NORSK LUFTAMBULANSE

Air Ambulance Services
- do they really make any difference?

Hans Morten Lossius MD PhD
Norwegian Air Ambulance

Cool guys

NORSK LUFTAMBULANSE

Cool guys

NORSK LUFTAMBULANSE

Cool guys

Fancy tools

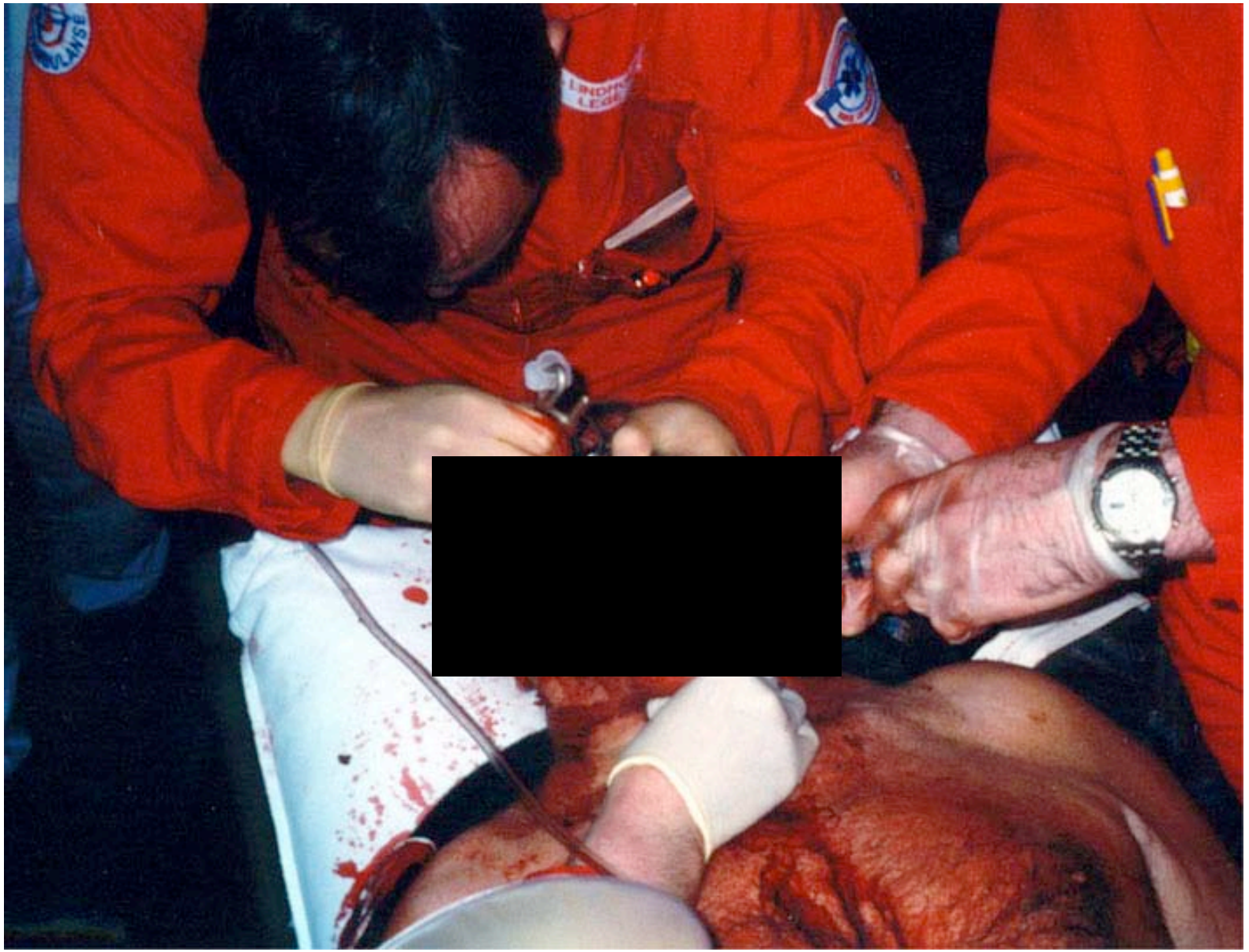
NORSK LUFTAMBULANSE

Cool guys

Fancy tools

NORSK LUFTAMBULANSE

But also more?



NORSK LUFTAMBULANSE

Agenda

- Define the topic
- The patients view
- Evidence
- AAS assessment and check list
- AAS desicion list
- Take home message

NORSK LUFTAMBULANSE

First of all

NORSK LUFTAMBULANSE

First of all

Define the topic

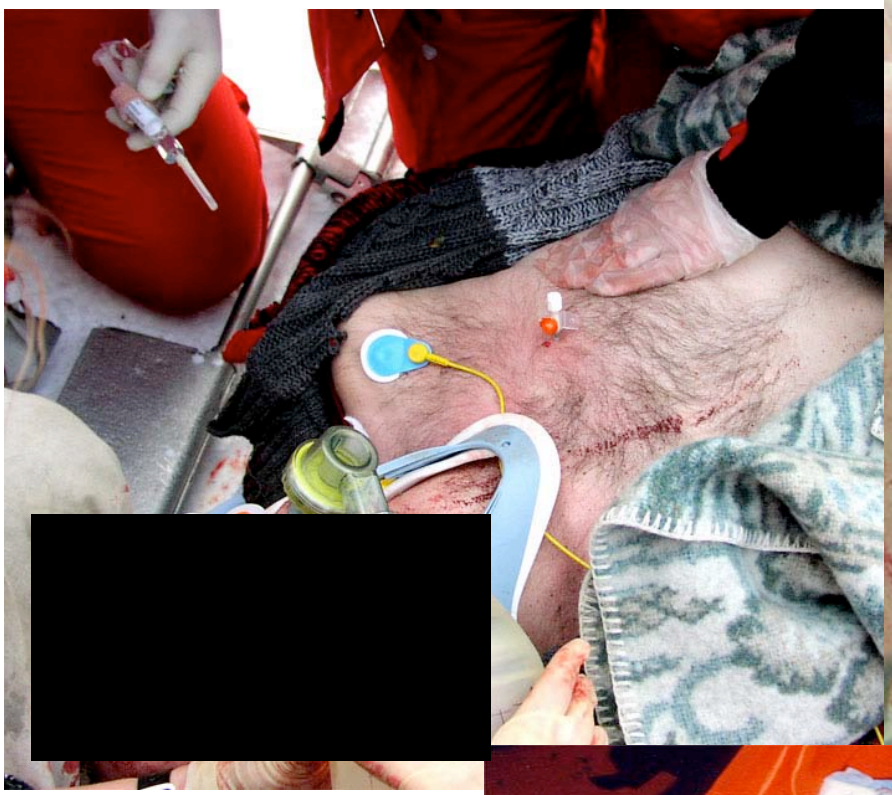
NORSK LUFTAMBULANSE

Air Ambulance Services

NORSK LUFTAMBULANSE

Air Ambulance Services

Air Ambulance Services



NORSK LUFTAMBULANSE

Air Ambulance Services

NORSK LUFTAMBULANSE

Air Ambulance Services

Physician

with advanced skills

NORSK LUFTAMBULANSE

Air Ambulance Services

Physician

Paramedic

with a substantial understanding of the basics

NORSK LUFTAMBULANSE

Air Ambulance Services

Physician

Paramedic

Nurse

for complete comfort

NORSK LUFTAMBULANSE

Air Ambulance Services

Show off??

NORSK LUFTAMBULANSE

Air Ambulance Services =

NORSK LUFTAMBULANSE

Air Ambulance Services =

Air Ambulance + Advanced Life Support =

NORSK LUFTAMBULANSE

Air Ambulance Services =

Air Ambulance + Advanced Life Support =

Rapid Transportation + Advanced Life Support =

NORSK LUFTAMBULANSE

Air Ambulance Services =

Air Ambulance + Advanced Life Support =

Rapid Transportation + Advanced Life Support =

Rapid transportation of medical personel or patient or both + advanced life support =

NORSK LUFTAMBULANSE

Air Ambulance Services =

Air Ambulance + Advanced Life Support =

Rapid Transportation + Advanced Life Support =

Rapid transportation of medical personel or patient or both + advanced life support =

Rapid transportation of medical personel or patient or both + advanced medicine

NORSK LUFTAMBULANSE

What is the purpose?
- the patient’s view

NORSK LUFTAMBULANSE

The patient has got the same needs for medical interventions

NORSK LUFTAMBULANSE

The patient has got the same needs for medical interventions

..on scene

NORSK LUFTAMBULANSE

The patient has got the same needs for medical interventions

..on scene

.....and in the ED

NORSK LUFTAMBULANSE

Are there any differences in what we *can* or *should* deliver?

- what are they?

- and how shall we deal with them?

NORSK LUFTAMBULANSE

Mortality - time to advanced ABC

Morbidity - time to decisive diagnostics and interventions

NORSK LUFTAMBULANSE

Advanced ABC

Major trauma
Cardiac crises
Respiratory crises

NORSK LUFTAMBULANSE

Advanced ABC

Major trauma
Cardiac crises
Respiratory crises

Airways
- RSI with ETI
- Surgical airway
- ....?

Breathing
- Controlled ventilation
- Thoracic drainage
- ....?

Circulation
- Volume therapy
- Thoracotomy
- ....?

NORSK LUFTAMBULANSE

Advanced ABC

Major trauma
Cardiac crises
Respiratory crisis

When is *rapid transport to* A or B or C the right thing to do?

NORSK LUFTAMBULANSE

Advanced ABC

Major trauma
Cardiac crises
Respiratory crisis

When is *rapid transport to* A or B or C the right thing to do?

.....and what are the time limits??

NORSK LUFTAMBULANSE

Time to decisive diagnostics and interventions

Trauma
Cardiac deseases
Respiratory deseases
Infectios deseases

NORSK LUFTAMBULANSE

Time to decisive diagnostics and interventions

Trauma
Cardiac deseases
Respiratory deseases
Infectios deseases

1. What can/should be done on scene or during transport
2. Rapid TRIAGE and transport

NORSK LUFTAMBULANSE

Time to decisive diagnostics and interventions

Trauma
Cardiac deseases
Respiratory deseases
Infectios deseases

PCI

Antibiotics

Stabilisation

Ultrasound

Interventional angiografi

Volume therapy

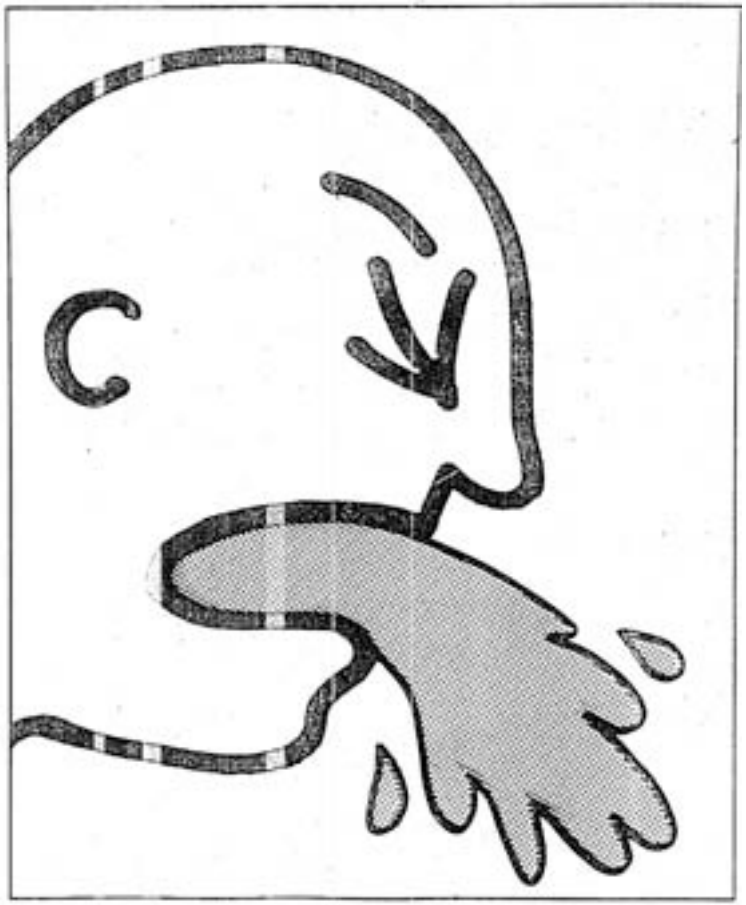
Neurosurgery

NORSK LUFTAMBULANSE

Evidence

NORSK LUFTAMBULANSE

Proving the effect of pre-hospital ALS
- the old discussion.....



NORSK LUFTAMBULANSE

- Bickell Immediate versus delayed for hypotensive patients with penetrating torso injuries. N Eng J Med 1994
- Gausche M Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome. JAMA 2000
- Liberman M Advanced or basic life support for trauma: meta-analysis and critical review of the literature. J Trauma 2000.

NORSK LUFTAMBULANSE

- Bickell Immediate versus delayed for hypotensive patients with penetrating torso injuries. N Eng J Med 1994
- Gausche M Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome. JAMA 2000
- Liberman M Advanced or basic life support for trauma: meta-analysis and critical review of the literature. J Trauma 2000.

NORSK LUFTAMBULANSE

Gausche M, JAMA 2000

Objective:

To compare the survival and neurological outcome of pediatric patients treated with bag-valve-mask ventilation (BVM) with those patients treated with BVM followed by endotracheal intubation.

NORSK LUFTAMBULANSE

Gausche M, JAMA 2000

- Paramedics
- Children < 13 yr
- *Compare BVM ventilation to ETI*
- OBS ETI without anaesthesia

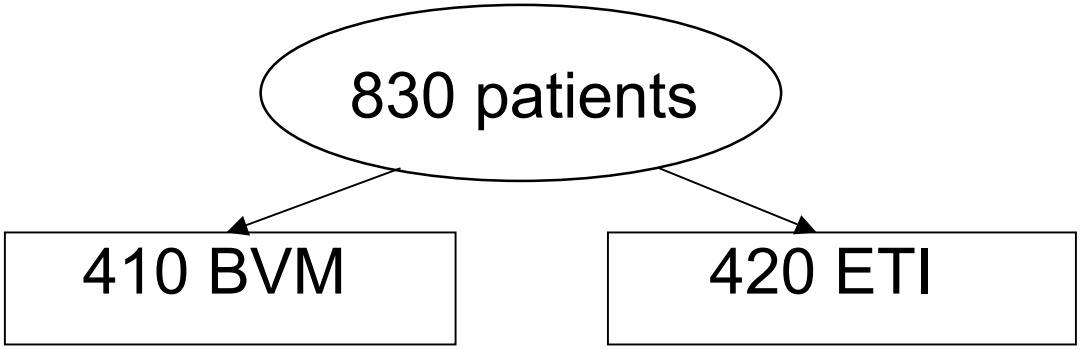
NORSK LUFTAMBULANSE

Gausche M, JAMA 2000

- Randomised by day
- ”Intention to treat”

NORSK LUFTAMBULANSE

Gausche M, JAMA 2000



NORSK LUFTAMBULANSE

Gausche M, JAMA 2000

BVM group:

- 391 BVM
- 9 BVM after ETI attempt (protocol violation)
- 10 ETI (protocol violation)

NORSK LUFTAMBULANSE

Gausche M, JAMA 2000

BVM group:

- 391 BVM
- 9 BVM after ETI attempt (protocol violation)
- 10 ETI (protocol violation)

ETI group:

- 115 BVM
- 128 BVM after ETI attempt
- 177 ETI

NORSK LUFTAMBULANSE

Gausche M, JAMA 2000

- No difference in mortality between the BVM and the ETI group (30% vs 26%)
- No difference in number of patients with ”good neurological outcome” between the groups

NORSK LUFTAMBULANSE

Gausche M, JAMA 2000

Objective:

To compare the survival and neurological outcome of pediatric patients treated with bag-valve-mask ventilation (BVM) with those patients treated with BVM followed by endotracheal intubation.

Conclusions:
These results indicate that the addition of out-of-hospital ETI to a paramedic scope of practice that already includes BVM did not improve survival or neurological outcome of pediatric patients treated in an urban EMS system

Gausche M, JAMA 2000

BVM group:

- 391 BVM
- 9 BVM after ETI attempt (protocol violation)
- 10 ETI (protocol violation)

Confounding factors???

ETI group:

- 115 BVM
- 128 BVM after ETI attempt
- 177 ETI

NORSK LUFTAMBULANSE

-Evidence of lack of effect

NORSK LUFTAMBULANSE

-Evidence of lack of effect

-Lack of evidence of effect

NORSK LUFTAMBULANSE

-Evidence of lack of effect

≠

-Lack of evidence of effect

NORSK LUFTAMBULANSE

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

Gordon C S Smith, Jill P Pell

Abstract

Objectives To determine whether parachutes are effective in preventing major trauma related to gravitational challenge.
Design Systematic review of randomised controlled trials.
Data sources: Medline, Web of Science, Embase, and the Cochrane Library databases; appropriate internet sites and citation lists.
Study selection: Studies showing the effects of using a parachute during free fall.
Main outcome measure Death or major trauma, defined as an injury severity score >15.
Results We were unable to identify any randomised controlled trials of parachute intervention.
Conclusions As with many interventions intended to prevent ill health, the effectiveness of parachutes has not been subjected to rigorous evaluation by using randomised controlled trials. Advocates of evidence based medicine have criticised the adoption of interventions evaluated by using only observational data. We think that everyone might benefit if the most radical protagonists of evidence based medicine organised and participated in a double blind, randomised, placebo controlled, crossover trial of the parachute.

Introduction

The parachute is used in recreational, voluntary sector, and military settings to reduce the risk of orthopaedic, head, and soft tissue injury after gravitational challenge, typically in the context of jumping from an aircraft. The perception that parachutes are a successful intervention is based largely on anecdotal evidence. Observational data have shown that their use is associated with morbidity and mortality, due to both failure of the intervention[1 2] and iatrogenic complications.[3] In addition, "natural history" studies of free fall indicate that failure to take or deploy a parachute does not inevitably result in an adverse outcome.[4] We therefore undertook a systematic review of randomised controlled trials of parachutes.

Methods

Literature search

We conducted the review in accordance with the QUOROM (quality of reporting of meta-analyses) guidelines.[5] We searched for randomised controlled trials of parachute use on Medline, Web of Science, Embase, the Cochrane Library, appropriate internet sites, and citation lists. Search words employed were "parachute" and "trial." We imposed no language restriction and included any studies that entailed jumping from a height greater than 100 metres. The accepted intervention was a fabric device, secured by strings to a harness worn by the participant and released (either automatically or manually) during free fall with the purpose of limiting the rate of descent. We excluded studies that had no control group.

Definition of outcomes

The major outcomes studied were death or major trauma, defined as an injury severity score greater than 15.[6]

Meta-analysis

Our statistical apprach was to assess outcomes in parachute and control groups by odds ratios and quantified the precision of estimates by 95% confidence intervals. We chose the Mantel-Haenszel test to assess heterogeneity, and sensitivity and subgroup analyses and fixed effects weighted regression techniques to explore causes of heterogeneity. We selected a funnel plot to assess publication bias visually and Egger's and Begg's tests to test it quantitatively. Stata software, version 7.0, was the tool for all statistical analyses.

Results

Our search strategy did not find any randomised controlled trials of the parachute.

Discussion

Evidence based pride and observational prejudice

It is a truth universally acknowledged that a medical intervention justified by observational data must be in want of verification through a randomised controlled

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

Department of Obstetrics and Gynaecology, Cambridge University, Cambridge CB2 2QQ
Gordon C S Smith *professor*
Department of Public Health, Greater Glasgow NHS Board, Glasgow G3 8YU
Jill P Pell *consultant*
Correspondence to: G C S Smith gcs21@cam.ac.uk

BMJ 2003;327:1459–61

HEMS related studies from Norway

1. Lind B. **Ambulanseflyvning i Sør-Trøndelag.** Tidsskr Nor Lægeforen 1950; 13-14.
2. Søreide E [**The critically ill and injured**] Tidsskr Nor Lægeforen 1985; 105: 1216-1219.
3. Søreide E et al. **Severe anaphylactic reactions outside hospital: etiology, symptoms and treatment.** *Acta Anaesthesiol Scand*. 1988; 32: 339-42.
4. Karper S **Legehelikopter i fjellbygder.** 1990
5. Wisborg T et al. **Anesthesiologist-manned helicopters and regionalized extracorporeal circulation facilities: a unique chance in deep hypothermia**. *Arctic Med Res*. 1991;50 Suppl 6:108-11.
6. Wisborg T **The potential of an Anaesthesiologist-Manned Ambulance Service in a Rural/Urban District** Acta Anaesthesiol Scand 1994; 38: 657-661
7. Søreide E et al. **Acute epiglottitis in a rural area: experiences with an anesthesiologist-staffed ambulance helicopter**. *J Emerg Med*. 1994; 12:213-6.
8. Lossius HM, Wisborg T, Gunnarsson E, Hoybjor, S. **Prehospital thrombolytic therapy of myocardial infarction in Northern Norway**. How to improve the service for patients in sparsely-populated areas? *Tidsskr Nor Laegeforen.* 1995 Jun 20;115:1961-3.
9. Hotvedt R **Which groups of patients benefit from helicopter evacuation?** Lancet 1996;347:1362-6.
10. Hotvedt R. **Does a shorter response time improve patient outcome in ambulance helicopter programmes?** Pre-Hosp Immed Care 1999;3:136-9.
11. **Skogvoll e et al. Helicopter emergency medical service in out-of-hospital cardiac arrest--a 10-year population-based study**. Acta Anaesthesiol Scand. 2000 Sep;44(8):972-9.
12. Ulvik A, Rannestad B, Carlsen AW, Nielsen EW. **[Rescue helicopter service in Bodo--advanced emergency service or alternative transportation?]** Tidskr Nor Lægeforen 2002; 122: 25-29
13. Lossius HM, Søreide E, Hotvedt R, Hapnes SA, Eielsen OV, Førde OH ans Steen PA. **Prehospital advanced life support provided by specially trained physicians - is there a benefit in terms of life years gained?** Acta Anesthesiol Scand 2002;
14. Puntervoll SA et al. **Rapid detection of oesophageal intubation: take care when using colorimetric capnometry**. *Acta Anaesthesiol Scand*. 2002; 46: 455-457.
15. Bredmose PP et al. **Prehospital thrombolysis in acute myocardial infarction in a very sparsely inhabited area in northern Norway**. *Eur J Emerg Med*. 2003; 10: 176-179.
16. Nakstad AR **Rapid response car as a supplement to the helicopter in a physician-based HEMS system.** Acta Anaesthesiol Scand 2004; 48: 588-591
17. Haagensen R et al. **Long-range rescue helicopter missions in the Arctic.** *Prehospital Disaster Med*. 2004; 19: 158-163.
18. Vårdal B, Lossius HM, Steen PA, Johnsen H. **Have the implementation of a new specialised emergency medical service influenced the pattern of general practitioners involvement in pre-hospital medical emergencies? A study of geographic variations in alerting, dispatch, and response.** *Emerg Med J*. 2005;22:216-219.
19. Berge SD et al. **Helicopter transport of sick neonates: a 14-year population-based study.** Acta Anaesthesiol Scand. 2005 Aug;49(7):999-1003.
20. Busch M. **Portable ultrasound in pre-hospital emergencies: a feasibility study.** *Acta Anaesthesiol Scand*. 2006; 50 :754-758.

NORSK LUFTAMBULANSE

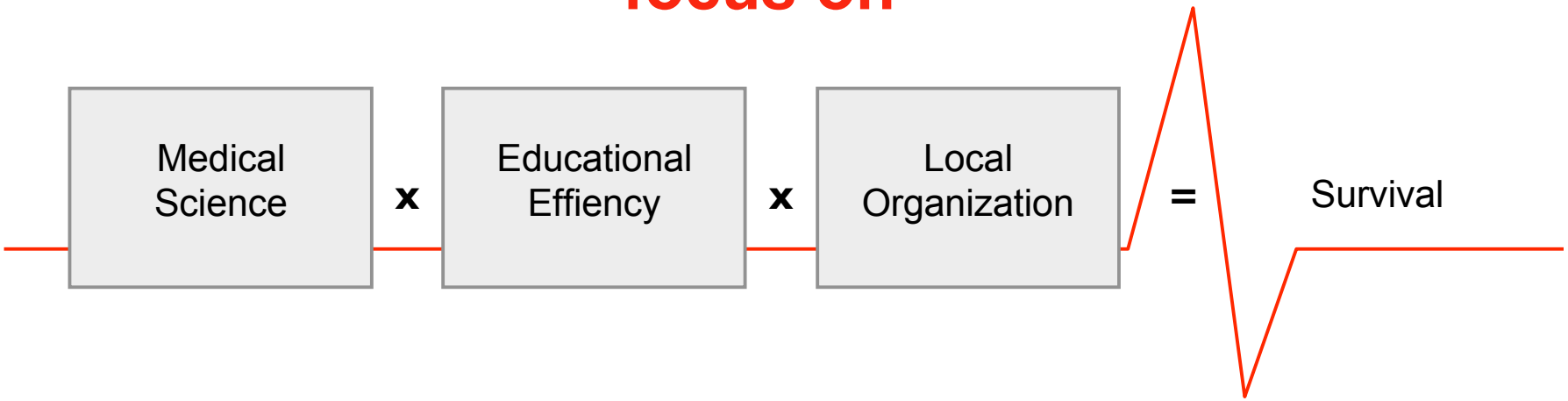
Norwegian studies

Influence mortality in
5-10%
of the patients

NORSK LUFTAMBULANSE

The Formula of Survival

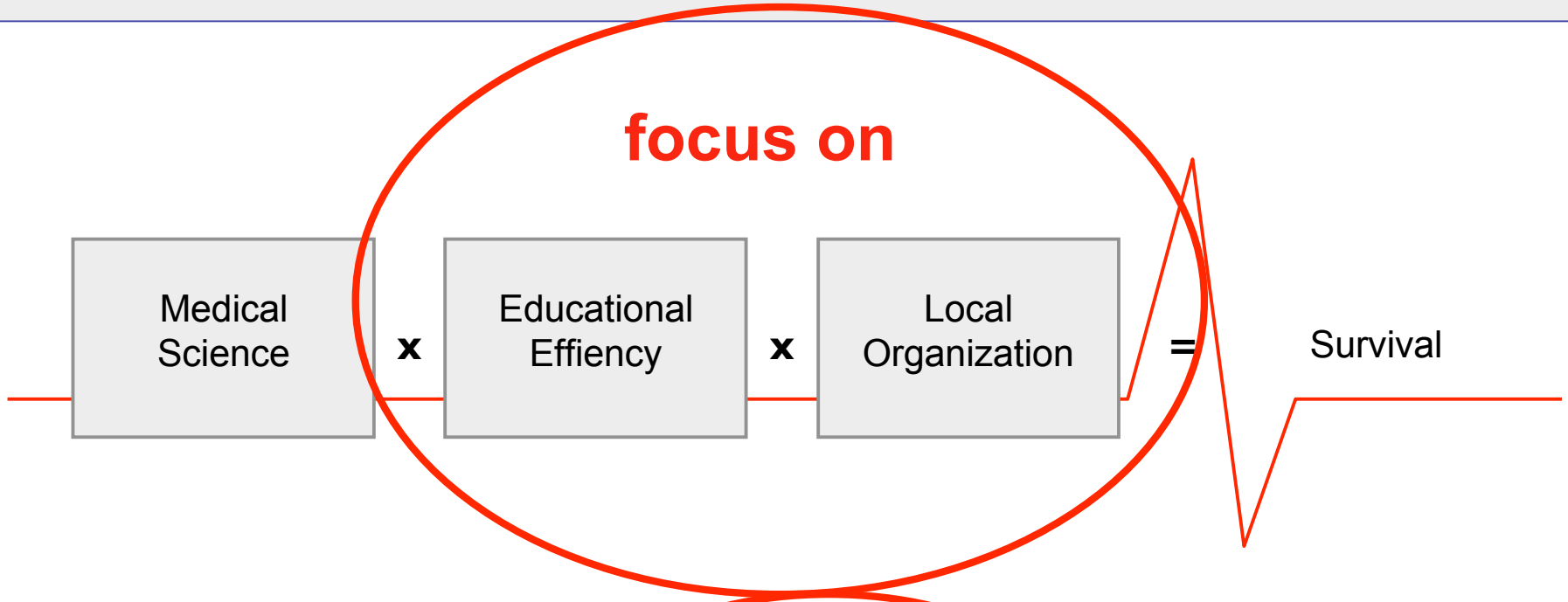
focus on



1	x	1	x	1	=	1
0,9	x	0,2	x	0,2	=	0,04

NORSK LUFTAMBULANSE

The Formula of Survival



1	x	1	x	1	=	1
0,9	x	0,2	x	0,2	=	0,04

NORSK LUFTAMBULANSE

TRIAGE of HEMS

NORSK LUFTAMBULANSE

TRIAGE of HEMS

...how do we TRIAGE patients to Air Ambulances

NORSK LUFTAMBULANSE

TRIAGE of HEMS

.....what is the efficiancy compared to trauma team TRIAGE?

NORSK LUFTAMBULANSE

Air Ambulance Services - assessment and check list

- Patient population you wish to serve
- Geographics and demograpics
- Primary missions - transfer
- Transportation times

NORSK LUFTAMBULANSE

Air Ambulance Services - decision list

- Tool (car/RW/FW)
- Guys (physician/paramedic/nurse)
- Proper TRIAGE
- Maximum response time
- Operational hours
- System for quality assurance

NORSK LUFTAMBULANSE

Rapid response cars - a natural extension or a dead end?

NORSK LUFTAMBULANSE

Air Ambulance Services - decision list

- Tool (car/RW/FW)
- Guys (physician/paramedic/nurse)
- Proper TRIAGE
- Maximum response time
- Operational hours
- System for quality assurance

NORSK LUFTAMBULANSE

Pre-hospital EMS should aim to deliver

- the right treatment
- to the right patient
- at the right time

.....and that makes a difference

NORSK LUFTAMBULANSE

Pre-hospital EMS should aim to deliver

- the right treatment
- to the right patient
- at the right time

.....and that makes a difference

...and medical competence, rapid and suitable transportation, and quality assurance are fundamental tools!

NORSK LUFTAMBULANSE