Tele-Emergency Medicine:

TELENOTARZT

Structure and Benefits of a Telemedicine Supported Emergency Ambulance System



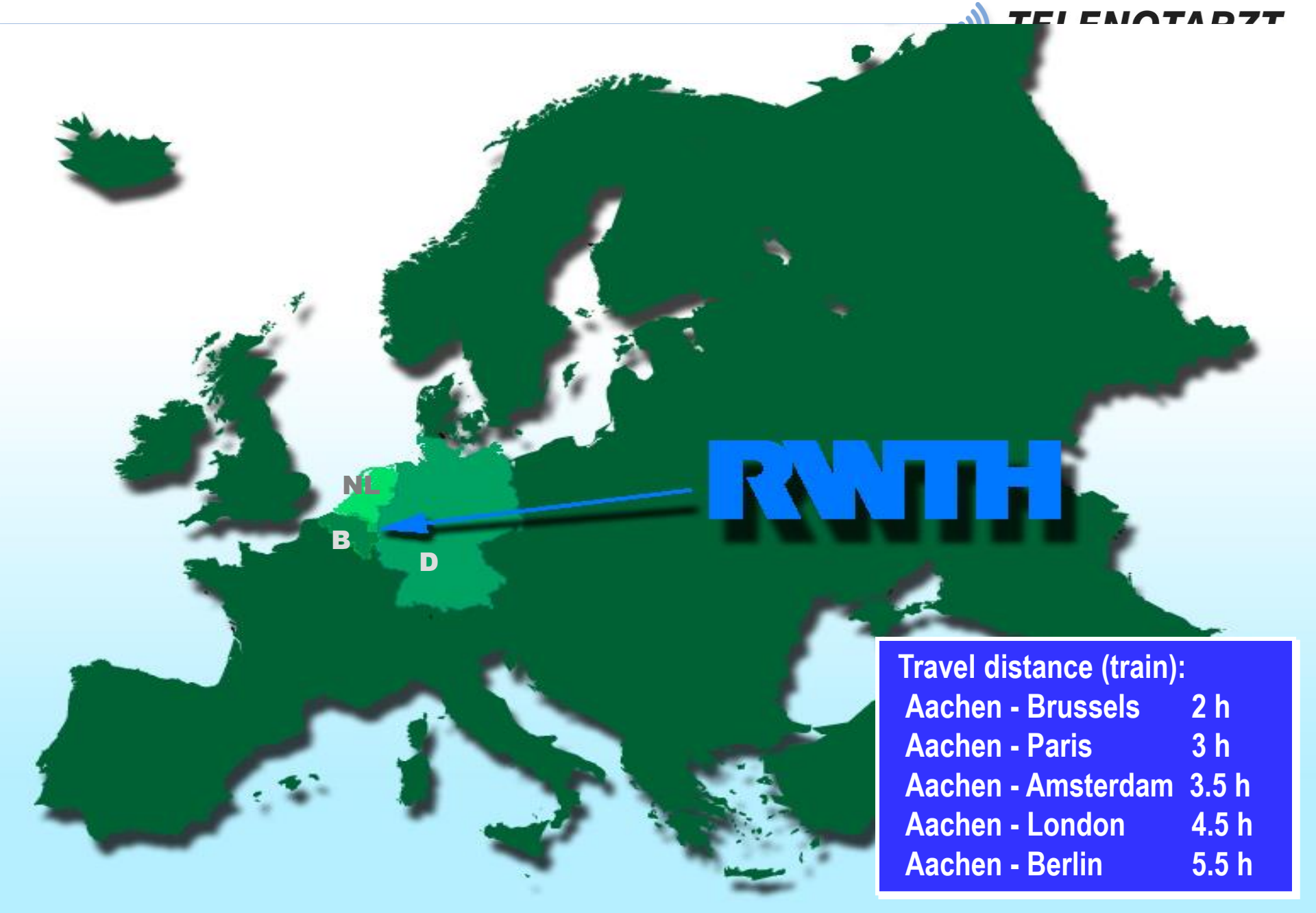
Rolf Rossaint

RWTH Aachen University




RWTH AACHEN UNIVERSITY
Founded 1870

Location



Travel distance (train):	
Aachen - Brussels	2 h
Aachen - Paris	3 h
Aachen - Amsterdam	3.5 h
Aachen - London	4.5 h
Aachen - Berlin	5.5 h

Conflicts of Interests

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- Research interest since 2003
- Co-founder of Docs-in-Clouds

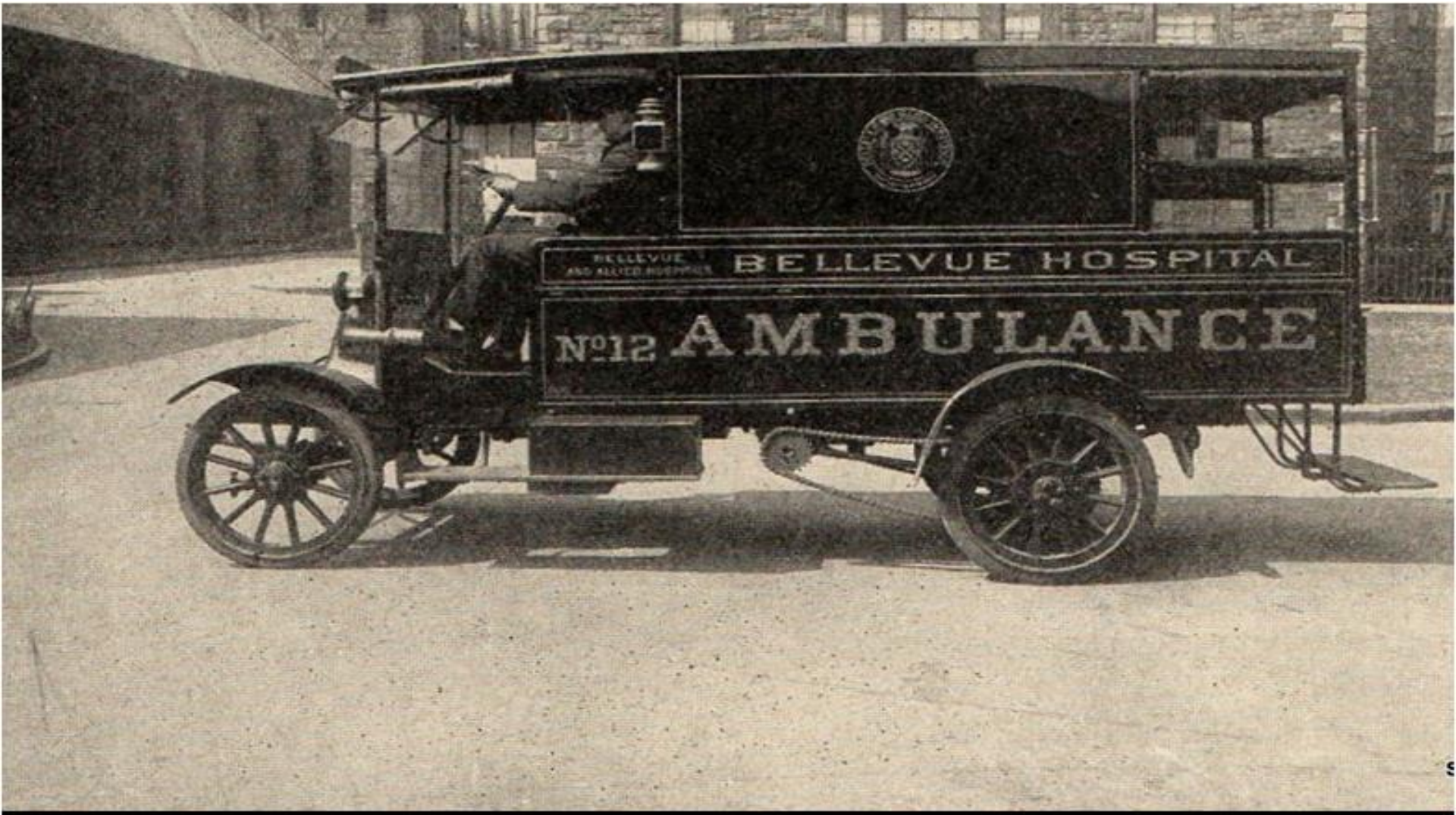


- Co-founder of P3 Telehealthcare



Milestones in rescue structure

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1914 Ambulance Bellevue Hospital

Milestones in german rescue structure

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1. Emergency physician



Ambulance
Cologne 1957

Milestones in german rescue structure

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1. Emergency physician



Ambulance
Cologne 1957

2. Rescue helicopter



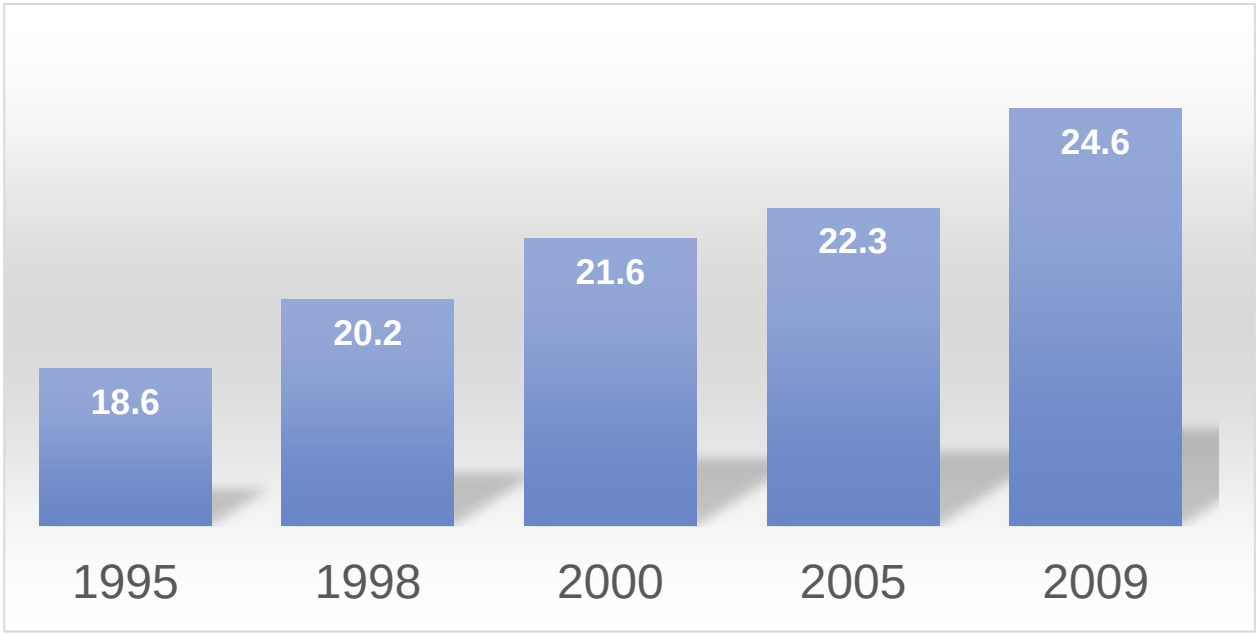
Christoph 1
Munich 1970

Problems of the current rescue system

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1. Prolonged arrival time of emergency physician

The emergency physician arrives at the scene in 95% within



Problems of the current rescue system

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2. Communication technology





...is much older than that!

Mobile devices, wireless communication

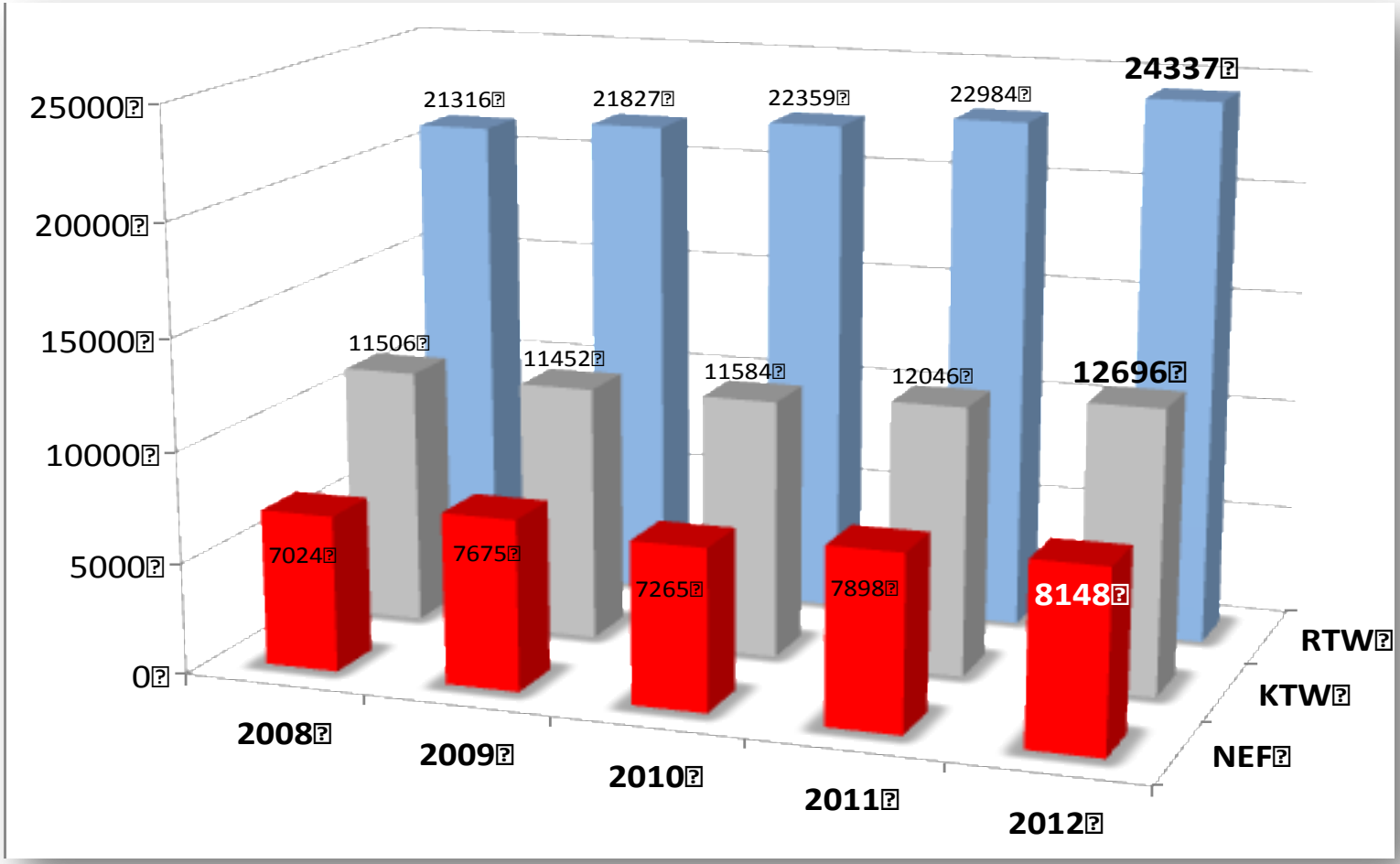
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Problems of the current rescue system

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3. Increasing number of emergency cases due to demographic changes (3% per year)



Regional differences in the disposition of emergency physicians

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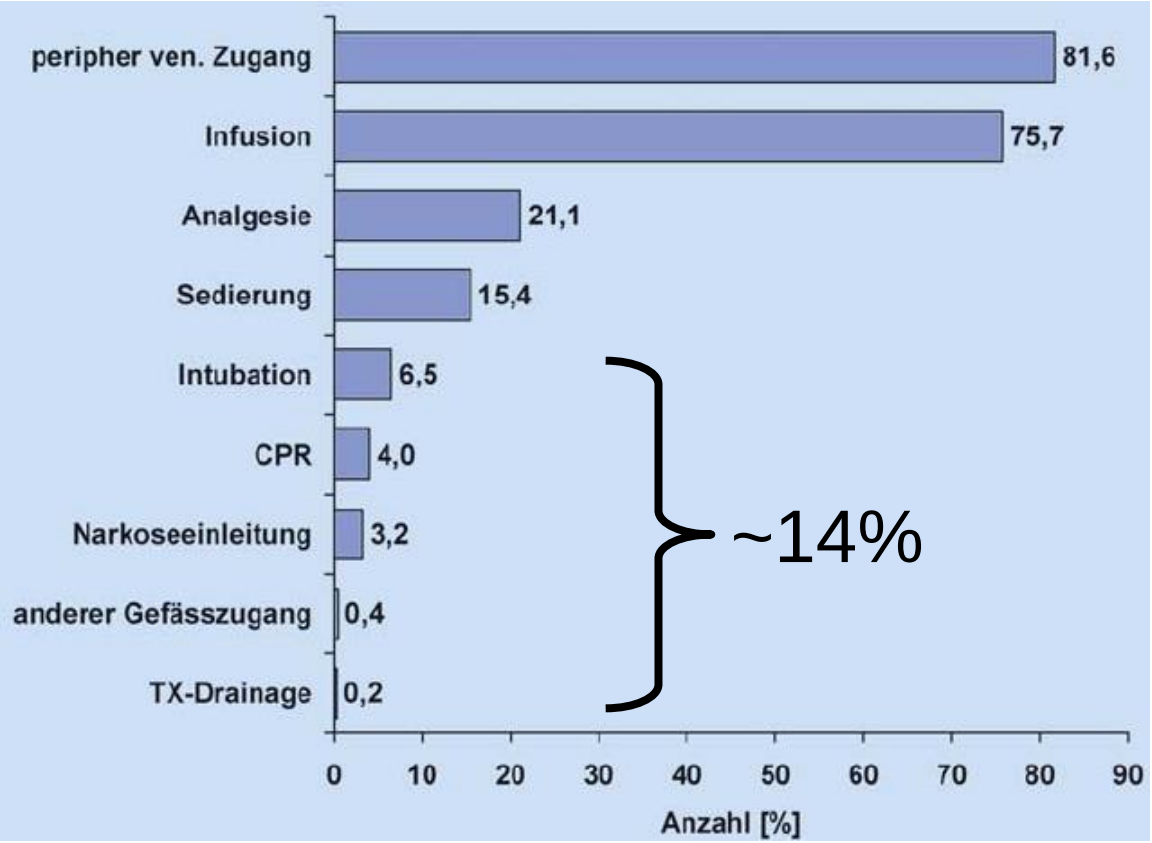
- % emergency physicians
  - nationwide 50% Behrendt et al., Notfall Rettungsmed 2006
  - Bavaria: 53% (range: 25% – **71**%) INM, München 2010
  - Aachen 33% BF Aachen 2011
- Average personnel engagement times per case
  - Hamburg: 40 ± 26 min Schuster et al., Emerg Med J 2010
  - Aachen: 53 min
  - NEF Mechernich (Kr. EU, rural district): 79 min

Physicians at scene: Always a necessity?

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Gries A et al

Anästhesist 52:718–724, 2003



→**Conclusion:**

The manual ability are needed only in ~14% !

Problems of the current rescue system

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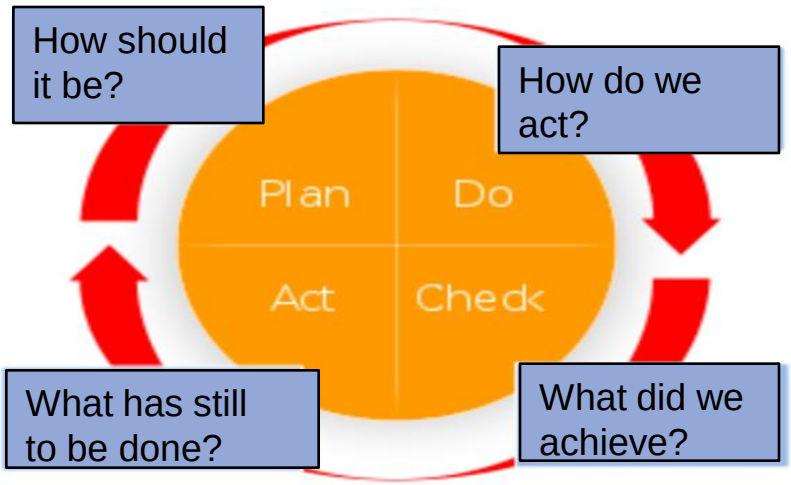
4. Shortage of qualified physicians!



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5. Non-existing systematic quality control

- Residents are allowed to act as out-of-hospital emergency physicians 18 months after beginning
- Unexperienced physicians acting beyond their training
- No supervision by specialists
- Often not guideline-based





Why tele-emergency medicine?

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- Allows in combination with the existing physician-based ground and air rescue system

Quality improvement by

- Reduction of therapy-free interval
- Introduction of SOPs and checklists
- Supervision

Compensation for

- Increasing number of out-of-hospital emergencies
- Lack of (qualified) emergencies physician

Goal-specific use of emergency physicians

- Exactly there, where they are needed

How did we target this project?

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Sitemap
Impressum
Kontakt

Med-on-@ix
2007 - 2010
Gefördert durch das
Bundesministerium für Wirtschaft und Technologie
SimoBIT
zum Projekt

TemRas
Telemedizinisches Rettungsassistenzsystem
2010 - 2013
EUROPÄISCHE UNION
Investition in unsere Zukunft
Europäischer Fonds für regionale Entwicklung
Ministerium für Innovation, Wissenschaft und Forschung des Landes Nordrhein-Westfalen
zum Projekt

RWTH AACHEN UNIVERSITY
IMA ZLW IfU
UNIVERSITÄTSKLINIKUM AACHEN
p3 communications
Feuerwehr Aachen
Menschen schützen Menschen
PHILIPS
3M

Main objective

- Development and implementation of a telemedical assistance system



- providing immediate medical support for the EMS personnel on site
- by transmitting audio and video data, vital signs and 12-lead-ECG in real-time from the emergency site to the teleconsultation center.

How did we target this project?

TELENOTARZT

1. Examination of the legal preconditions

- Are paramedics allowed to administered the needed drugs?
- Is it allowed that the patient with a potential life-threatening emergency is treated by a physician via telemedicine?
- Who of the team is the legal responsible person?

How did we target this project?

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1. Examination of the law

2. Analysis: Are there already tele-rescue systems established?

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The project „Stroke Angel“

www.strokeangel.de



Improvement of stroke treatment:

„TIME IS BRAIN“

[Mobile computing systems in preclinical care of **stroke**. Results of the **Stroke** Angel initiative within the BMBF project PerCoMed].
Ziegler V, Rashid A, Müller-Gorchs M, Kippnich U, Hiermann E, Kögerl C, Holtmann C, Siebler M, Griewing B.
Anaesthesist. 2008 Jul;57(7):677-85. doi: 10.1007/s00101-008-1395-x. German.

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Project „Cardio Angel“

www.cardioangel.de



cardio angel

Improvement of myocardial infarction treatment:

„TIME IS MUSCLE“

Example of tele-emergency consultation: Germany

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- **12-ECG-transmission in STEMI:**

  Effectiveness of prehospital wireless transmission of electrocardiograms to a cardi
  held device for patients with acute myocardial infarcti

  ST
  Acute Myocardial Infarction (STAT-MI) trial

  The STAT-MI trial improves outcomes Sanchez-Ross et al., JACC Cardiovasc Interv. 2011: 222-227

Benefit and outcome improvement are proven!

But: 2011 in Germany: Transmission of 12-lead-ECG was only established in 44%!
Mann V. Innovative Techniken in der präklinischen Notfallmedizin in Deutschland. Anaesthesiol Intensivmed 2011;52:824-833

- **Stroke Angel: Only regional transition into routine care**
  - Standorte: Rhön-Grabfeld, Bad Kissingen, Hassberge, Dachau, Uelzen…
  - Lyserate erhöht und innerklinische Versorgungszeiten verkürzt
    Ziegler et al. Anaesthesist 2008

Example of tele-emergency consultation: : Arizona

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Realtime inter-hospital consultation in trauma at the University Hospital in Tucson, Arizona, USA

UMC
UNIVERSITY MEDICAL CENTER
Tucson, Arizona

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Search

USNews America's Best Hospitals 2009-10

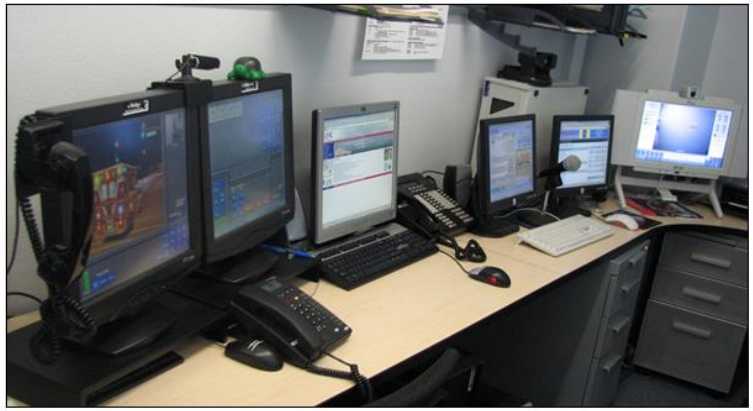
Southern Arizona Telemedicine and Telepresence (SATT) Program

The Southern Arizona Telemedicine and Telepresence (SATT) Program, directed by Dr. Rifat Latifi, is a regional inter-hospital link between the UMC and 5 rural hospitals in Southern Arizona using telemedicine systems. The SATT program facilitates the virtual presence of an experienced trauma surgeon using high quality live audio and video which is streamed from a dedicated telemedicine network. Advances in technology including telemedicine and telepresence applications for trauma, emergency management, and intensive critical care may be the solution to reducing and/or eliminating the gap in trauma care between rural and urban areas.

The SATT Program was made possible by a generous grant from Blue Cross Blue Shield of Arizona.

BlueCross BlueShield of Arizona

An Independent Licensee of the Blue Cross and Blue Shield Association



Example of tele-emergency consultation: Arizona

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The American Journal of Surgery (2009) 198, 905–910

The American Journal of Surgery®

The Southwestern Surgical Congress

Initial experiences and outcomes of telepresence in the management of trauma and emergency surgical patients

Rifat Latifi, M.D.[a,b,*], George J. Hadeed, M.P.H.[a], Peter Rhee, M.D.[a], Terrence O'Keeffe, M.D.[a], Randall S. Friese, M.D.[a], Julie L. Wynne, M.D.[a], Michelle L. Ziemba, R.N.[c], Dan Judkins, R.N.[c]

- Teleconsultation (country Hospital→Trauma Center) for 59 surg. patients
- 35 trauma patients
- 6 potential life-saving tele-consultations

Example of tele-emergency consultation: Texas



Example of tele-emergency consultation: Texas

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Lifebot-Entwicklung (www.lifebot.us.com)



Example of tele-emergency consultation: Las Vegas

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HP, US-Army et al



Both the ambulance and the cart systems utilize DREAMS™, a $14 million research project that has built the first Digital Telemedicine Ambulances. The project was the brain child of a Texas surgeon, Dr. James “Red” Duke, Jr. and was funded by the Telemedicine and Technology Research Center (TATRC) and U.S. Army Medical Research and Material Command (USAMRMC), Department of Defense agencies.

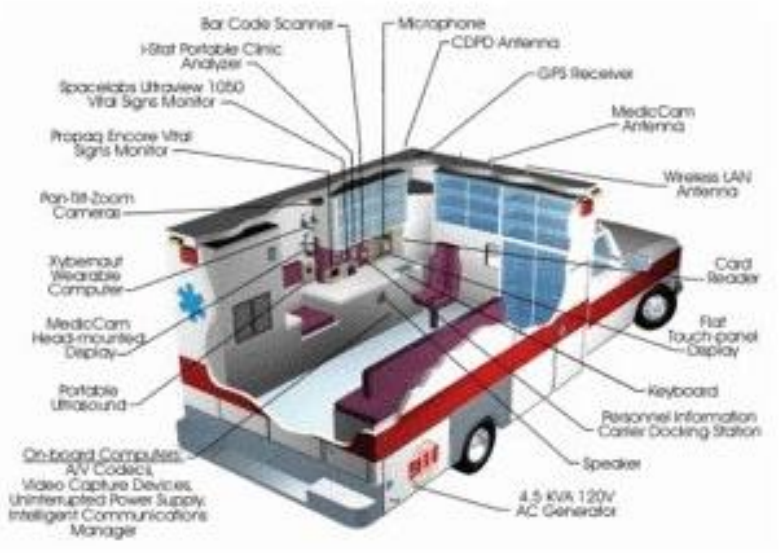
Example of tele-emergency consultation: Texas

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The LifeBot 5: The most advanced Mobile Integrated Healthcare in the world.

Disaster Relief and Emergency Medical Services, or DREAMS™ was developed using $14 million in funding through U. S. Army Medical Research and Materiel Command and the Telemedicine and Technology Research Center (TATRC) as a Congressionally Funded military research project.

DREAMS™ has been proven in actual use for over six years in real-time life-saving operations aboard five ambulances in Liberty County Texas. No other system is more proven or more efficacious as an ambulance to hospital based telemedicine system. The motto for DREAMS™ is , "*Saving lives in real-time.™*" and it has done that longer than any other system in the history of the industry.



DREAMS™ offers not only direct live transmission of voice and video but complete patient physiologic data, e.g. ECG, 12-lead STEMI, blood gases, ultrasound, e-PCR, EHR, blood pressure, and a lot more.

First and foremost, One System Does It All without the need to cobble together separate products or systems. This can not only provide higher levels of care, but also save money, substantially lower the chances of risks or errors, and save lives.

Prehospital telemedicine for Stroke (Houston)

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Prehospital Utility of Rapid Stroke Evaluation Using In-Ambulance Telemedicine

A Pilot Feasibility Study

Tzu-Ching Wu, MD; Claude Nguyen, MD; Christy Ankrom, BS; Julian Yang, MD; David Persse, MD; Farhaan Vahidy, MD; James C. Grotta, MD; Sean I. Savitz, MD

Stroke. 2014;45:2342-2347

Establishing the First Mobile Stroke Unit in the United States

Stephanie A. Parker, RN; Ritvij Bowry, MD; Tzu-Ching Wu, MD; Elizabeth A. Noser, MD; Kamilah Jackson, RT; Laura Richardson, BS; David Persse, MD; James C. Grotta, MD

Stroke. 2015;46:1384-1391

Prehospital telemedicine in rural patients in need of primary coronary intervention (Canada/Quebec)

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ELSEVIER

The Journal of Emergency Medicine, Vol. ■, No. ■, pp. 1–8, 2015
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0736-4679/$ - all see front matter

Selected Topics: Prehospital Care

RURAL PATIENT ACCESS TO PRIMARY PERCUTANEOUS CORONARY INTERVENTION CENTERS IS IMPROVED BY A NOVEL INTEGRATED TELEMEDICINE PREHOSPITAL SYSTEM

Alain Tanguay, MD,* Renée Dallaire, PHD,*† Denise Hébert, RN, BSN,* François Bégin, MD,* and Richard Fleet, MD, PHD*†

*Centre hospitalier affilié universitaire Hôtel-Dieu de Lévis, Lévis, Québec, Canada and †Laval University, Québec, Québec, Canada

Reprint Address: Richard Fleet, MD, PHD, CHAU Hôtel-Dieu de Lévis, 143 rue Wolfe, Lévis, QC G6V 3Z1, Canada

Prehospital telemedicine in rural patients in need of primary coronary intervention (Canada/Quebec)

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Objectives: Ability of an STEMI system serving suburban and rural populations to achieve the recommended 90-min interval benchmark for PCI.

Methods: Implementation of a prehospital telemedicine program:

Three patient groups between August 1, 2006 and October 20, 2012:

1) patients already en route to a PCI center,
2) patients initially directed to the nearest hospital who were subsequently diverted to a PCI center during transport, and
3) patients directed to the nearest hospital without transfer for PCI.

Results: 208 patients diagnosed with STEMI:

- 14.9% were already on their way to a hospital with PCI capabilities,
- 75.0% were rerouted to a PCI center, and
- 10.1% were directed to the nearest local hospital.

All patients but one arrived at the PCI center within the 60min prehospital care interval,considering an additional 30 min for balloon inflation for PCI.

Prehospital emergency telemedicine in Brussels

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OPEN ACCESS Freely available online

PLOS ONE

Feasibility of AmbulanCe-Based Telemedicine (FACT) Study: Safety, Feasibility and Reliability of Third Generation In-Ambulance Telemedicine

Laetitia Yperzeele[1,2]*, Robbert-Jan Van Hooff[1,2], Ann De Smedt[1,2], Alexis Valenzuela Espinoza[2], Rita Van Dyck[1], Rohny Van de Casseye[3], Andre Convents[2], Ives Hubloue[4,5], Door Lauwaert[4,5], Jacques De Keyser[1,2,6], Raf Brouns[1,2]

1 Department of Neurology, Universitair Ziekenhuis Brussel, Brussels, Belgium, **2** Center for Neurosciences (C4N), Vrije Universiteit Brussel (VUB), Brussels, Belgium, **3** Flanders District of Creativity, Leuven, Belgium, **4** Department of Emergency Medicine, Universitair Ziekenhuis Brussel, Brussels, Belgium, **5** Research Group on Emergency and Disaster Medicine (ReGEDiM), Vrije Universiteit Brussel (VUB), Brussels, Belgium, **6** Department of Neurology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

Results: Prehospital teleconsultation was obtained in 41 out of 43 cases (95.3%). The success rates for communication of blood pressure, heart rate, blood oxygen saturation, glycemia, and electronic patient identification were 78.7%, 84.8%, 80.6%, 64.0%, and 84.2%. A preliminary prehospital diagnosis was formulated in 90.2%, with satisfactory agreement with final in-hospital diagnoses. Communication of a prehospital report to the in-hospital team was successful in 94.7% and prenotification of the in-hospital team via SMS in 90.2%. Failures resulted mainly from limited mobile connectivity and to a lesser extent from software, hardware or human error. The user acceptance was high.

Conclusions: Ambulance-based telemedicine of the third generation is safe, feasible and reliable but further research and development, especially with regard to high speed broadband access, is needed before this approach can be implemented in daily practice.

How did we target this project?

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1. Examination of the law

2. Analysis: Are there already tele-rescue systems established?

3. Establishment of a safe and robust data transfer unit, a physician-based tele-emergency center and software

Components of „our“ tele-emergency system:

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24/7 telemedicine center



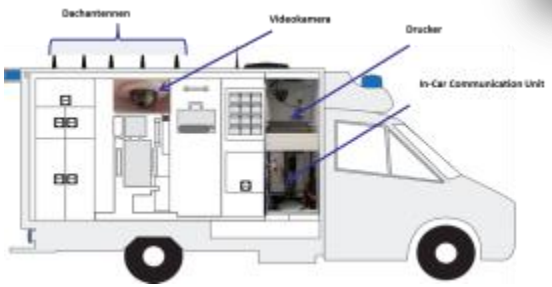
1) Real-time data transfer



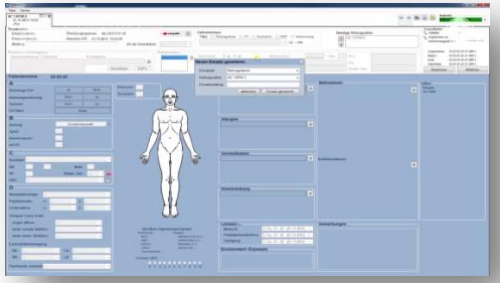
Communication unit



2) Audio-video communication



Telemedicine equipped ambulances



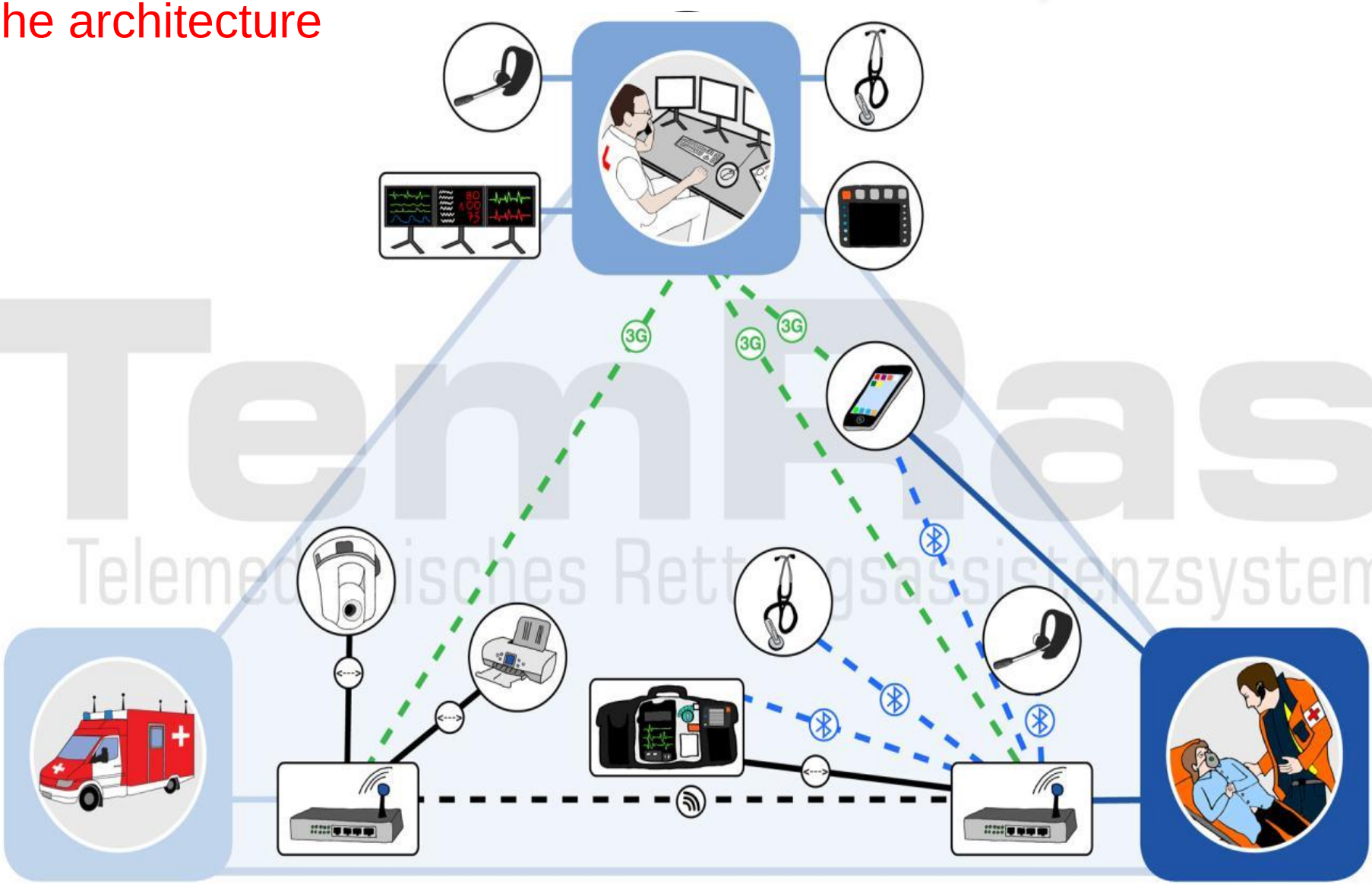
3) Documentation and decision support system

Skorning et al Der Anaesthesist 2010; Bergrath et al J Telemed Telecare 2011

„Our“ tele-emergency system:

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The architecture



TemRas
Telemedizinisches Rettungsassistenzsystem

„Our“ tele-emergency system: The data transfer unit

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CWEB-108 -- -- J. | -- | -- cm | -- kg

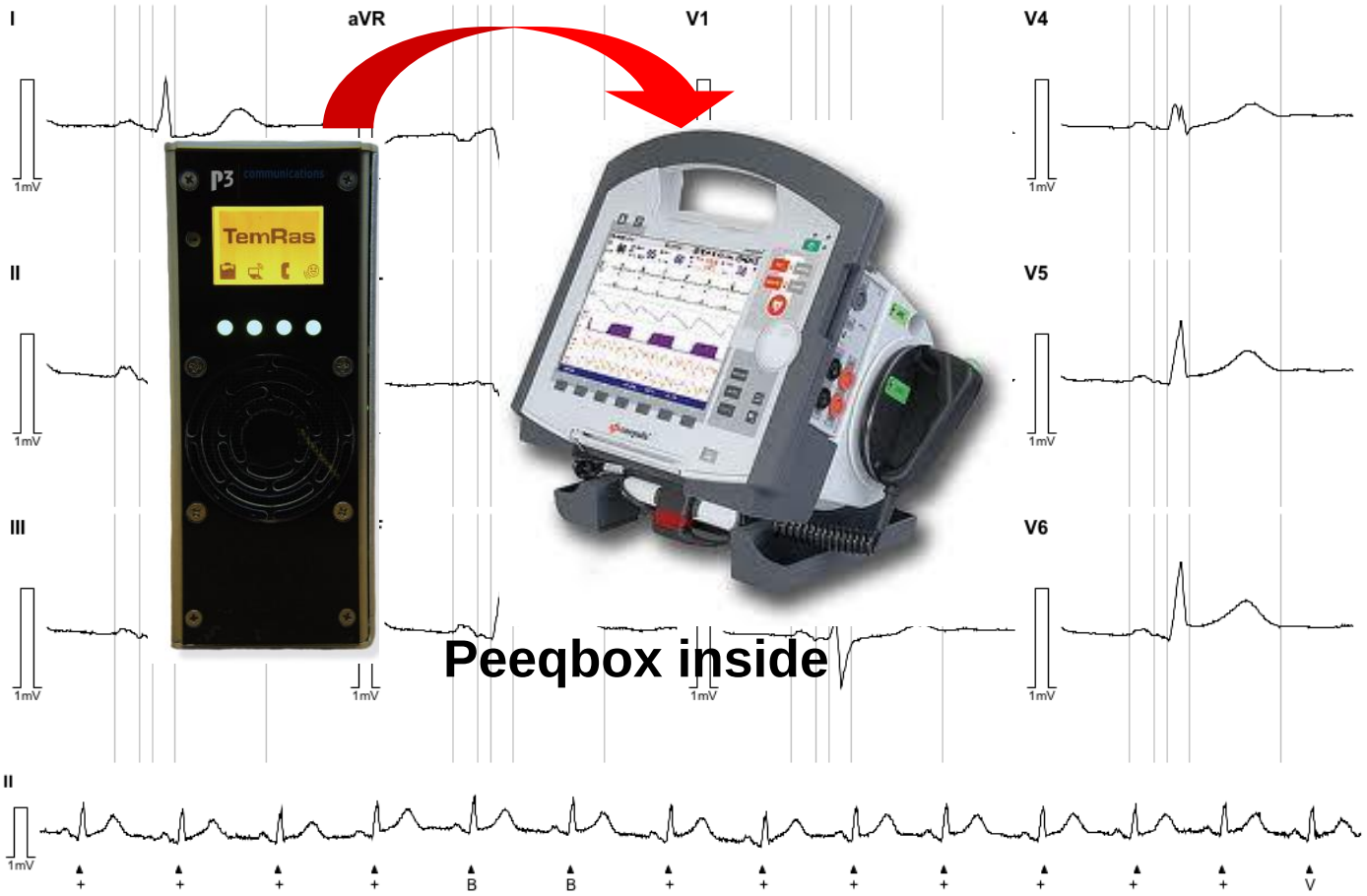
Funkkennung: 1NEF1
Rückrufnummer: 01716540897

Einsatz verlassen

Einsatzakte | R-EKG | Ereignisse | Livedaten | Arbeitsprotokoll

R-EKG 1 26.03.2013 14:45 | R-EKG 2 26.03.2013 14:45

12-Kanal-Vorschau
Vermessung
Repräsentativer Schlag
HES®



UNIKLINIK RWTH AACHEN

TELENOTARZT.DE

„Our“ tele-emergency system: The data transfer unit

P3 peeqBOX

- Ultra-mobile communication unit
- Data priorization and splitting
- Simultaneous use of three different mobile radio networks
- Bluetooth interfaces to medical and communication devices

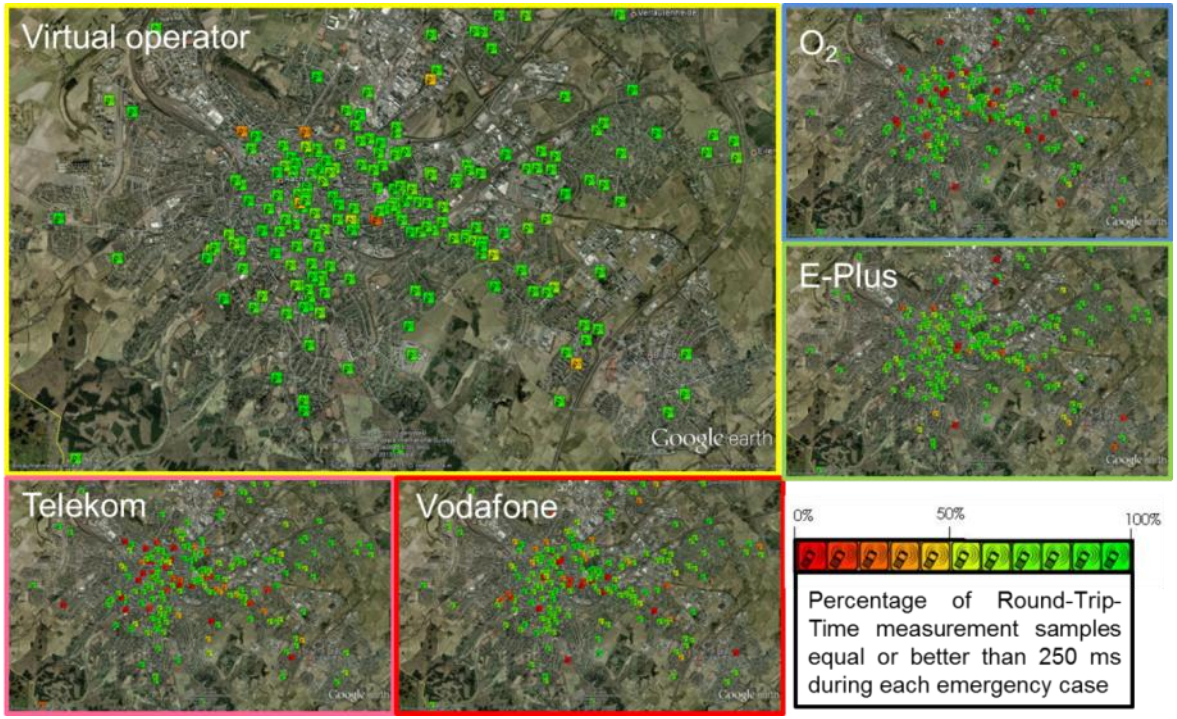




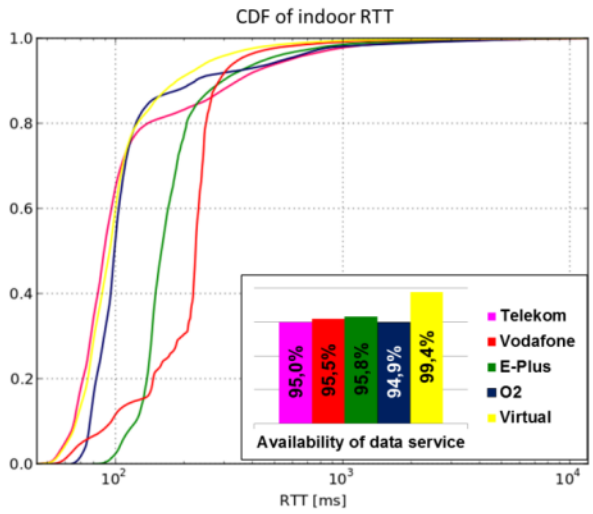
„Our“ tele-emergency system: The data transfer unit

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peeqBOX technology enables reliable data communication for real-time based medical applications in mobile environments



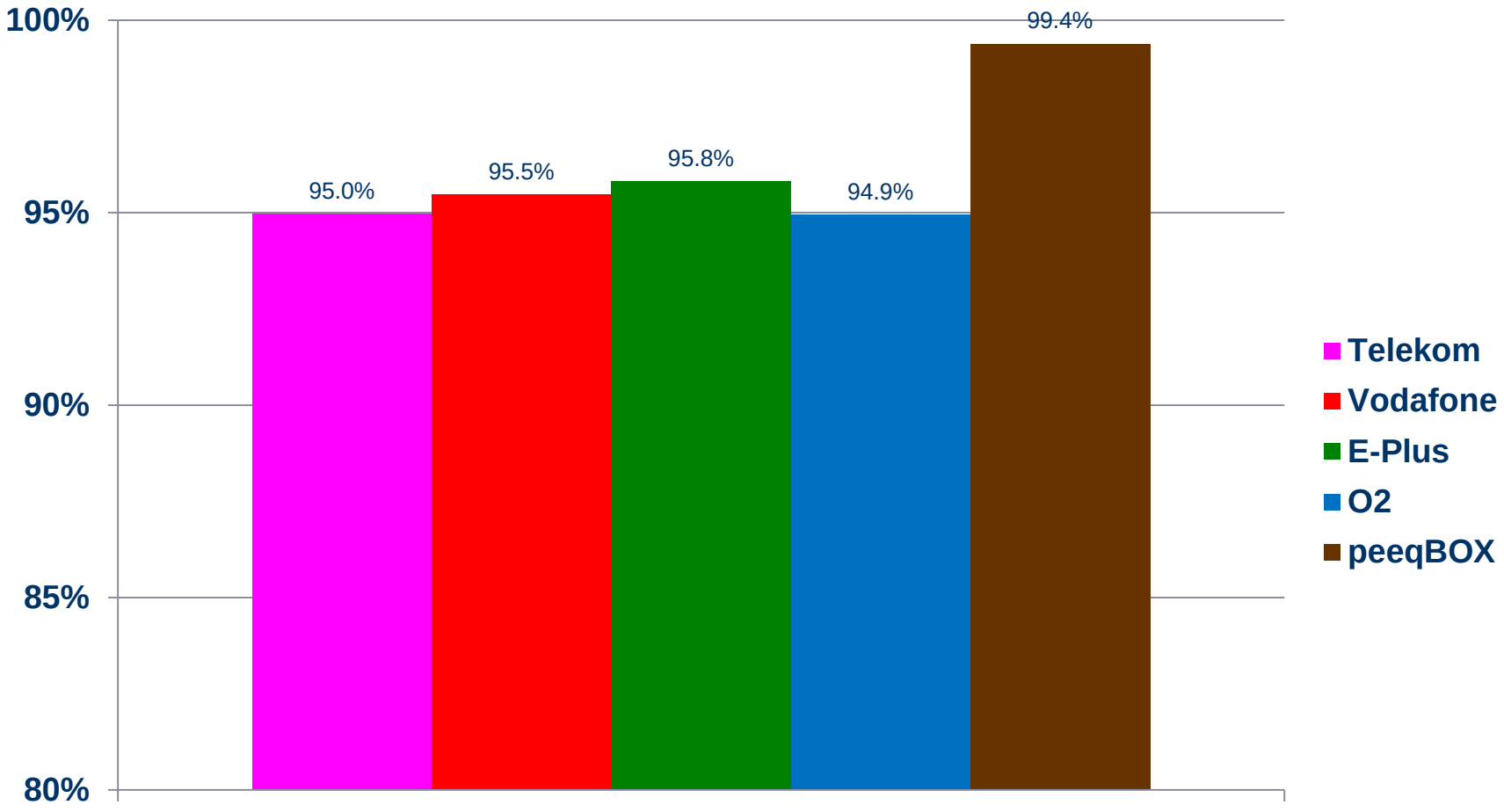




„Our“ tele-emergency system: The data transfer unit

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Is there a need for such an extensive technical solution?

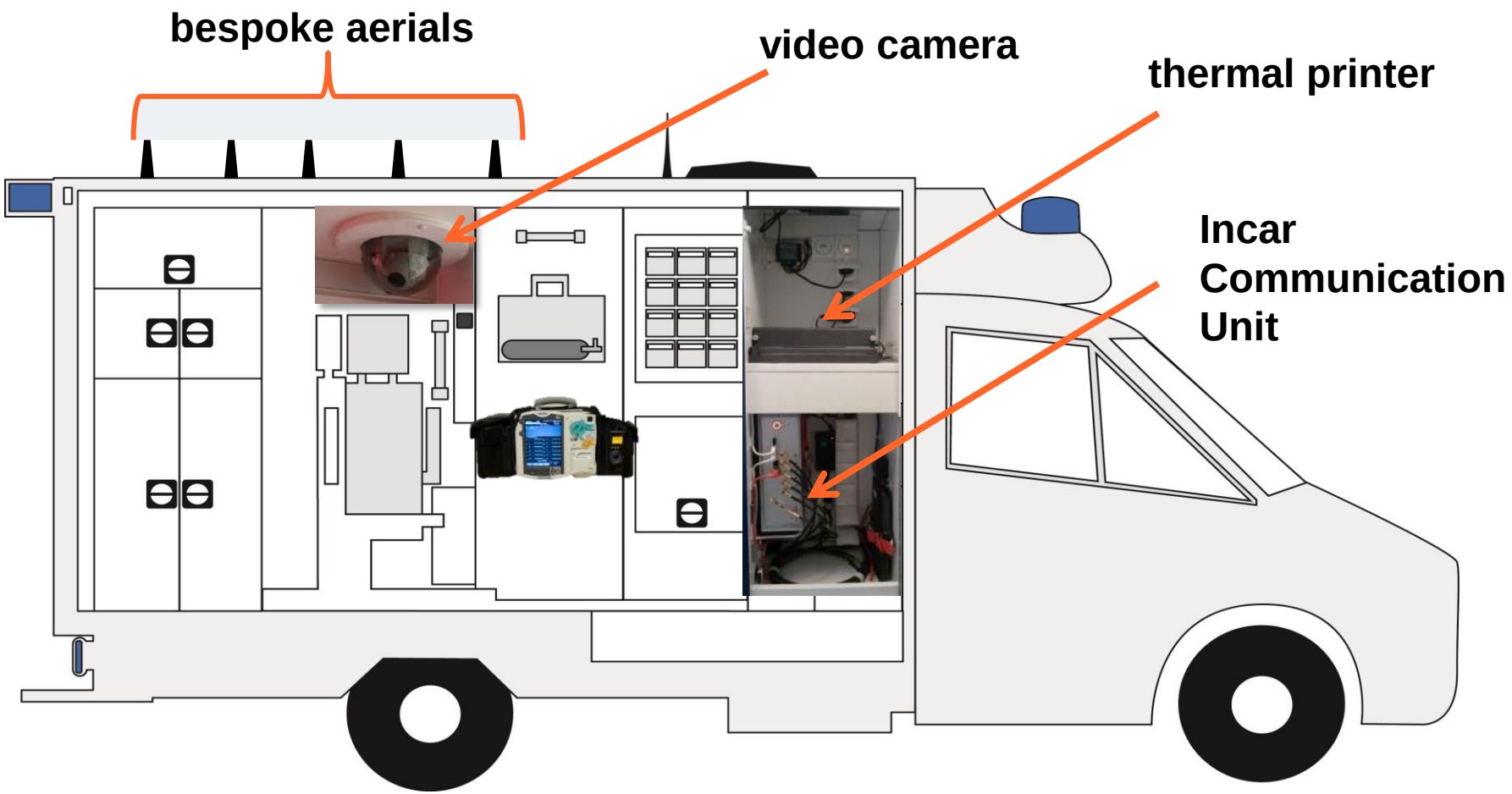


Verfügbarkeit Datendienst innerhalb von Gebäuden in Med-on-

(Quelle: P3 communications, 2011) @ix

„Our“ tele-emergency system: The ambulance

Devices in the ambulance



„Our“ tele-emergency system: The telemedicine center

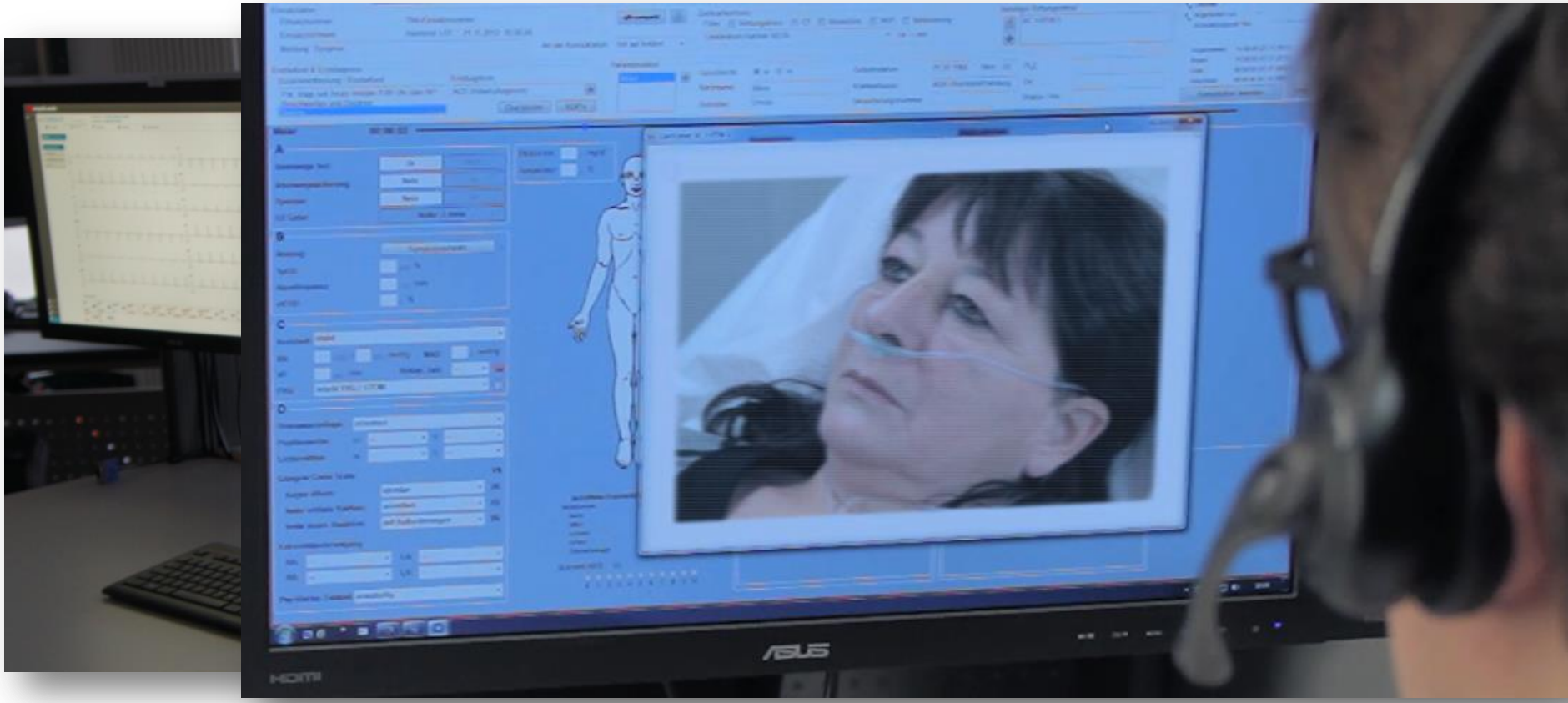
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„Our“ tele-emergency system: The telemedicine center

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Vital parameters / communication



„Our“ tele-emergency system: The telemedicine center

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Vital parameters

Protocol / Documentation

SOP´s / Checklists

GPS-tracking



The ambulance in Med-on-@ix

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…3.12.2009 – 30.09.2010 on duty (40h/week)

… ca. 450 patients treated

How did we target this project?

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1. Examination of the law

2. Analysis: Are there already tele-rescue systems established?

3. Establishment of a safe and robust data transfer unit and a physician-based tele-emergency center

4. Quality increase by development of telemedicine applicable SOP / checklists and integration of the software package

„Our“ tele-emergency system: The decision supprt system

TELENOTARZT

Vital parameters

Protocol / Documentation

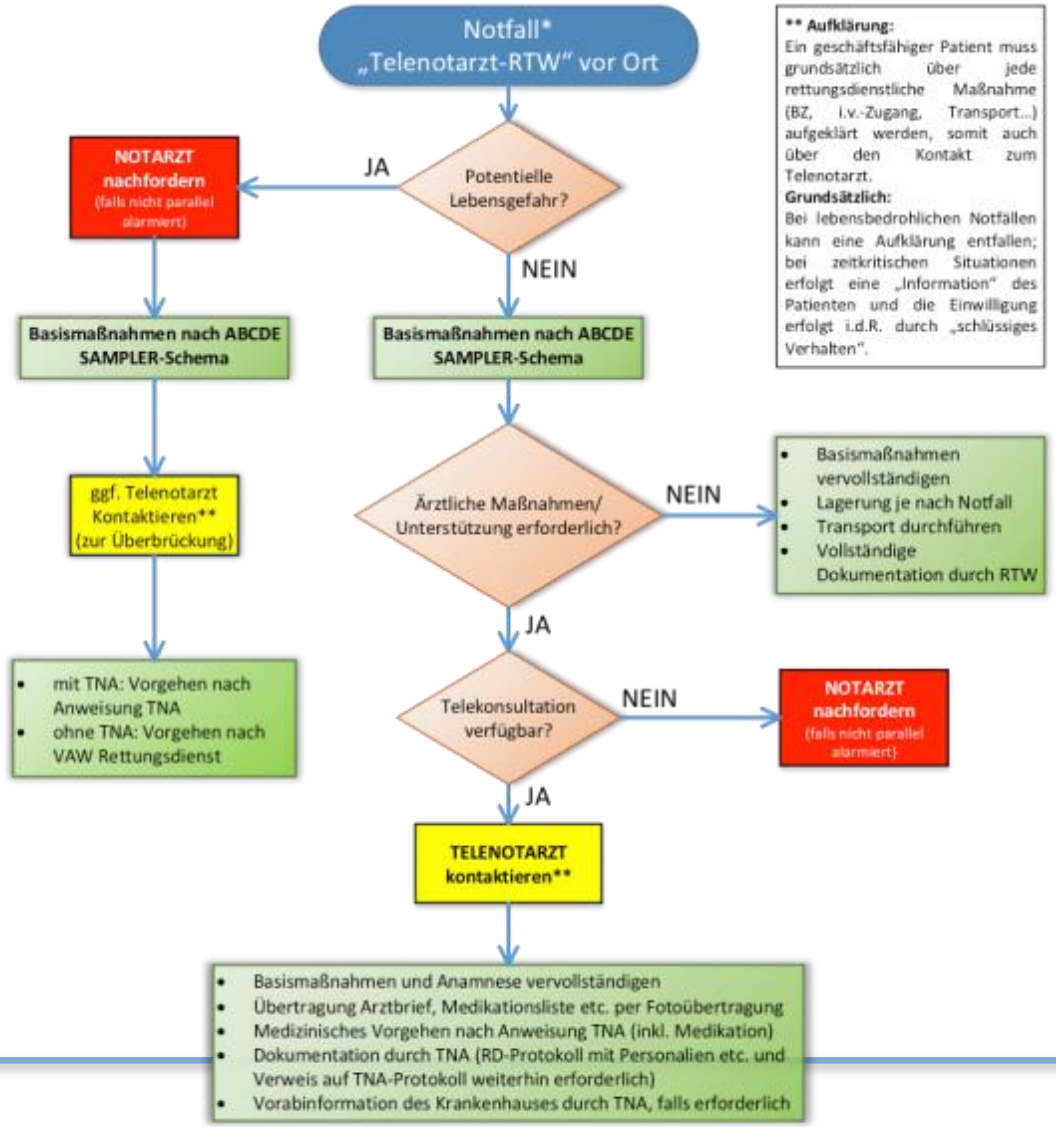
SOP´s / Checklists

GPS-tracking



Decision support system

Standard Operating Procedures



Decision support system

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Schlaganfall-Checkliste

Einsatznr.

Name | Vorname | Einsatzdatum 31.01.2014

Gerburtsdatum | Alter | Geschlecht ○ m ○ w | Erstellt um

Erstbefund

voraussichtliches Eintreffen

Symptombeginn: Freitag , 31. Januar 20 ○ unbekannt

RR / mmHg HF /min GCS BZ mg/dl

Allergien

min

Symptomcheck

Synkope erlitten?	ja -1	nein 0	unbekannt
Krampfanfall erlitten?	ja -1	nein 0	unbekannt
einseitige Facialisparese?	ja +1	nein 0	unbekannt
einseitige Armparese?	ja +1	nein 0	unbekannt
einseitige Beinparese?	ja +1	nein 0	unbekannt
Sprach- oder Sprechströrung?	ja +1	nein 0	unbekannt
Sehstörungen?	ja +1	nein 0	unbekannt

Rosier-Score Gesamtpunktzahl

Lyse-Kontrainindikationen

orale Antikoagulation? (z.B. Marcumar®, Pradaxa®, Xarelto®, Eliquis®)	ja	nein 0	unbekannt
Heparin? (z.B. Clexane®)	ja	nein 0	unbekannt
große OP / Trauma in den letzten 3 Monaten?	ja	nein 0	unbekannt
GI-Blutung oder sonstige Blutung in den letzten 7 Tagen?	ja	nein 0	unbekannt

Hausarzt | Tel.:

nächster Angehöriger | Tel.:

Dosistabelle Ketamin 0,25mg/ kg KG

Gewicht:	Dosis Ketamin:	Menge bei 10mg/ml:
30-39kg	8mg	0,8ml
40-49kg	10mg	1,0ml

Kontraindikationen für Analgosedierung mit

TELENOTARZT.DE

How did we target this project?

TELENOTARZT

1. Examination of the law

2. Analysis: Are there already tele-rescue systems established?

3. Establishment of a safe and robust data transfer unit and a physician-based tele-emergency center

4. Quality increase by development of telemedicine applicable SOP / checklists and integration of the software package

5. Development of educational concepts for the use of tele-emergency for physicians and paramedics

How did we target this project?

TELENOTARZT

1. Examination of the law

2. Analysis: Are there already tele-rescue systems established?

3. Establishment of a safe and robust data transfer unit and a physician-based tele-emergency center

4. Quality increase by development of telemedicine applicable SOP / checklists and integration of the software package

5. Development of educational concepts for the use of tele-emergency for physicians and paramedics

6. Field tests

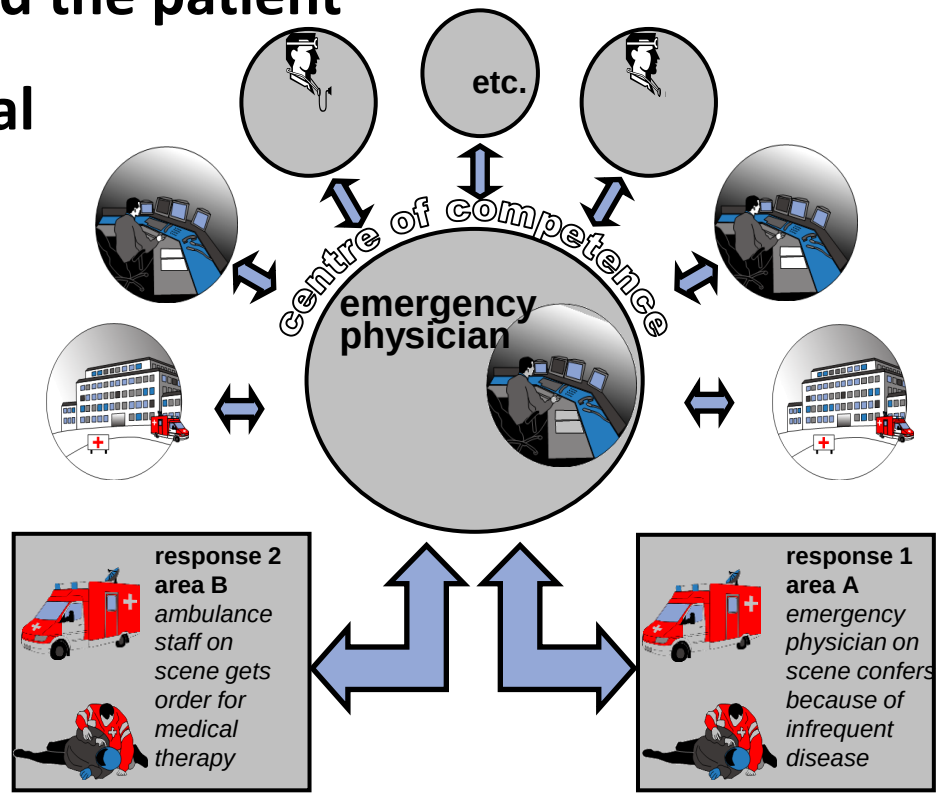
Phase 1: The Med-on-@ix Project (2007-2010)

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- **Design and engeneering of the tele-emergency system**
- **Field test from 12/2009 bis 9/2010:**

  tele- emergency physician treated the patient

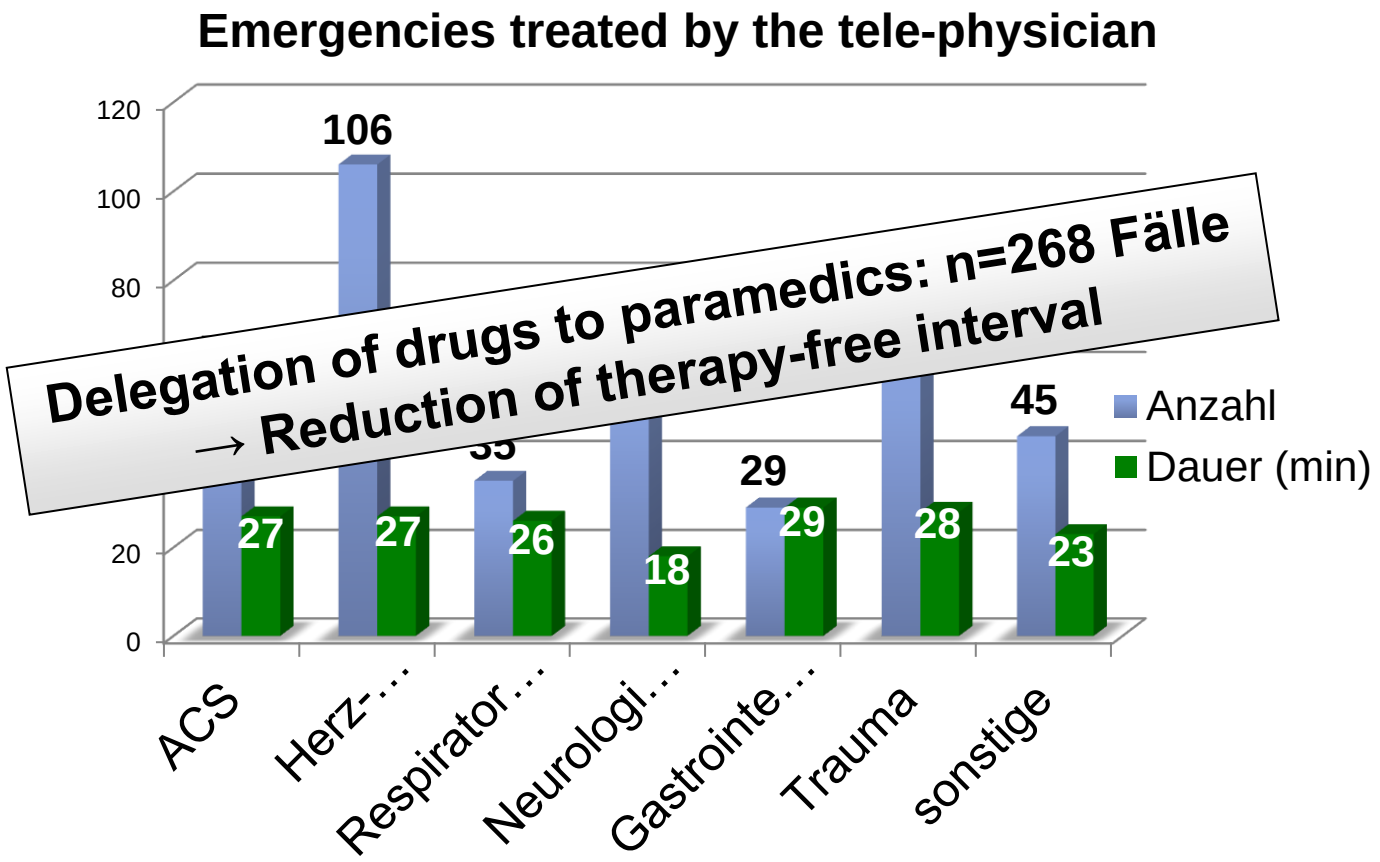
  (possible back-up by conventional physician present at the scene)



Bergrath S et al. J Telemed Telecare 2011; 17:371-377
Czaplik M et al. Methods Inf Med 2014; 53:99-107

Feasability: Med-on-@ix

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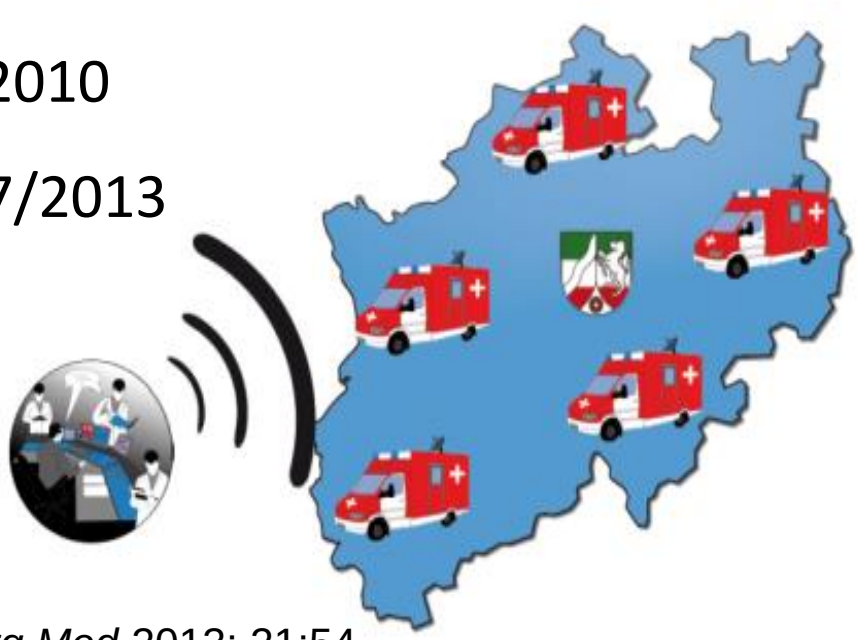


Disposition for emergency physicians was not changed!

Phase 2: The TemRas project (2010 – 2013)

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- Use of a technical improved system in five different districts
- Paramedics were enabled to contact the tele-emergency physician RA (freiwillig)
- Field test from 12/2009 bis 9/2010
- Evaluationsbetrieb 08/2012-07/2013



Bergrath S et al. *Scand J Trauma Resusc Emerg Med* 2013; 21:54
Brokmann JC et al. Anaesthesist 2015

Results from the project TemRas:

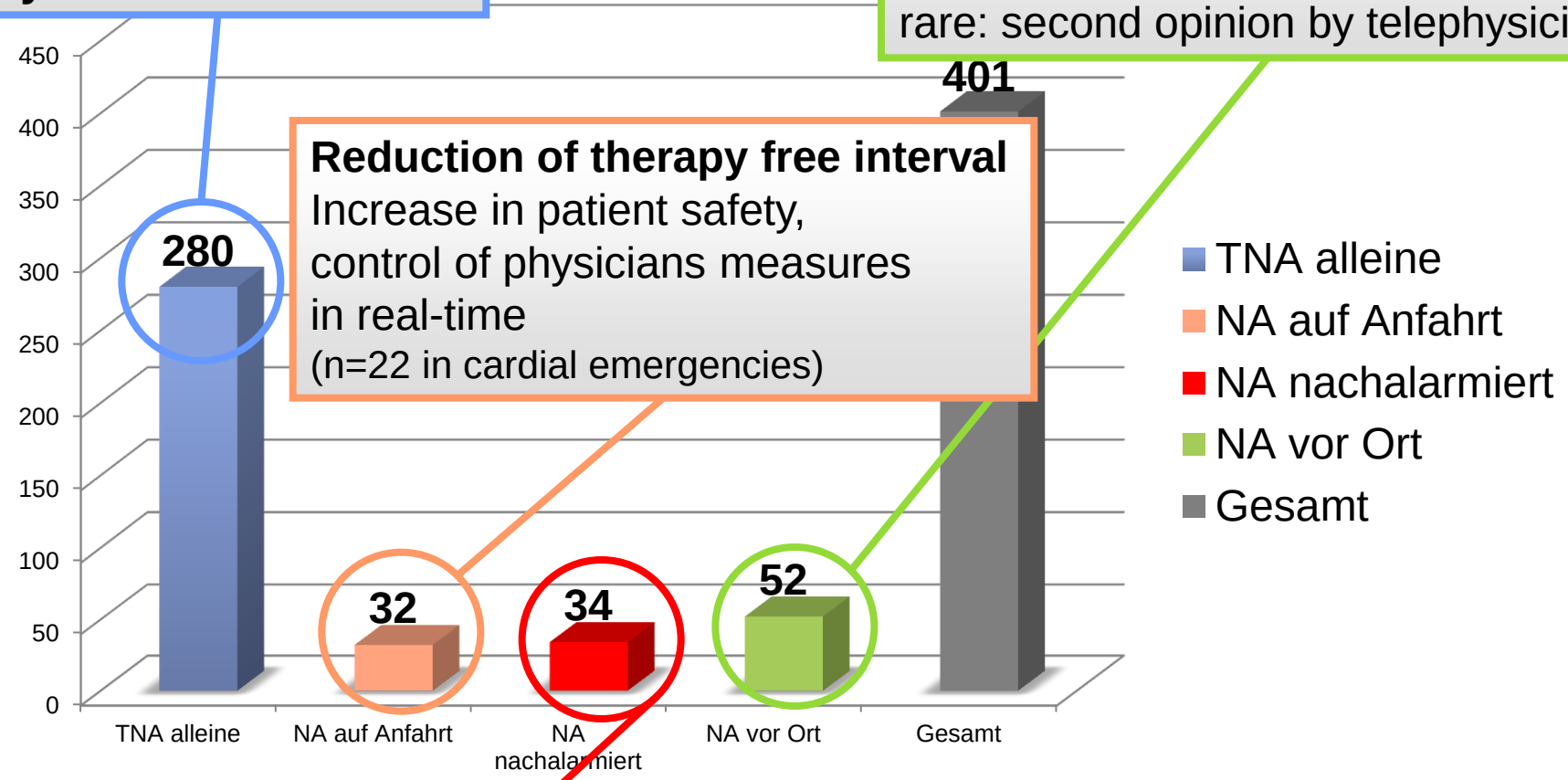
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Potential for savings of physicians at scene

e-emergency phys

Shorter time for physician at scene
TNA takes over for transport,
rare: second opinion by telephysician

Reduction of therapy free interval
Increase in patient safety,
control of physicians measures
in real-time
(n=22 in cardial emergencies)



Improvement of quality! Increase in patient safety!

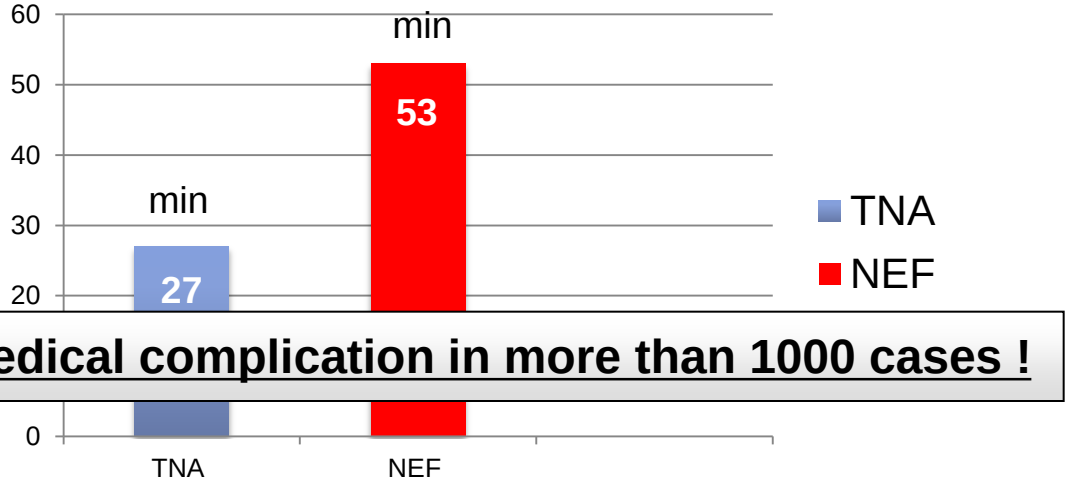
Efficiency and safety of the tele-emergency system

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Treatment duration



None medical complication in more than 1000 cases !

Bergrath et al Plos One 2013; Bergrath et al Scand J Trauma Resuscitation Emerg Med 2013

Quality in acute coronary syndrome: telemedical vs. conventional emergency physician

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- prospective, interventional multicenter-study
- telemedical supported or by conventional emergency physician (matched pairs)
- 150 patienten with cardiac/cir culatory symptoms treated by tele-emergency physician, 39 with acute coronary syndrome
- Treatment according guideline with respect to the following 5 items:

	Telemedical group n=39	Conventional group n=39	p-value
12-lead-ECG performed	38 (97%)	39 (100%)	1,0
ASS correct	31 (79%)	33 (85%)	0,73
Heparin correct	34 (87%)	33 (85%)	1,0
Morphin correct	29 (74%)	27 (69%)	0,5
Sauerstoff correct	29 (74%)	18 (46%)	0,007

Data 08/2012 – 07/2013 presented at DAC 2015

clinicaltrials.gov, NCT01644006

Main results from the projects:

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Prehospital emergency telemedicine

- is feasable in nearly all emergency situations
- will reduce the therapy–free interval especially in rural areas
- will be a quality improvement fotr the whole rescue system
- will increase the availability of the emergency physician

Transition in routine care is needed!

Step-by-step implementation of tele-emergency medicine

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- Start of an insurance reimbursed prehospital emergency system in Aachen beginning from 4/2014
- Step-by-step implementation of 24/7availability
- In addition: 2 conventional prehospital emergency physicians both available 24/7

Procedural instruction

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***Suited for tele-emergency consultation:**

- Hypertensive crisis
- Pain managment in non life-threatening trauma
- Stroke (without unconsciousness)
- Hypoglycaemia
- Assistance in unclear emergency situations
- Assistance with interpretation of ECG
- Sekundary transport of non-ventilated ICU-patients

:

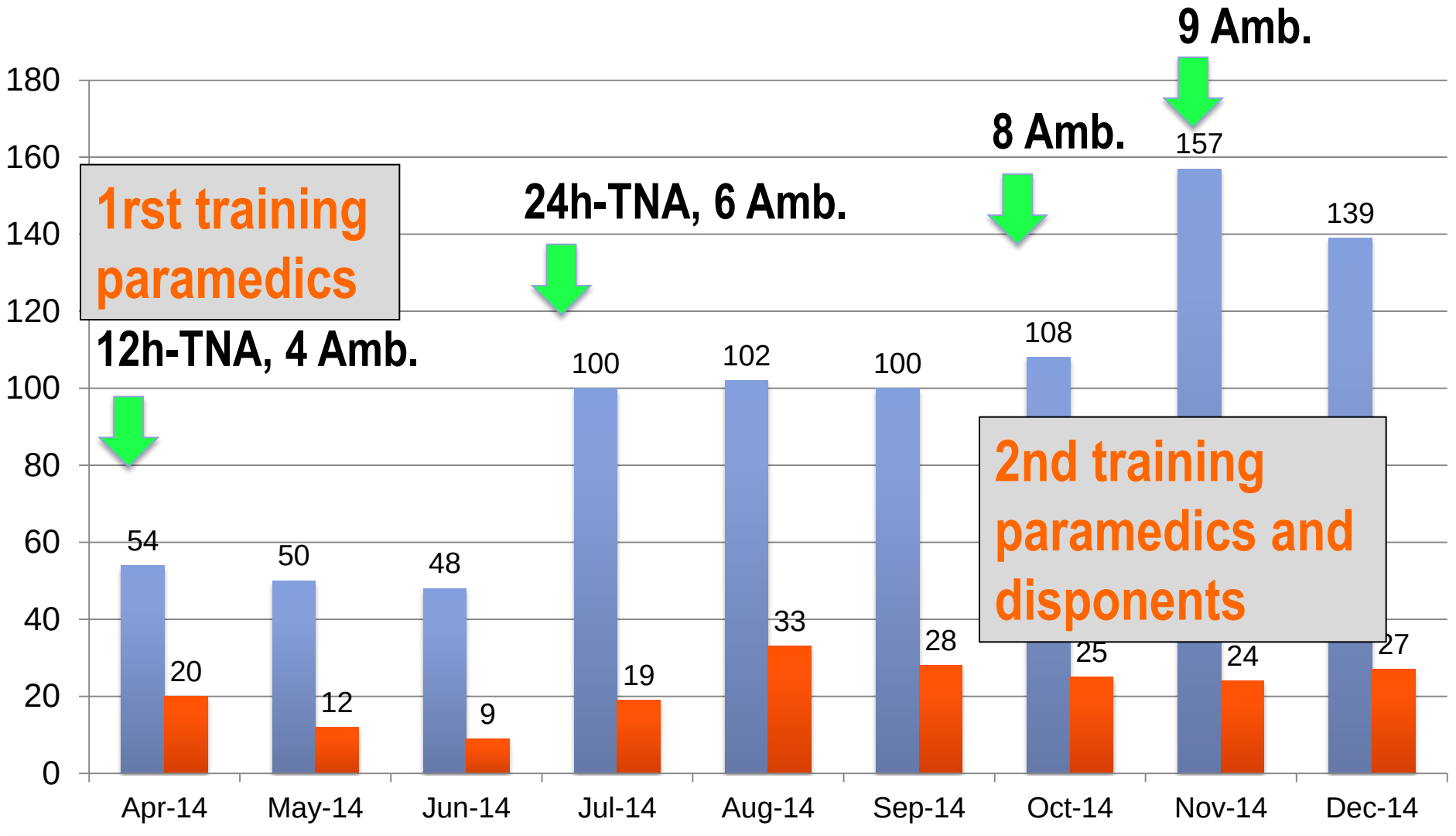
- **Pending arrival of the emergency physician**

***Indications for physician at the emergency scene**

- Resuscitation
- unconsciousness
- Acute coronary syndrome (STEMI)
- Cerebral seizure
- Severe dyspnoe/respiratory insufficiency
- Polytrauma, critical gun shots or stab wounds
- PsychKG-Indication or psychiatric emergency with children
- Burns
- Acute life-threatening emergency“

Step-by-step implementation of tele-emergency medicine

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Prehospital diagnosis Oct.-Dec. 2014

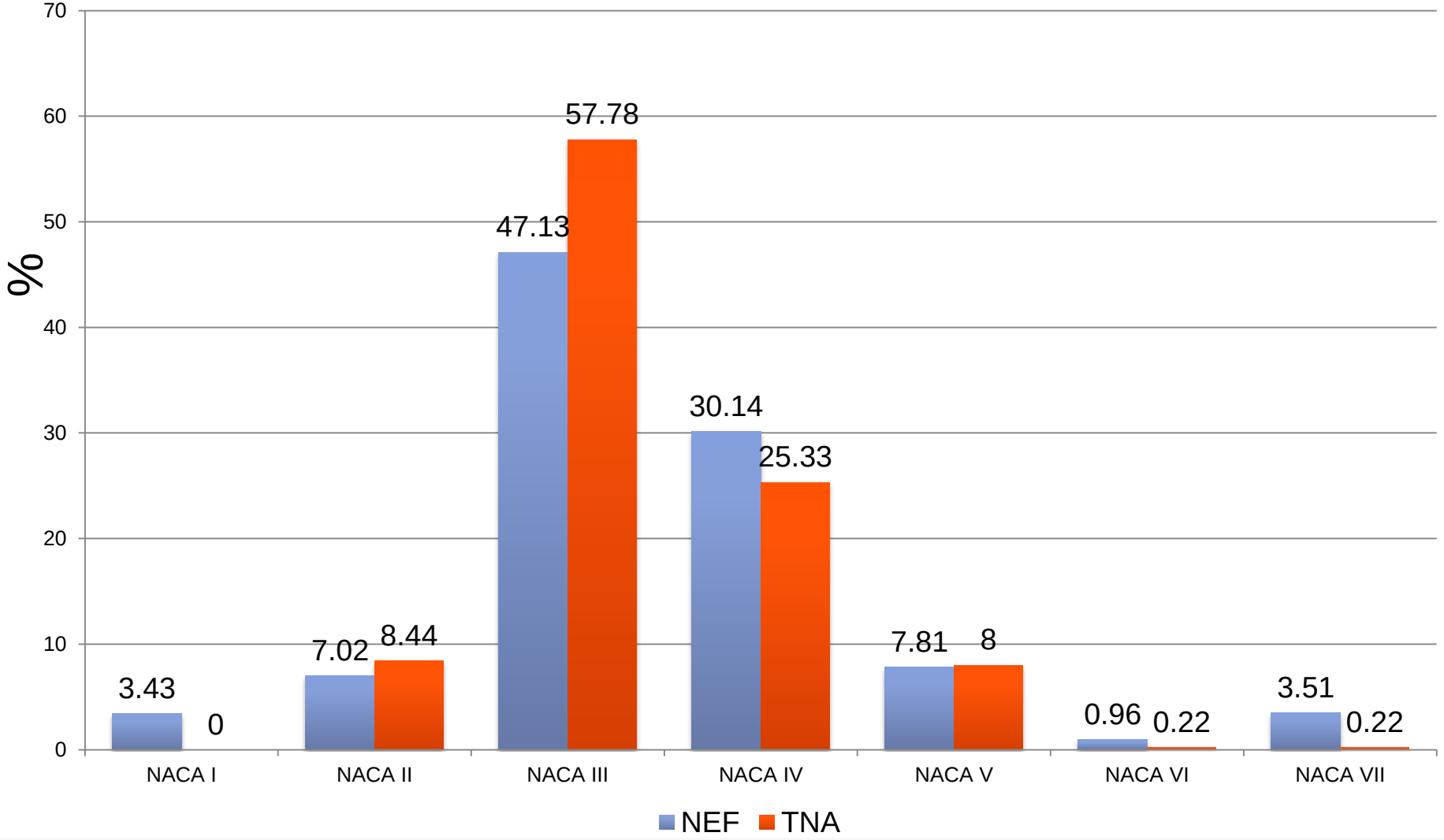
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Diagnosis	number	%
acute coronary syndrome	37	8,1%
NSTEMI	25	5,5%
hypertensive crisis	57	12,6%
trauma	56	12,4%
stroke	31	6,8%
acute abdomen	32	7,1%
arrhythmia	22	4,9%
seizure	18	4,0%
respiratory distress	15	3,3%
others (Neuro/Kreislauf/Psych/Infekt)	129	28,5%

Severity of emergencies in conventional vs. tele-emergency patients

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Data 07/14 – 09/14 in Aachen



Reliability of data transfer and communication

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OPEN ACCESS Freely available online

PLOS ONE

Feasibility of AmbulanCe-Based Telemedicine (FACT) Study: Safety, Feasibility and Reliability of Third Generation In-Ambulance Telemedicine

Laetitia Yperzeele[1,2]*, Robbert-Jan Van Hooff[1,2], Ann De Smedt[1,2], Alexis Valenzuela Espinoza[2], Rita Van Dyck[1], Rohny Van de Casseye[3], Andre Convents[2], Ives Hubloue[4,5], Door Lauwaert[4,5], Jacques De Keyser[1,2,6], Raf Brouns[1,2]

Tele-emergency system Aachen 2014: 95-98%

...in **41 of 43** cases ... the success rates for transmission of blood pressure, heart rate, blood oxygen saturation, glycemia and electronic patient identification were **78,7%, 84,8%, 80,6%, 64,0%** and **84,2%**...

PLOS ONE 2014

Reliability of data transfer and communication

TELENOTARZT

Stroke
Journal of the American Heart Association

American Heart Association | American Stroke Association

Telestroke Ambulances in Prehospital Stroke Management: Concept and Pilot Feasibility Study

Thomas G. Liman, Benjamin Winter, Carolin Waldschmidt, Norman Zerbe, Peter Hufnagl, Heinrich J. Audebert and Matthias Endres

Successful video data transfer in Aachen 2014: 97%

In 18 of 30 scenarios NIHSS assessment could not be performed due to loss of audio-video signal...

...not an acceptable level for clinical use, at least on the basis of the used technology...

Stroke 2012

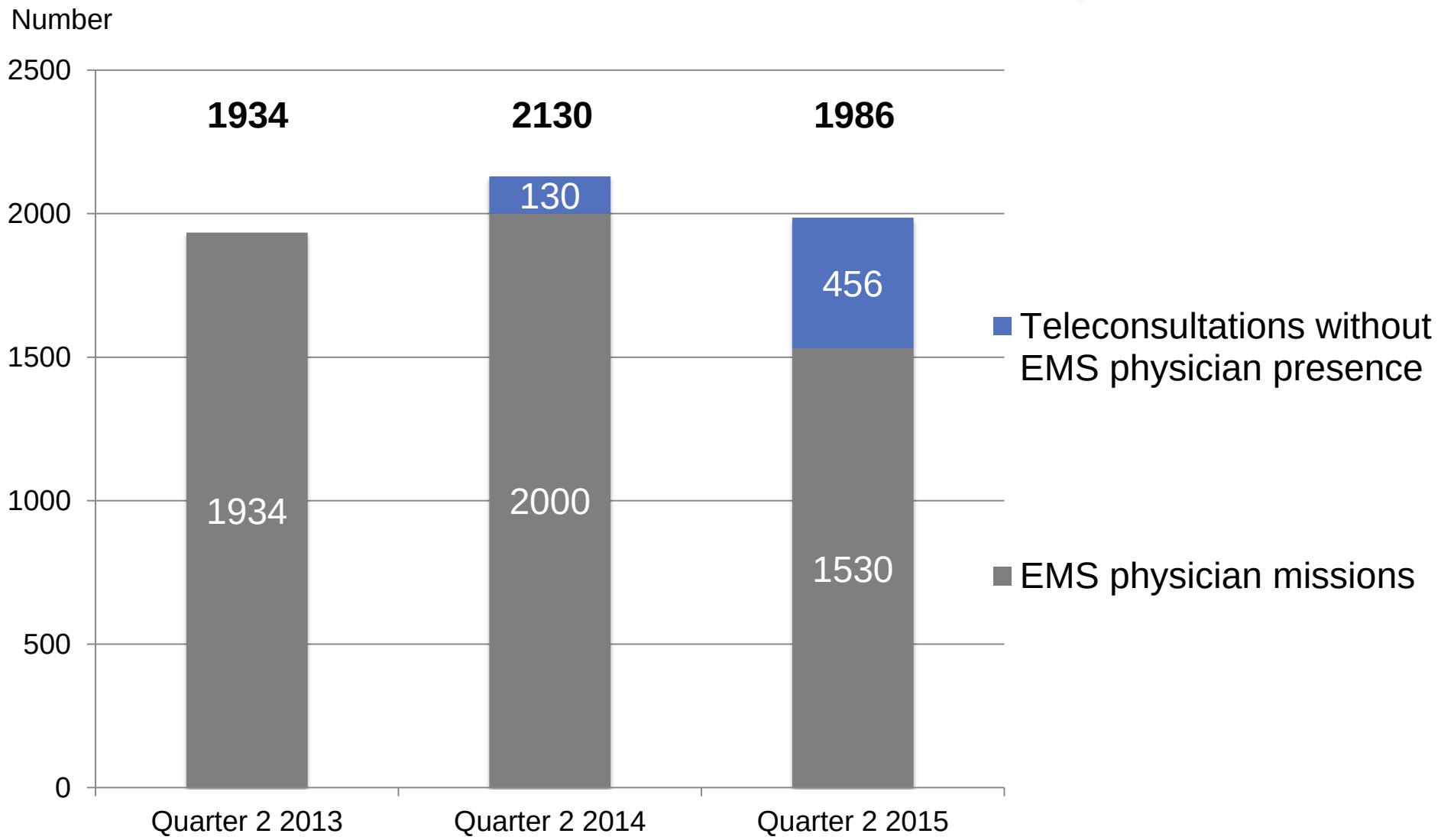
What did we achieve ?

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- Teaching and training of **17 tele-emergency physicians**
- Teaching and training of **263 paramedics**
- **> 3000 patients treated with prehospital tele-emergency care**

Cases in the prehospital emergency system in Aachen

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Efficiency of (our) prehospital emergency telemedicine system

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- Telemedicine supported emergencies:
  - Duration including documentation: 31 min

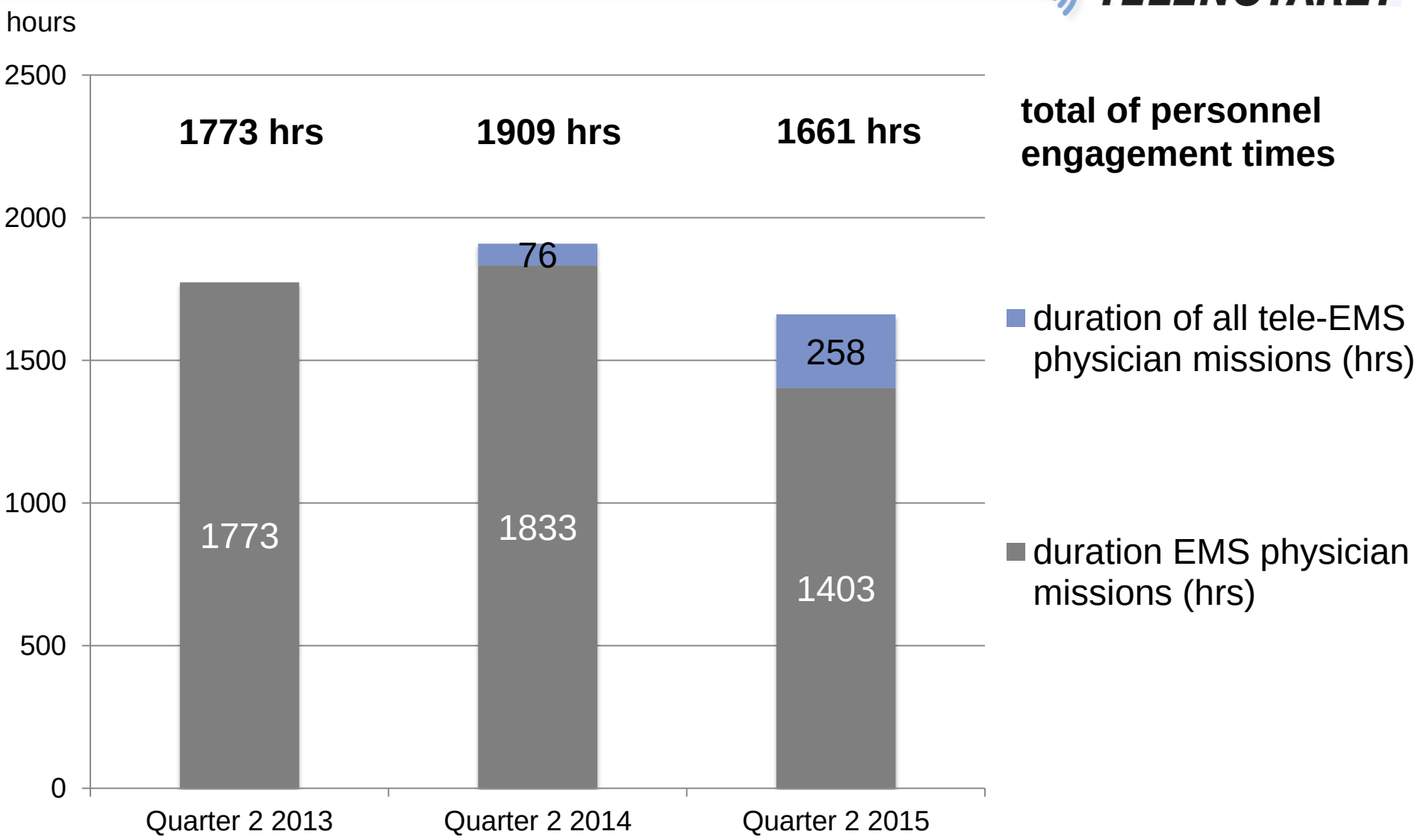
- Conventional prehospital emergencies:
  - Duration including documentation and return to basis: 54 min

Needed time ~ 50% shorter if telemedicine is used

Daten 3. Quartal 2014, BF Aachen

Cumulative personnel engagement times of physicians

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Benefits of a telemedicine supported prehospital emergency system

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System related benefits:

- Reduction in physician-directed therapy free time lapse
- Reduction of personnel engagement time of physicians
- Optimization of the use of the emergency physician
- Support/supervision for paramedics and physicians
- Increase in legal certainty of paramedics

Software related benefits:

- Diagnosis and therapy according guidelines and checklists
- Improvement in quality of diagnosis and therapy
- Systems reminds you, if you forget something
- Automated quality checks (Adherence control)

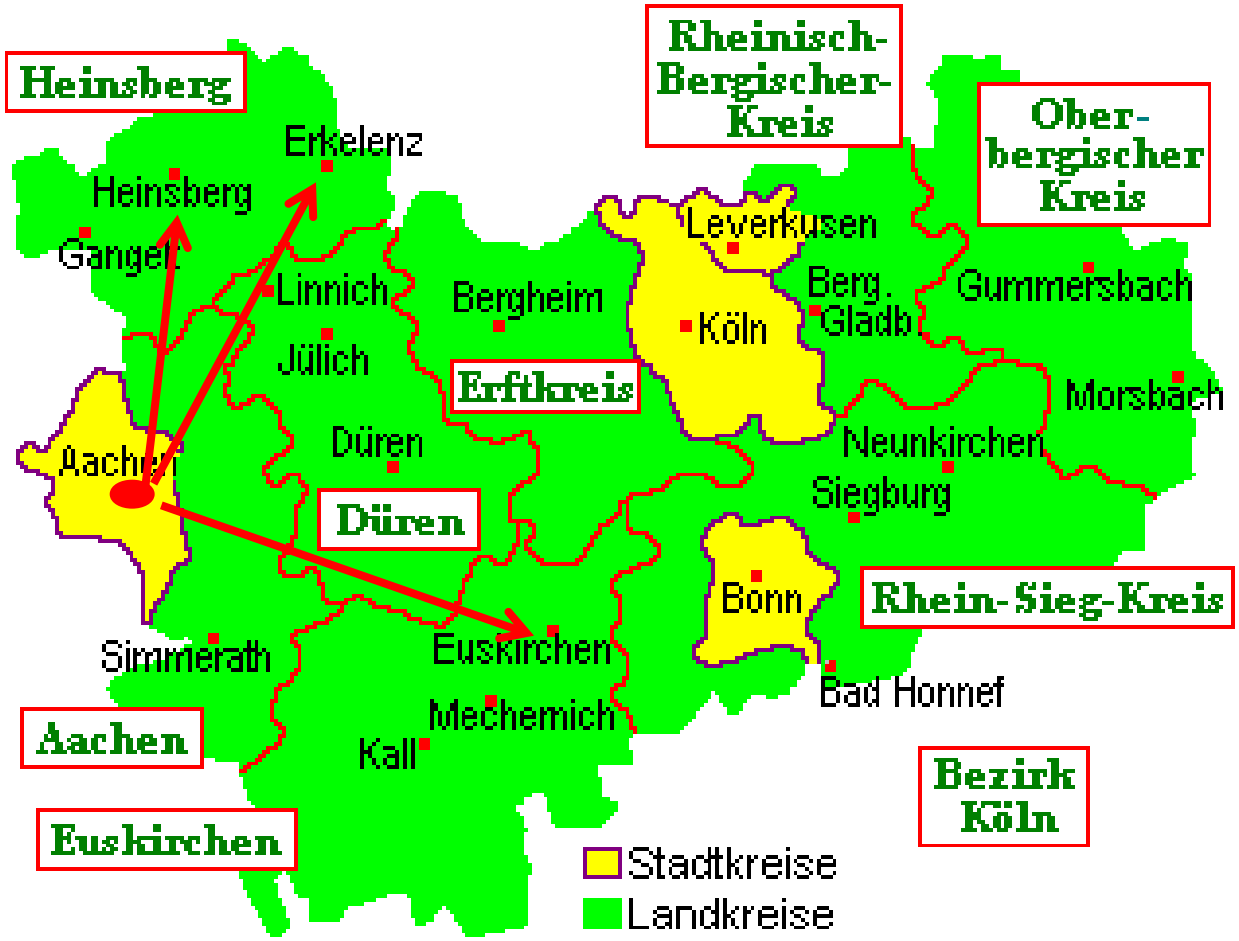
Increase in Quality

Economic benefits

- A 24/7 tele-emergency physician is able to deal with ~12.000 - 15.000 cases
- 30-40% of all inter-hospital transports can be supervised
- If implemented transregional, it results in a reduction in the increasing need of additional conventional emergency physicians

One prehospital emergency telemedicine center serves several emergency districts

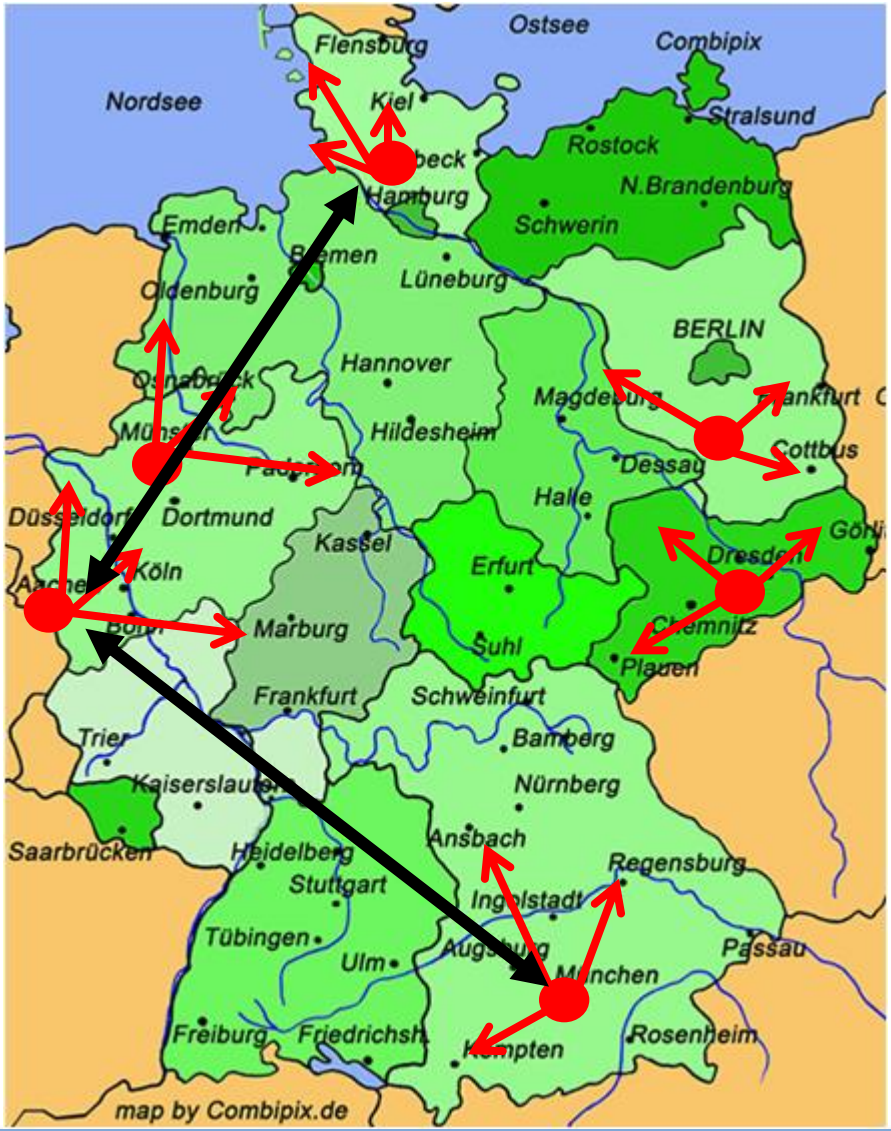
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Bezirk Köln
mit den Landkreisen

Several prehospital emergency telemedicine centers serve nationwide

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Take home messages

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Telemedical Rescue Assistance

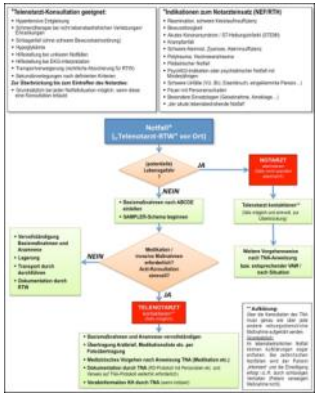
- **A TELE-EMS PHYSICIAN FOR EMERGENCY MEDICAL SERVICES**
  - 24/7 teleconsultation services for EMS
  - High qualified EMS physicians supporting missions
  - live transmission of patient data



- **HIGH QUALITY MEDICAL SUPPORT AT THE TOUCH OF A BUTTON**
  - Immediate medical support
  - Using standard communication devices
  - Enhanced legal certainty for EMS by means of medical delegation



- **QUALITY MANAGEMENT IN EMERGENCY MEDICAL SERVICES**
  - Seamless qualified documentation of the treatment
  - Equal, guideline compliant treatment
  - Using defined standard operation procedures



- **SEAMLESS INFORMATION MANAGEMENT ALONG THE RESCUE CHAIN**
  - Preinformation from the EMS mission to the clinic
  - Seamless digital documentation of the treatment

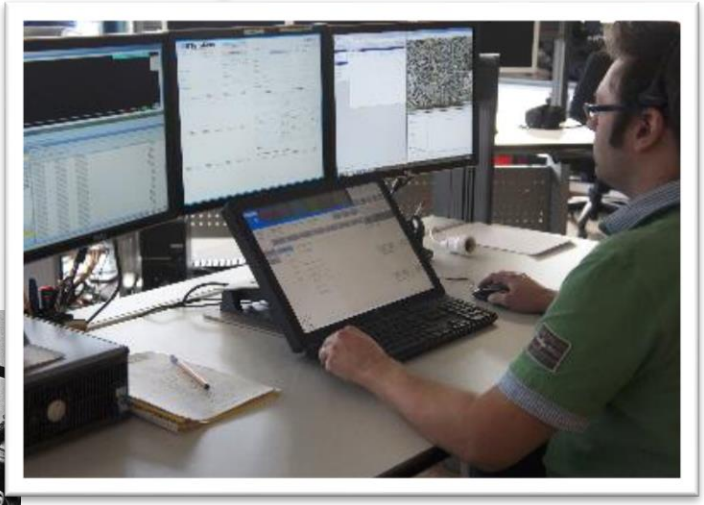


Milestones in german rescue structure

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1957

Ambulance Cologne

1970

Christoph 1 Munich

2014

Tele-emergency Aachen