Maurizio Menarini

TRAUMA ED ELISOCCORSO

ABBIAMO EVIDENZA PER EFFICACIA ED EFFICIENZA?

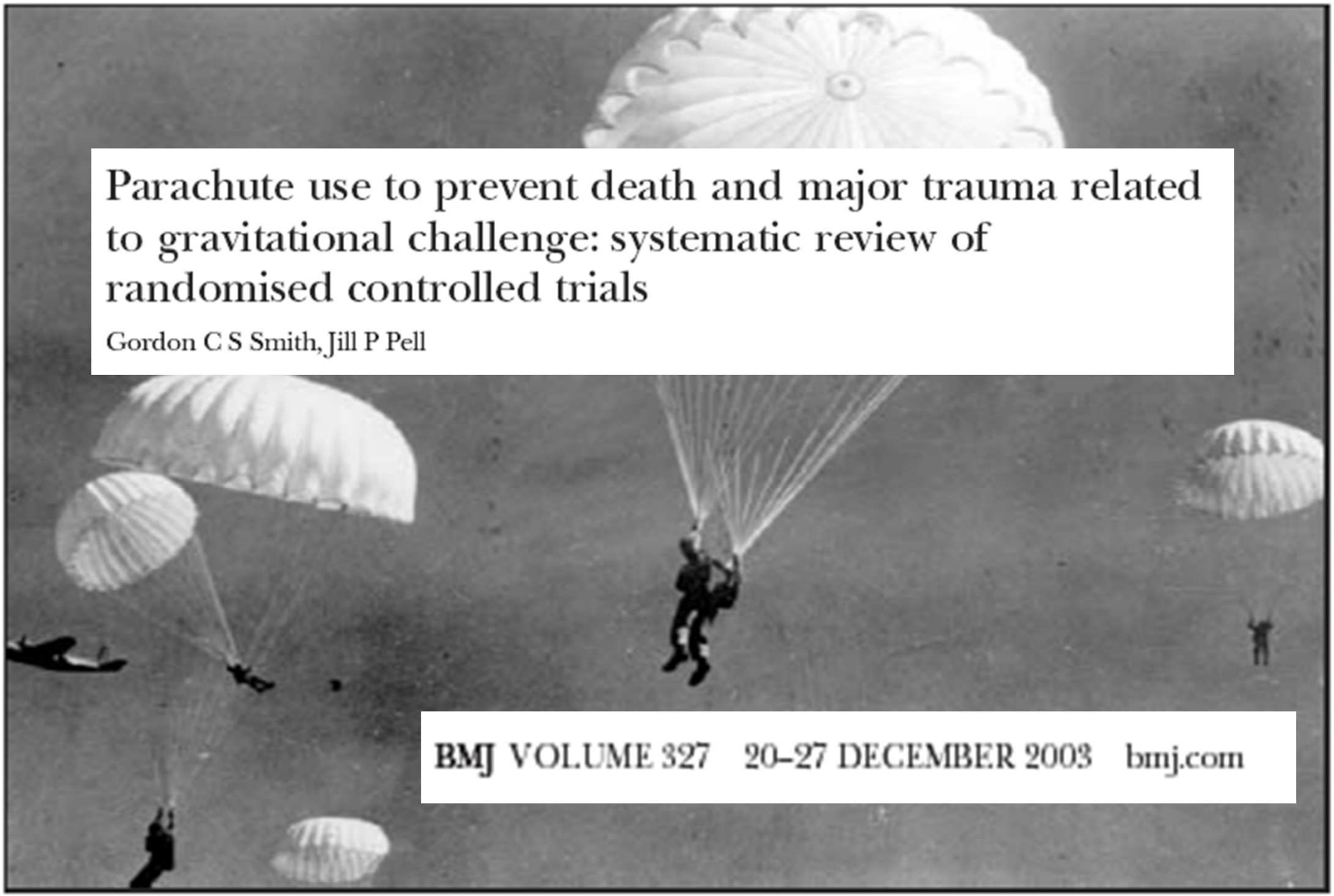
Modena, 23 novembre 2012

IF YOU'RE WOUNDED IN ACTION IN IRAQ OR AFGHANISTAN, YOU HAVE A MORE THAN 90 PERCENT CHANCE OF COMING HOME WITH A HEARTBEAT. THAT'S THE BEST SURVIVAL RATE IN THE HISTORY OF WAR: UP FROM 76 PERCENT IN VIETNAM, 70 PERCENT IN WORLD WAR II, AND DON'T-EVEN-ASK-BECAUSE-YOU'RE-DEAD BEFORE THAT. THIS NEW CALCULUS IS ONE OF THE ONLY CONSISTENT BRIGHT SPOTS TO COME OUT OF A DECADE OF BLOODSHED, THE RESULT OF A SYSTEM THAT FERRIES SOLDIERS FROM WHEREVER THEY FALL TO A FIELD SURGEON, USUALLY IN LESS THAN AN HOUR, AND HOME FOR EVEN MORE SPECIALIZED TREATMENT, OFTEN WITHIN A WEEK. BUT IT ALL DEPENDS ON THAT FIRST RESPONSE, THE HELICOPTER RIDE NEARLY EVERY WOUNDED WARRIOR HAS IN COMMON.

L’elicottero è sicuramente fotogenico

Ma è anche efficace?

Further randomized studies are necessary!



Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials

evidence that there are *some* data upon which to base determinations as to how to appropriately use HEMS. The argument that "there's no evidence" can no longer be accepted as a basis for failure to establish guidelines for utilization of the HEMS resource.

Pre-hospital airway management: guidelines from a task force from the Scandinavian Society for Anaesthesiology and Intensive Care Medicine

Acta Anaesthesiol Scand 2008; 52: 897–907

P. Berlac[1], P. K. Hyldmo[2], P. Kongstad[3], J. Kurola[4], A. R. Nakstad[5] and M. Sandberg[6]
[1]*Copenhagen Mobile Intensive Care Unit, Rigshospitalet, Capital Region of Denmark, Copenhagen, Denmark,* [2]*Division of Anaesthesia and Emergency Medicine, Sørlandet Hospital, Kristiansand, Norway,* [3]*Department of Prehospital Care and Disaster Medicine in Region of Skåne, Sweden,* [4]*Department of Anaesthesiology and Intensive Care, Kuopio University Hospital, Kuopio, Finland,* [5]*Department of Anaesthesiology, Ullevål University Hospital, Oslo, Norway and* [6]*The Air Ambulance Department, Ullevål University Hospital, Lørenskog, Norway*

operating theatre. But can the results – and evidence level – from such laboratory studies be used to develop recommendations about pre-hospital airway management? Yes, they can for lack of better studies performed in the pre-hospital setting, but subjective judgment must be applied by the group developing the recommendations. The grades of recommendations presented in this paper will be on D level because the evidence is extrapolated and the majority of the studies have not been performed under realistic, pre-hospital conditions.

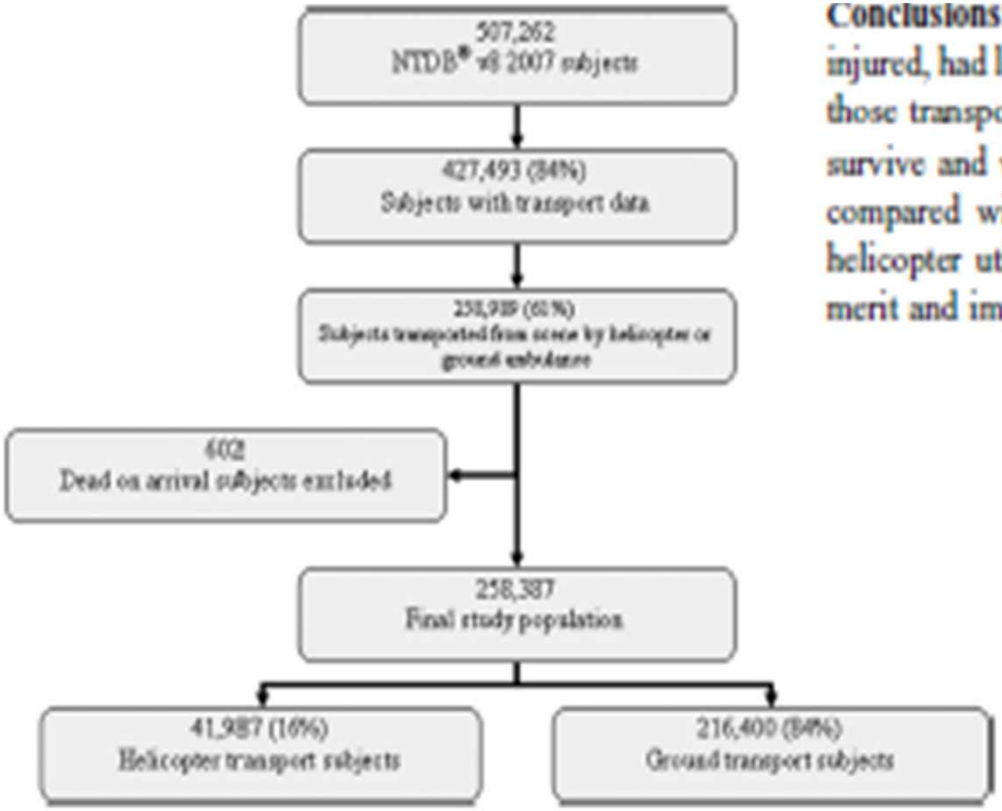
Table 2. HEMS Mortality Outcomes Study Designs.

Study Type	Sample Methodology	Advantages	Disadvantages
Panel Review	Use of Delphi technique to achieve a consensus conclusion about HEMS benefits in a given set of patients	• Ease of completion • Enables outcomes assessment to take into account intangibles or difficult-to-quantify issues • Maximal ability to attribute putative outcome improvements to specific HEMS actions (eg, intubation)	Subject to bias inherent to retrospective analysis of effects of transport on outcome
Cohort	Use of categorical methods or logistic regression to assess outcomes in patients stratified by RTS and/or ISS, while accounting for factors such as injury mechanism and demographics	• Straightforward, "air vs ground" testing • For classical methodology (eg, Mantel-Haenszel), an intuitively clear approach • For logistic regression, flexibility and power for multivariate assessment	Large *n* required for robust results, due to relatively uncommon occurrence of HEMS mortality benefit
TRISS	Use of "3-step" approach: 1. Compare HEMS patients' actual to TRISS-predicted mortality, 2. Compare ground patients' actual to TRISS-predicted mortality, 3. Test H_o: actual-vs-predicted mortality differences similar between the air and ground cohorts	• Optimizes use of a population-based, robust mortality assessment method *given certain assumptions* • Reduces confounding through inclusion of both air and ground cohorts (ie, receiving care at the same center) for comparison of study groups' vs TRISS-predicted mortality	"Black-box" nonintuitive methodology built on imperfect acuity scales and frequently misapplied (eg, through lack of employing standardized W statistic when M is too low — see text for explanation)
Natural Experiment	Employment of "before-and-after" comparison of patient outcomes in a region losing HEMS availability	• Theoretically approximates design of a controlled trial • Provides large–area-based, intuitive assessment of HEMS effects	Substantial potential for selection bias (ie, the "after" study must include outcomes assessment in all patients who would have been flown during the "before" period)

Helicopters and the Civilian Trauma System: National Utilization Patterns Demonstrate Improved Outcomes After Traumatic Injury

Joshua B. Brown, BA, Nicole A. Stassen, MD, Paul E. Bankey, MD, PhD, Ayodele T. Sangosanya, MD, Julius D. Cheng, MD, and Mark L. Gestring, MD

(*J Trauma.* 2010;69: 1030–1036)



Conclusions: Trauma patients transported by helicopter were more severely injured, had longer transport times, and required more hospital resources than those transported by ground. Despite this, HT patients were more likely to survive and were more likely to be discharged home after treatment when compared with those transported by ground. Despite concerns regarding helicopter utilization in the civilian setting, this study shows that HT has merit and impacts outcome.

Outcomes of Blunt Trauma Victims Transported by HEMS from Rural and Urban Scenes

Christy L. McCowan, MD, MPH, FACEP, Eric R. Swanson, MD, FACEP, Frank Thomas, MD, MBA, Diana L. Handrahan, BS

PREHOSPITAL EMERGENCY CARE 2007;11:383–388

groups ($p = 0.074$). **Conclusions.** Despite longer flight and scene times for rural patients, adjusted in-hospital mortality rates were similar for patients transported from urban and rural scenes. Factors prior to HEMS arrival may contribute to increased mortality rates of rural blunt trauma victims documented nationally. **Key words:** out-of-hospital transport; air medical transport; blunt trauma; outcomes.

Air Medical Response to Traumatic Brain Injury: A Computer Learning Algorithm Analysis

Daniel P. Davis, MD, FACEP, Jeremy Peay, MD, Benjamin Good, MS, Michael J. Sise, MD, Frank Kennedy, MD, A. Brent Eastman, MD, Thomas Velky, MD, and David B. Hoyt, MD

Background: The role of air medicine in traumatic brain injury (TBI) has been studied extensively using trauma registries but remains unclear. Learning algorithms, such as artificial neural networks (ANN), support vector machines (SVM), and decision trees, can identify relationships between data set variables but are not empirically useful for hypothesis testing.

Objective: To use ANN, SVM, and decision trees to explore the role of air medicine in TBI.

Methods: Patients with Head Abbreviated Injury Score 3+ were identified from our county trauma registry. Predictive models were generated using ANN, SVM, and decision trees. The three best-performing ANN models were used to calculate differential survival values (actual and predicted outcome) for each patient. In addition, predicted survival values with transport mode artificially input as "air" or "ground" were calculated for each patient to identify those who benefit from air transport. For SVM analysis, χ^2 was used to compare the ratio of unexpected survivors to unexpected deaths for air- and ground-transported patients. Finally, decision tree analysis was used to explore the indications for various transport modes in optimized survival algorithms.

Results: A total of 11,961 patients were included. All three learning algorithms predicted a survival benefit with air transport across all patients, especially those with higher Head Abbreviated Injury Score or Injury Severity Score values, lower Glasgow Coma Scale scores, or hypotension.

Conclusion: Air medical response in TBI seems to confer a survival advantage, especially in more critically injured patients.

Key Words: Artificial neural network, Support vector machine, Decision tree, Learning algorithms, Air medical, Helicopter, Traumatic brain injury.

J Trauma. 2008;64:889–897.

Academic Emergency Medicine
Official Journal of the Society for Academic Emergency Medicine

RESEARCH METHODS AND STATISTICS

Association of Direct Helicopter Versus Ground Transport and In-hospital Mortality in Trauma Patients: A Propensity Score Analysis

Kenneth E. Stewart, PhD, Linda D. Cowan, PhD, David M. Thompson, PhD, John C. Sacra, MD, and Roxie Albrecht, MD

Conclusions: Helicopter EMS transport was associated with a decreased hazard of mortality among certain patients transported from the scene of injury directly to definitive care. Refinements in scene triage and transport guidelines are needed to more effectively select patients that may benefit from HEMS transport from those unlikely to benefit.

ACADEMIC EMERGENCY MEDICINE 2011; 18:1208–1216

Efficacia dell'elisoccorso:

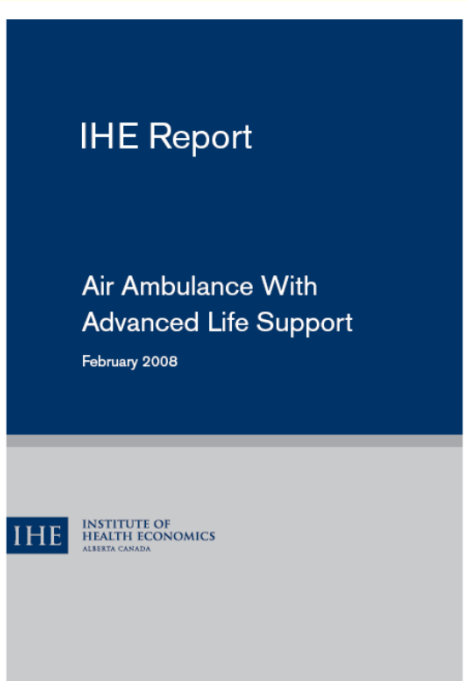
una questione di

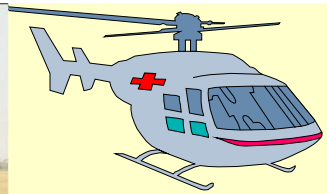
Organizzazione del sistema?

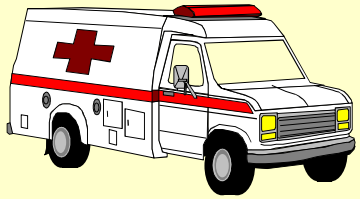
Qualità di intervento?

Tempi?

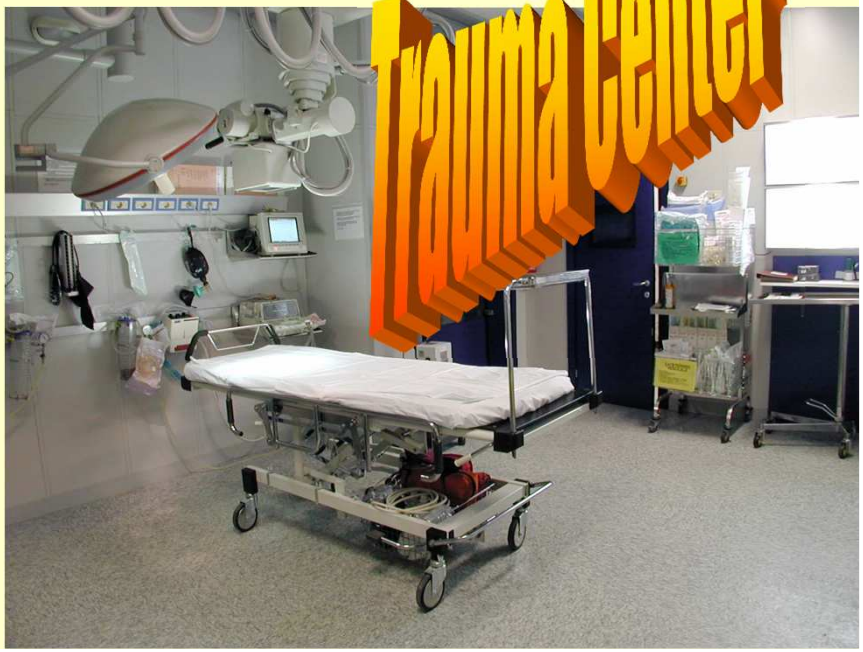
Costi?







Continuity of care



We need to assure the quality of prehospital emergency care.

We need to assure the quality of airway management, not only the success of a single manoeuvre.

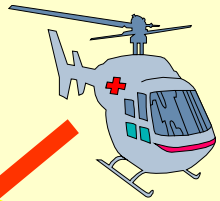
The Journal of TRAUMA® Injury, Infection, and Critical Care

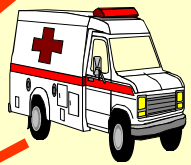
Helicopter Emergency Medical Services (HEMS): Impact on On-Scene Times

Akkie N. Ringburg, MD, Willem R. Spanjersberg, MSc, Sander P. G. Frankema, MD, Ewout W. Steyerberg, PhD, Peter Patka, MD, PhD, and Inger B. Schipper, MD, PhD

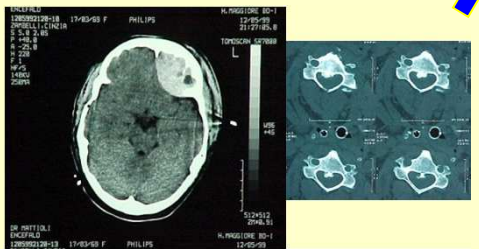
J Trauma. 2007;63:258–262.

Allertamento precoce Trauma team

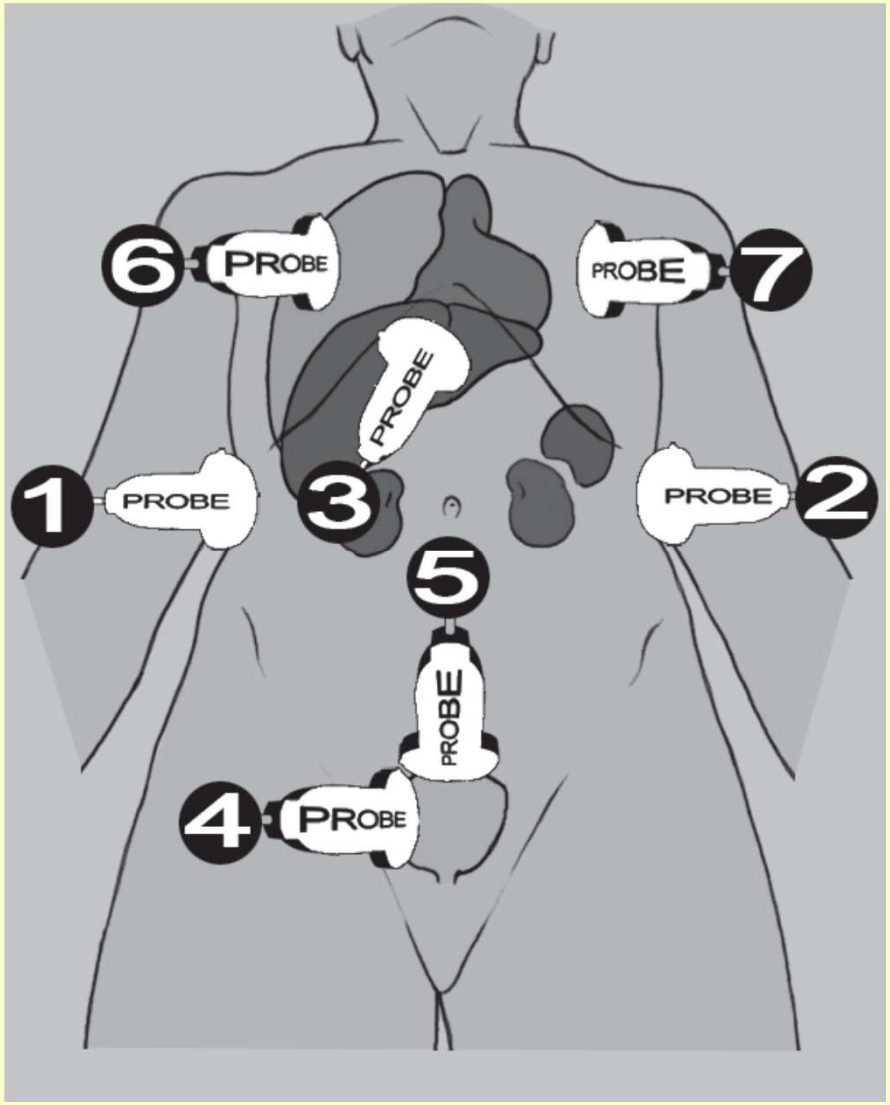




RIA



Prehospital Ultrasound



Pazienti tempo-dipendenti

- **Indicazioni:**
  - Traumi addominali chiusi instabili con FAST +
  - Traumi penetranti tronco instabili
  - Traumi penetranti con indicazione chirurgica
  - Traumi toracici chiusi in peri/arresto cardiaco

Case report

- **Allarme: 14.14**
- **Atterraggio: 14 25**
- **Decollo: 14.39**
- **Atterraggio piazzola: 14.49**

- OR: 14.59

M 70aa

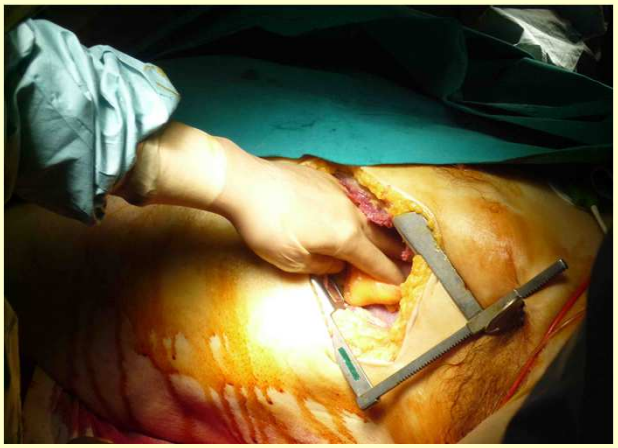
Trauma penetrante da arma d.fuoco addome con eviscerazione

14’

Time on scene

10’

Arrivo in H -> Sala Operatoria



Review

A systematic review of the costs and benefits of helicopter emergency medical services☆

Colman B. Taylor [a,*], Mark Stevenson [a,b], Stephen Jan [a,b], Paul M. Middleton [d], Michael Fitzharris [e,f], John A. Myburgh [a,c]

[a] The George Institute for International Health, Sydney, NSW, Australia
[b] University of Sydney, Sydney Medical School, Sydney, NSW, Australia
[c] University of New South Wales, Faculty of Medicine, Sydney, NSW, Australia
[d] Ambulance Research Institute, Ambulance Service of NSW, Sydney, NSW, Australia
[e] Accident Research Centre, Monash South Africa, Johannesburg, South Africa
[f] Accident Research Centre, Monash University, Melbourne, Australia

Injury, Int. J. Care Injured 41 (2010) 10–20

Interpretation: The cost and effectiveness of HEMS varied considerably between studies. Despite generally being more expensive than ground transport, a number of studies found HEMS to be cost-effective. However, given the variation in the intervention design, context and study methods between studies it was not possible to assess the cost–effectiveness of HEMS in general. Given the variation inherent in the health systems in which HEMS operate, synthesis and extrapolation of study findings across differing health environments is difficult. To address economic and clinical evidence in relation to HEMS, future research that is tailored to account for local system factors is required.

CONCLUSIONI

Helicopter emergency medical services for adults with major trauma (Protocol)

Galvagno S, Thomas S, Baker S, Swedler D, Stephens C, Floccare D, Pronovost P, Haut E

THE COCHRANE COLLABORATION®

To determine if helicopter emergency medical services (EMS) transport, compared to ground EMS transport, is associated with improved morbidity and mortality for adults with major trauma.

CONCLUSIONI

- **Evidenze su miglioramento outcome pazienti soccorsi e centralizzati direttamente da elisoccorso a trauma center**
- **Metodologia di studio**
- **Survey su qualità interventi preH**
- **Raccolta dati sistematica e multicentrica**
- **Analisi del sistema ed effetto delle variazioni di protocolli e procedure**

Evaluation by CO 118

Dispatch

team BLS

Does the benefit of on scene intervention outweigh the disadvantage of delayed arrival in hospital? …are difficult to quantify scientifically

Lockey, 2001 Resuscitation