



NORSK LUFTAMBULANSE
NORWEGIAN AIR AMBULANCE



Prehospital Plasma / TXA experience - FDP in Norwegian HEMS

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COI: None

Text of the day

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- The Wiser Guys > scientific rationale behind FDP use in HEMS
- Point of care and competence to the scene ?
- Is FDP feasible in HEMS with short on-scene + transport times ?
- Approval and implementation ?
- Preliminary results from the first year ?
- Which Q remain from a clinical point of view ?



FDP into what service: N-HEMS ?

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Started 1978, nationalised 1988

Runs 24/7/365, NVG capabilities

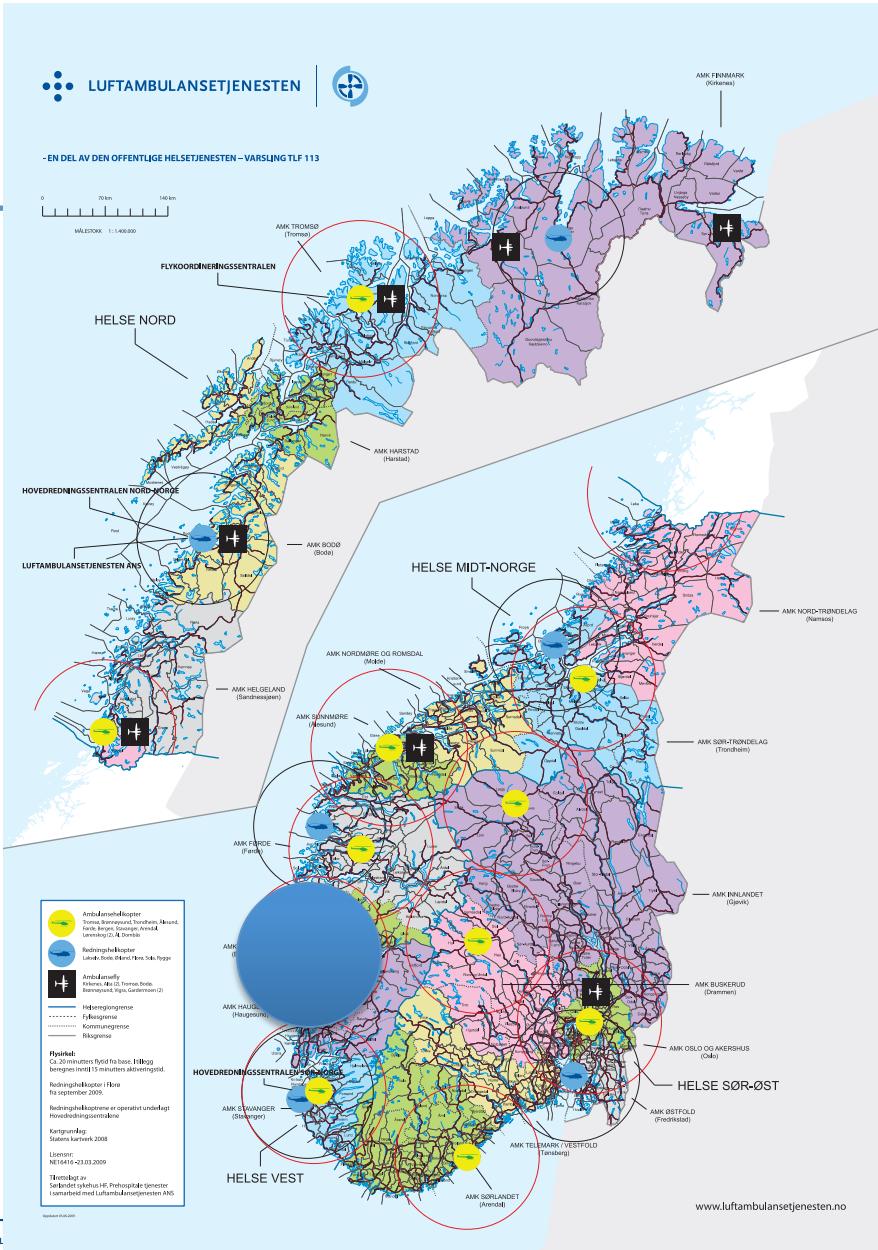
Trauma : Non-trauma = 30:60

Uniform 3 crew concept:

- Prehospital Anaesthetist
- Flight paramedic (Nurse / PM)
- Pilot (Mil / Civ)
- All are "lifers"



New York – Kansas London - Rome

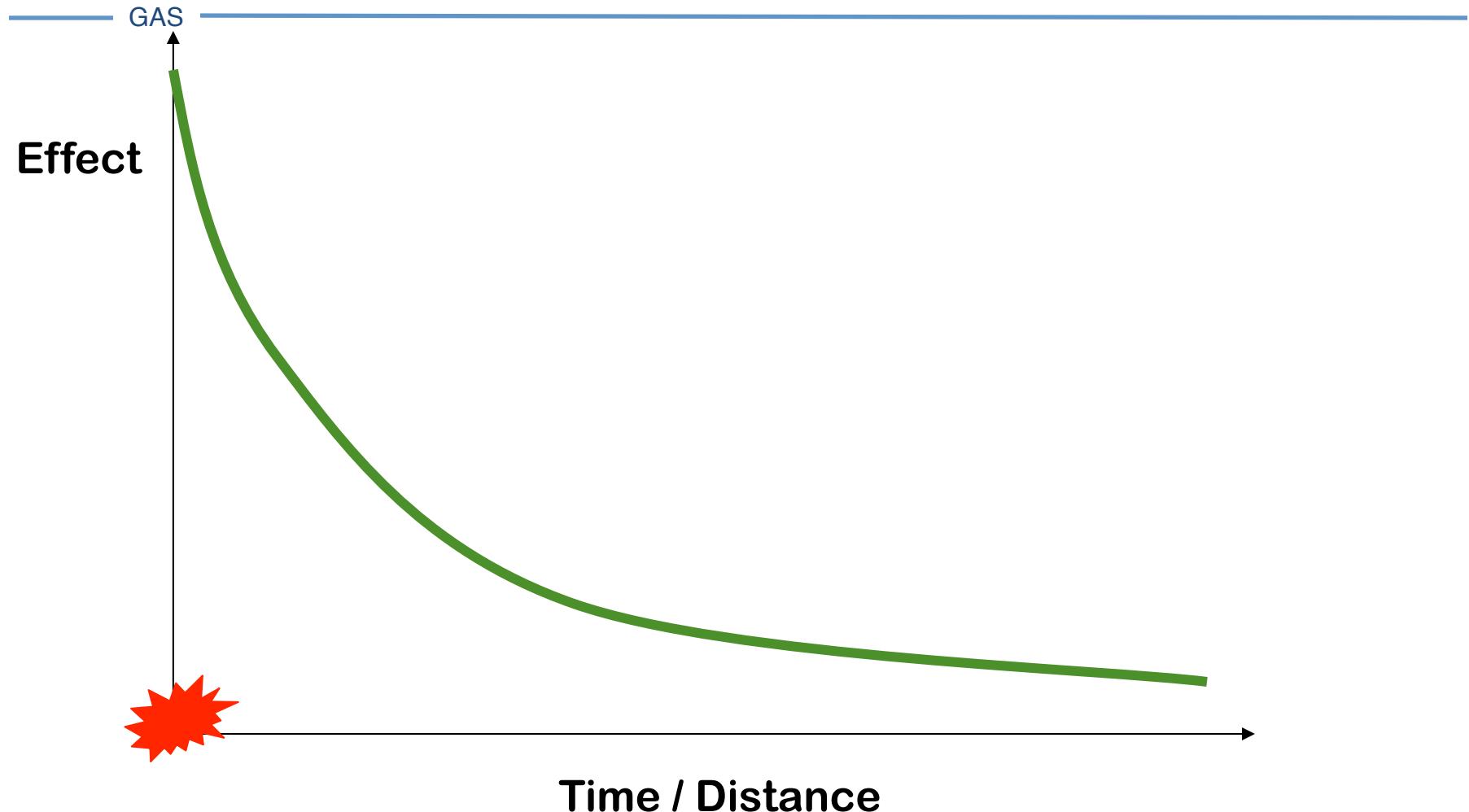


Bergen-HEMS

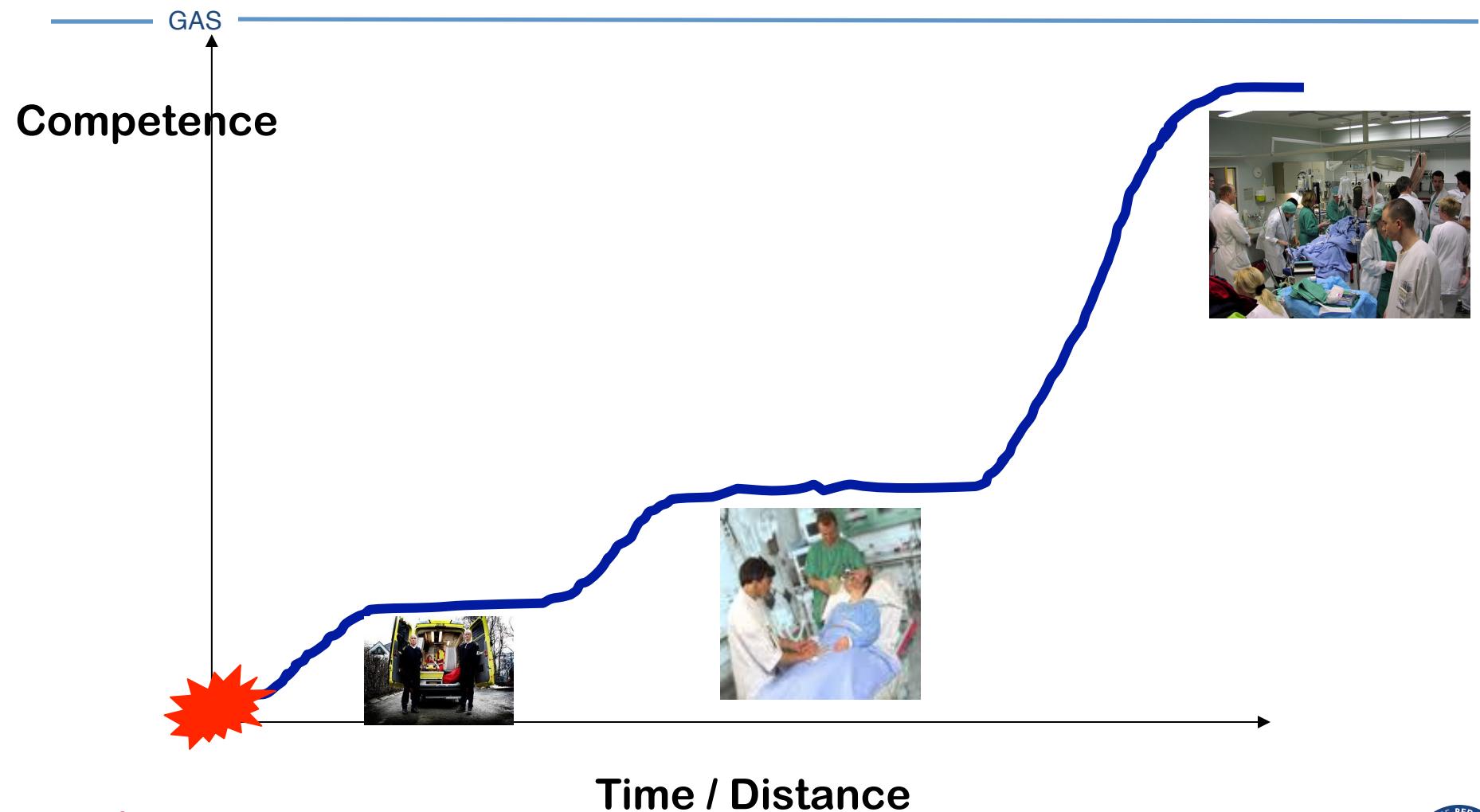
- First FDP in 2013
 - First Blood in 2014



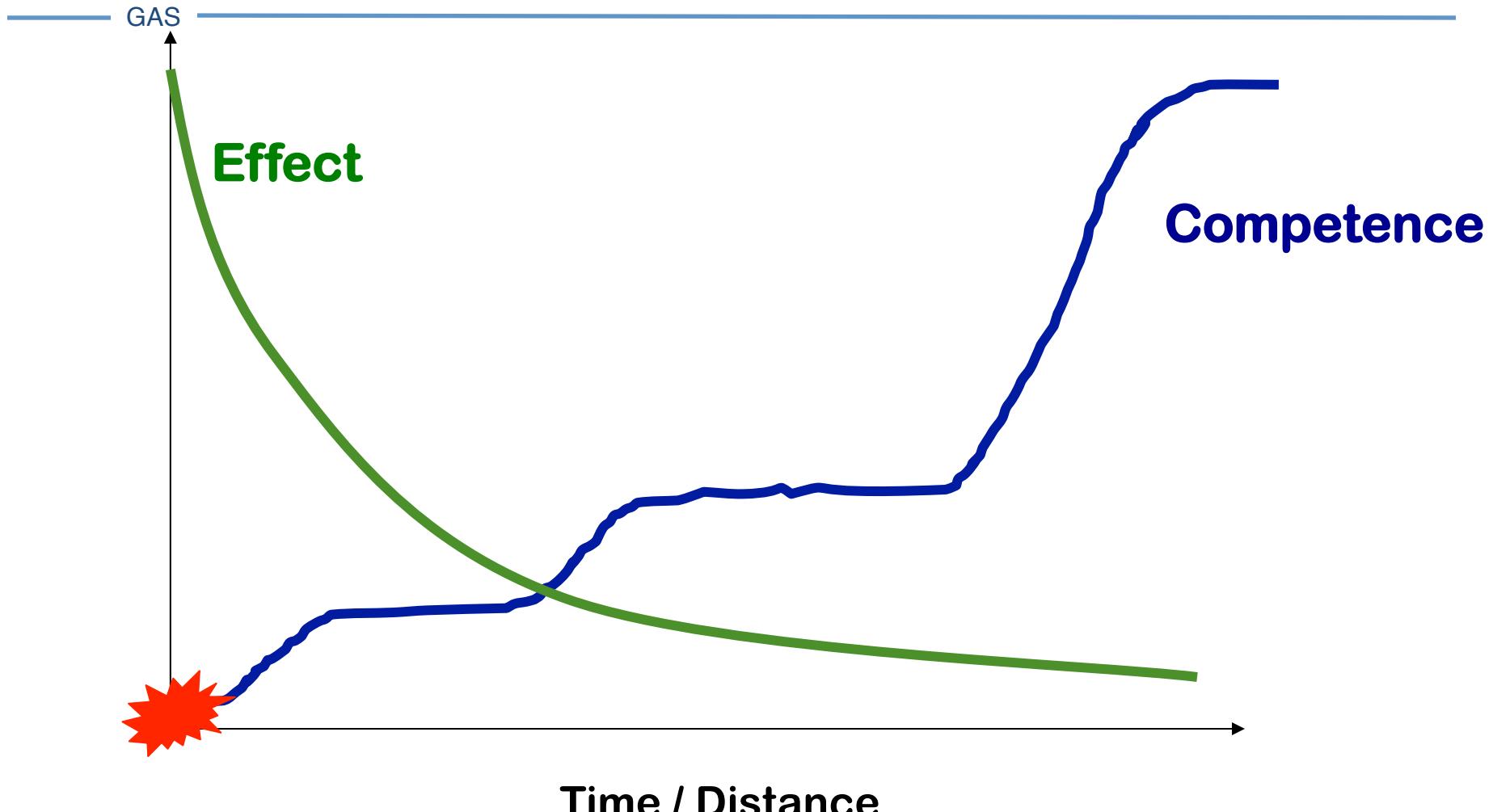
Effect of ALS-interventions (like FDP/TXA)

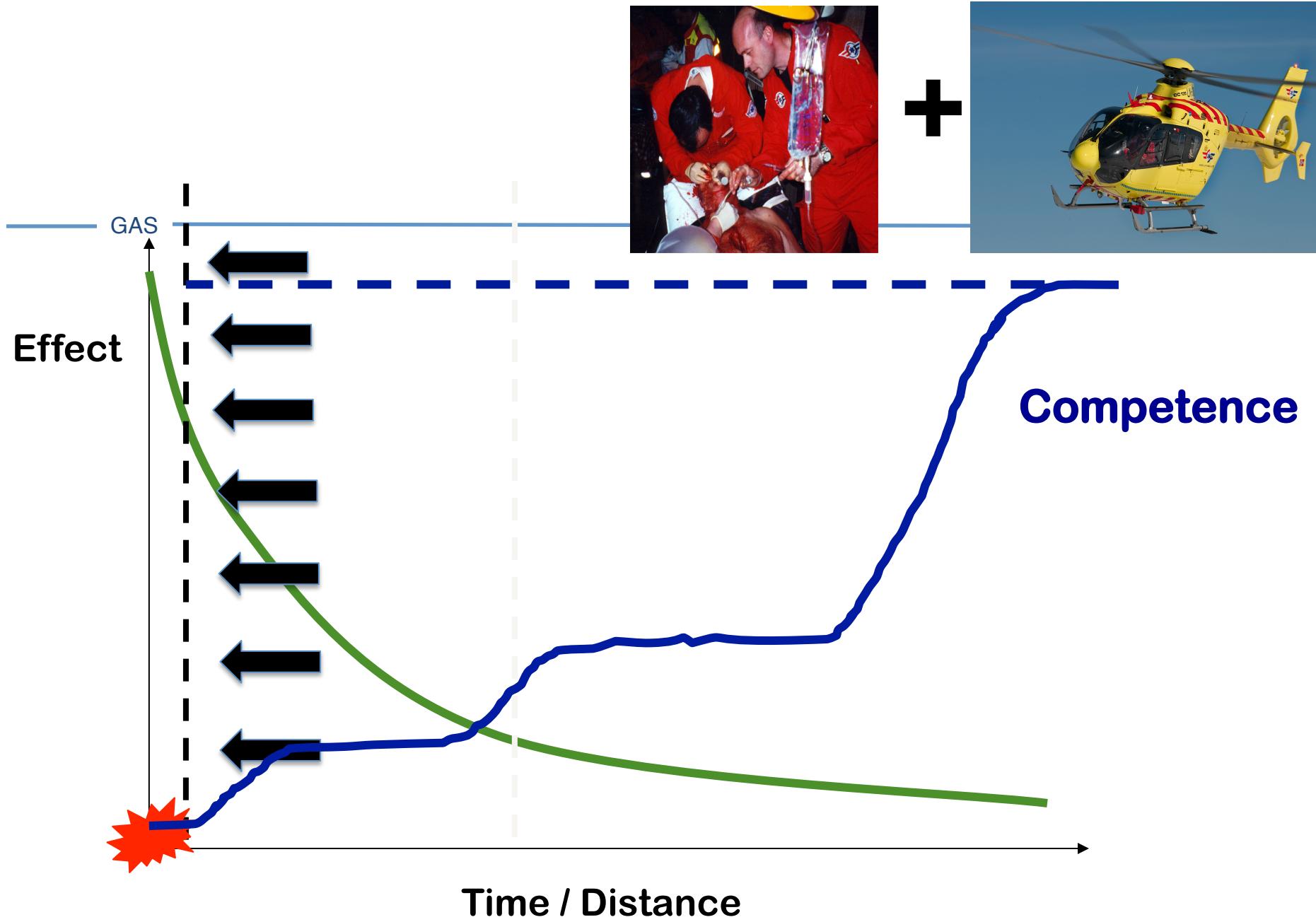


Effect of ALS-interventions



Effect – Competence mismatch





Pushing FDP + Blood to the scene...

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Ultrasound

StO₂

Lactate

CIV: Point-of-care

MIL: tactical

combat casualty

care

FDP in "Prehospital hemorrhage care bundle"

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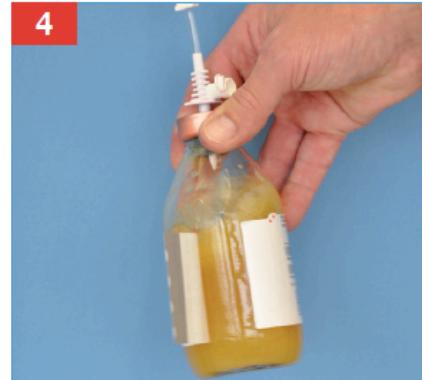
Established + developing concepts of HC > physician manned HEMS

- On-scene DCR + Early use of blood products
- Practical hemorrhage controll: Epistats, bite-blocks, tourniquets
- TXA < 1 hrs en-route to hospital
- Gentle patient (clot) handling + splints: pelvic, multiple rib fractures
- Triage to correct fascility + "Code Red" prewarning Policy > initiate MTP
- *"The Right People doing the Right Stuff to the Right Patients"*

Lockey DJ, Weaver AE, Davies GE. "Practical translation of hemorrhage control techniques to the civilian trauma scene". Transfusion. 2013 Jan;53 Suppl 1:17S-22S.

LyoPlas N - w

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Shelf life 15 months.

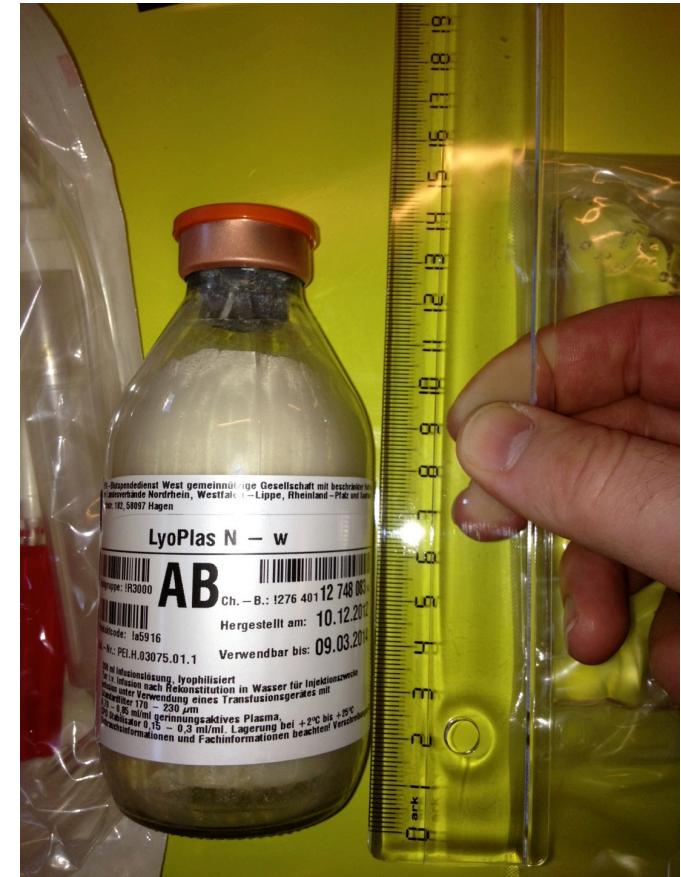
Only AB-type is used in our HEMS.

Re-constitution takes:

- Cold water: 6 minutes**
- Room-temp: 3 minutes**

Size does matter < gross weight HCP

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Stored in Hcp + Rapid response car

Difficult to get German FDP into N-HEMS ?

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1. Our HEMS wanted it.
2. Our Dept. of Immunology and Transfusion Medicine, Haukeland University Hospital, Bergen did the validation and paperwork
3. The Authorities signed off nicely
4. Implemented into HEMS in 2013



Our FDP procedure from the start

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Indication (= same as FFP basically):

- Trauma patients with on-going massive hemorrhage and clinical need for fluid resuscitation

Contra:

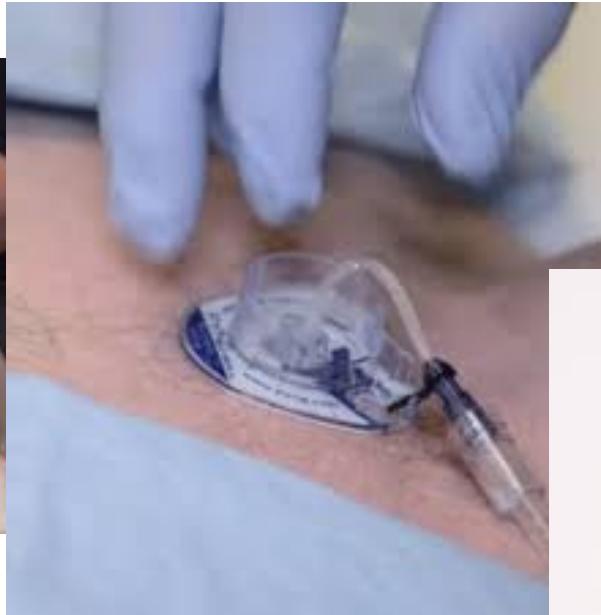
- Prior anafylactic reaction at plasma-transfusion or known plasma protein intolerance
- **Problem: Transfusion reaction may mimic clinical hemorrhage**

Dose:

- Adults: 200 ml bolus, may be repeated.
- Children: 20 ml/kg bolus, may be repeated.

FASTResponder sternal IO

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FASTResponder introduced in our service primarily for FDP/Blood/Volume purposes in 2014.

Used EZ-IO since 2006.

1 % Adult patients

External hemorrhage control

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- CAT Tourniquet
- No hemostatic dressings

Administration of FDP on-scene

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- All HEMS members, including flight paramedics and pilots, were trained in dissolving and administering LyoPlas
- Crew cooperation on-scene dictates that the physician dissolves the FDP en-route to the scene, or the pilot dissolves the plasma on-scene
- In most cases LyoPlas were given inflight en-route to hospital, in coherence with having as short on scene time as possible.

Traneksamic acid (Cyklokapron)

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Indication:

- Adult trauma patients with SBP < 90 and/or
- HR >110 or assessed as major hemorrhage and
- < 3 hours after injury.

We focus on giving TXA as early as possible, on-scene / en-route to hospital, without delaying transport, and < 1 Hrs.

Used FDP in 16 (18) pacs last 12 months

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Non-Trauma (7)

- Post partum hemorrhage
- Post tons. hemorrhage
- GI hemorrhage
- GI hemorrhage
- GI hemorrhage
- Ruptured AAA
- Ruptured AAA

Trauma (9)

- Blunt trauma - Fall
- Blunt trauma - Fall
- Blunt trauma - Fall
- Blunt trauma - MVA
- Blunt trauma - Head
- Penetrating THX - Knife
- Penetrating THX - Knife
- Penetrating Head trauma
- Penetrating Extrem - Knife

Vitals as transfusion criteria ?

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TABLE 2. Demographic Characteristics and Prehospital Physiology per MEDEVAC Platform

	MERT	PEDRO	DUSTOFF	p
n	543	326	106	
Age, mean (SD)	24.1 (4.8)	23.6 (4.1)	24.4 (5.8)	0.328
Casualty category, n (%)				
US military	151 (27.8)	127 (39.0)	78 (73.6)	<0.001*
NATO military	240 (44.2)	111 (34.0)	7 (6.6)	
Non-NATO military	152 (28.0)	88 (27.0)	21 (19.8)	
Mechanism of injury, n (%)				
Gunshot wound/ballistics	133 (24.5)	10 (32.8)	24 (22.6)	<0.001*
Blast	391 (72.0)	177 (54.3)	67 (63.2)	
Other	19 (3.5)	42 (12.9)	15 (14.2)	
Prehospital vitals, mean (SD)				
Systolic blood pressure	106 (31)	121 (27)	124 (26)	<0.001*
Heart rate	104 (31)	92 (23)	97 (23)	<0.001*
Unassisted respiratory rate	22 (16)	19 (6)	19 (7)	0.001*

*p value significance based on 0.05.

blast, all explosive devices/blast; other, all other mechanisms of injury.

Apodaca, A., et al. (2013). "Performance improvement evaluation of forward aeromedical evacuation platforms in Operation Enduring Freedom." The journal of trauma and acute care surgery 75(2 Suppl 2): S157-163.

TABLE 1. Comparison of Prehospital Plasma Resuscitation and Control Groups (a Positive INR Change Denotes an Improvement in Coagulopathy)

Variable	Prehospital Plasma Group	Control Group	p
Age, y	54	41	0.090
Male, %	89	60	0.072
Penetrating mechanism, %	33	18	0.317
ISS	27	23	0.918
TRIIS (Ps)	0.24	0.66	0.005
ABC score	2	2	0.614
GCS	5	8	0.081
History of warfarin use	22%	2%	0.036
INR baseline	2.6	1.5	0.004
Arrival INR	1.6	1.3	<0.001
Change in INR	0.9	0.2	0.078
Arrival aPTT	51	35	0.037
Arrival lactate	5.2	4.4	0.472
Inclusion criteria	3	2	0.101
Arrival SBP	89	109	0.057
Arrival HR	100	109	0.324
Lowest SBP	56	76	0.005
Highest HR	118	120	0.800
Arrival Hg	10.0	10.7	0.308
Arrival BD	0.5	0.4	0.940
Arrival pH	7.19	7.22	0.634
Arrival platelet count	132	176	0.074

ABC, assessment of blood consumption; aPTT, activated partial thromboplastin time; BD, base deficit; GCS, Glasgow Coma Scale; Hg, hemoglobin; HR, heart rate; Ps, Probability of Survival; SBP, systolic blood pressure; TRISS, Trauma Injury Severity Score.

Boldface indicates statistical significance.

Our preliminary experience with FDP

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- In the absence of whole-blood or platelet-rich products, FDP seems to be a valuable alternative compared to crystalloids.
- FDP ensures both coagulation factors and volume replacement.
- Implementation of FDP in trauma and medical patient population treated by civilian HEMS is feasible.
- Need for more stringent transfusion criteria in the future.

Blood and FDP in HEMS...Sobriety !!

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- **Totally dependent upon blood-bank expertise for implementation**
- **HEMS decides in which clinical settings this is applied**
- **HEMS must be 100% accountable**
- **Prove that we are not giving the right stuff to the wrong patients**
- **HEMS should have established clinical governance and quality assurance systems to ensure this.**

Q for the plasma discussion ?

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- New toys in HEMS: risk of becoming too liberal with Blood/FDP ?
- Reasonable prehospital transfusion criteria and treatment goals ?
- Trauma AND Non-Trauma patients ?
- Imperative we get “the middle group” right ?