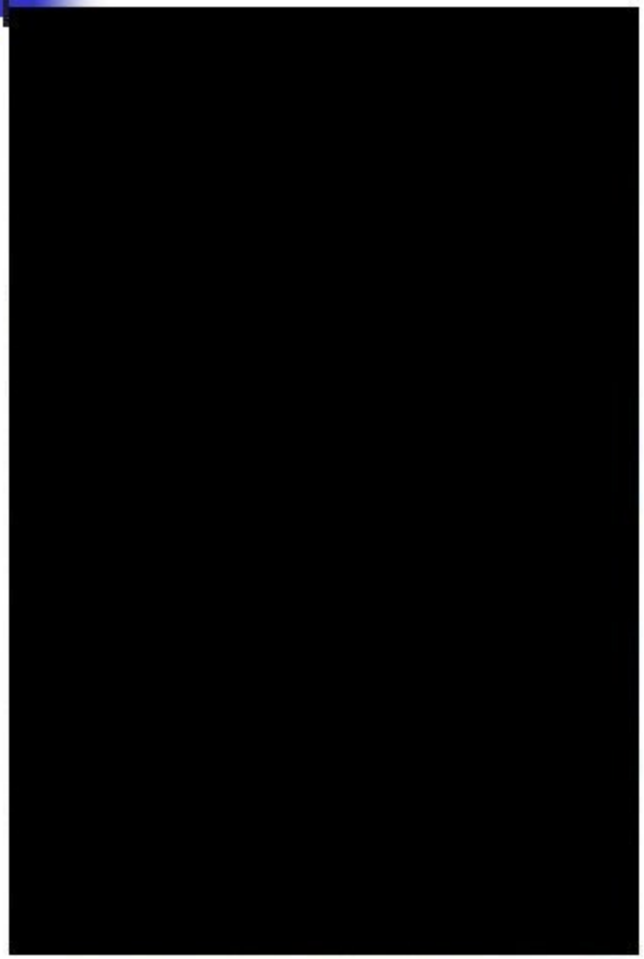
Osterwalder JJ. *J Trauma* 2003;**55**:355-361

Table 2 Comparison of Actual and Predicted Mortality

Deaths	Without Emergency Physician (n • 71)			With Emergency Physician (n • 196)		
	No.	p Value[1]	Mortality (%)	No.	p Value[1]	Mortality (%)
Actual	10	0.066	10/71 (14.1)	22	0.734	22/196 (11.2)
Predicted	6.6			23.3		
(95 CI)	(3–10.2)		6.6/71 (9.3)	(16.1–30.5)		23.3/196 (11.9)

Osterwalder JJ. *J Trauma* 2003;**55**:355-361

Italian Model



- 1 year trauma registry from northeastern Italy
- EMS – Nurse-led supported by BLS
- HEMS – Anaesthetist and 2 nurses
  - Target Syst BP 90 or 110
- Severe head injury (AIS >3) with major trauma
- Included Daylight hours and rural setting
- Outside protocol, tasked elsewhere
- Physician-led ground ambulance excluded

Bartolomeo SD et al. *Arch Surg* 2001;**136**:1293-1300

Outcome

Overall Mortality

- 28/92 (30%) in HEMS
- 22/92 (24%) in EMS
- OR 1.39 (0.72 to 2.67)

Table 3. Outcome of Patients and Comparison After Exclusion of Falls as Mechanism of Injury*

	Group A (n = 74)	Group B (n = 88)	95% CI of the Difference Between Groups
Trauma deaths, No. (%)	23 (31)	20 (23)	0.76 to 3.09 (OR, 1.533)
GOS, mean (median)	4.1 (5)†	4.0 (5)‡	0.0 to 0.0§

- No difference for subgroups age, ISS, GCS or hypotensive on scene

Bartolomeo SD et al. *Arch Surg* 2001;**136**:1293-1300


YAESU

Finnish model

- Medic dispatched with probable severe compromise
- Either helicopter or car (Anaesthetist)
- 2 year period compared with historical controls
- In addition looked at ISS $\geq$ 27

Iirola TT et al. *Eur J Emerg Med* 2006;**13**:335-9

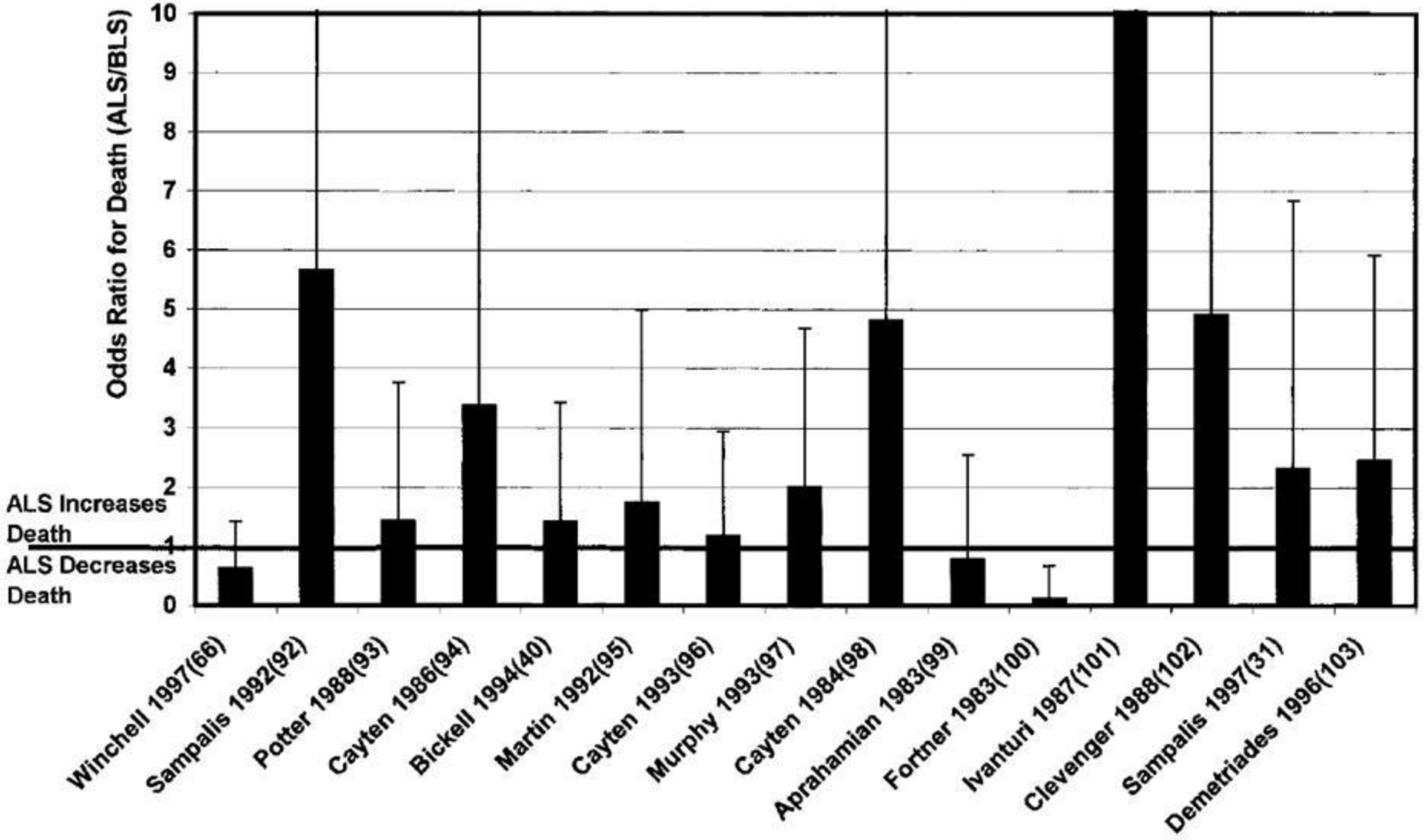
	HEMS	Control
All		
Patients	81	77
Died	25 (31)	14 (18)
In the emergency department	11	0
In the OR or ICU	10	10
Later	4	4
ISS r 26		
Patients	37	35
Died	3 (8)	1 (3)
In the emergency department	1	0
In the OR or ICU	2	1
Later	0	0
ISS > 26		
Patients	44	42
Died	22 (50)	13 (31)
In the emergency department	10	0
In the OR or ICU	8	9
Later	4	4

Iirola TT et al. *Eur J Emerg Med* 2006;**13**:335-9

Meta-analysis of ALS in trauma

- We KNOW it works!!?
- ALS principles in prehospital care established
- Very heterogeneous
- Average amounts of fluid administered are small
- Endotracheal intubation
- Various medication administered

Libermann et al. *J Trauma* 2000;**49**:584-599



Libermann et al. *J Trauma* 2000;**49**:584-599

Issues

- Randomised trial
  - Unethical
  - Resource and infrastructure
- Cohort studies to compare often use different centres and systems
- Role of Trauma Facility in mortality

International Comparison

- 5 countries with ALS
- 4 countries with Doc-ALS

Included

- 15-55yr
- ISS>15
- Direct transport to trauma centre

- Demographics
- ISS, GCS, Syst BP
- Times and interventions

Outcome

- ED Shock rate (<90mmHg)
- Early fatality (during the first 24hr)

Roudsari et al. *Injury* 2007;**38**:993-1000

Outcome

- Demographics similar
  - Shock at scene 17%-27%
  - ISS 24-32

Table 3 Adjusted[a] odds ratios of ED shock and early trauma fatality rate, comparing Doc-ALS with ALS EMS system (baseline group) for different levels of injury severity and SBP at scene and at ED

	OR of ED shock[b]		OR of early trauma fatality[a]	
	ISS > 15	ISS > 25	ISS > 15	ISS > 25
All patients, regardless of their SBP at scene or at ED	1.18 (0.73–1.92)	1.00 (0.72–1.39)	0.70 (0.54–0.91)	0.57 (0.42–0.77)
Patients with detectable SBP at scene	1.09 (0.82–1.43)	1.00 (0.71–1.41)	0.64 (0.49–0.85)	0.55 (0.40–0.75)
Patients with detectable SBP at ED	1.03 (0.76–1.46)	1.00 (0.68–1.45)	0.61 (0.46–0.80)	0.53 (0.39–0.73)

[a] Adjusted for age, sex, type and mechanism of injury, injury severity score and SBP at scene.
[b] Comparing Doc-ALS EMS system to ALS (reference group).

Roudsari et al. *Injury* 2007;**38**:993-1000

Conclusion

- Evolution of prehospital care
- Balance of evidence
- Difficulty of good structured studies
- Comparitive studies
- Extract elements from cohort studies

Introduction

- Evolution of Prehospital care
- Emotive Issues
- Experience in different centres
  - Head Injury
  - Polytrauma
- Comparison with ALS studies
- International comparison


REWS AMBULANCE ASSOCIATION
THE ARMITAGE WAGGON.

- Advanced prehospital care origins in mobile CCU

- 4 Patterns seen:
  - No organised system
  - Basic Life Support
  - Advanced Life Support
  - Physician-led

Skills include.....

- Extensive training
- Understanding of physiology/pathophysiology
- Practical skills
  - Advanced Airway Care
  - Chest Thoracocentesis
- Drugs and equipment
- Critical Decision Making skills rather than SOP
- Communication skills
- Understand local centres
- Increased number of personnel