Teleconsultation in German EMS – from research to reality

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Agenda

1. Motivation
2. Concept of a tele-EMS physician
3. Technical requirements and solutions
4. Operation of teleconsultation service
5. Outlook
Introduction to (German) Emergency Medical Services

**Motivation**

**Increase of Mission Numbers, Demographic Trend**

**Shortage of Physicians**

**Influencing Factors**

**Emergency Medicine is Information Management**
Chances of teleconsultation in EMS

**Instead of manual skills of the physician decision-making authority is needed (e.g. in the question of whether the patient can remain at home)**

![Bar chart showing distribution of EMS missions to different NACA severity scores.](image)

**Scoring system of the severity in cases of medical emergencies**
- NACA I-III = 60.17%
- Capability for tele-EMS physician

**Daily routine – mobile solutions**
- Telemedicine applications for cardiac emergencies aim at improved care and outcomes

  - Delegation of "medical measures" is legally possible and in other projects safely and successfully implemented
  - Kill C, Notfall Rettungsmed 2011; Katzenmeier, Kölner Schriften zum Medizinrecht 2010

**State of research and challenges**
Telemedical Rescue Assistance

A TELE-EMS PHYSICIAN FOR EMERGENCY MEDICAL SERVICES

- 24/7 teleconsultation services for EMS
- High qualified EMS physicians supporting EMS missions
- Realtime 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
Main objectives Teleconsultation

**The tele-EMS physician can and should not replace the physical EMS physician, but:**
- Reduce treatment-free interval
- Increase availability of emergency resources
- High-quality addition to the overall EMS

**The concept aims at:**
- Improving patient-centred care
- Increasing efficiency
- Optimizing information flow
- Saving time
- Providing immediate medical support for the EMS personnel onsite
- Ensuring data privacy and permitted delegation of medical measures
- Reliable and secure technical systems
- Appropriate usability for technical system
- Transmitting audio and video data, vital signs and 12-lead-ECG in real-time from the emergency site to the teleconsultation center
- Customizing solutions for different application domains
Technical requirements and solutions

Main functionalities used by a tele-EMS physician

- Voice communication
- ECG and vitals
- Photo, video stream
- Documentation, SOP
- System diagnostics, ...

Application priority

On scene

Voice communication

Sign up

Hospital
Technical requirements and solutions

Usage of standard products/services is not applicable in the field of EMS
Redundancy of communication links is a mandatory requirement for a reliable usage of teleconsultation in EMS

**IMPROVING ALWAYS BEST CONNECTED APPROACH**
- IP communication is based on parallel usage of different carriers of commercial cellular networks
- Significant increase for IP connection availability for indoor usage
- Data bundling approach allows almost always continuously highest service quality

**EXEMPLARY RESULTS FROM FEASIBILITY STUDY**

Availability of data service is defined as the fraction of time during every emergency case where the ping requests have been successfully responded within a timeout period of 60 s. Presented is the average value over all indoor emergency cases.
Very easy handling, robustness of services and interoperability of devices is mandatory for value proposition

**Very easy handling and faultlessness of services are key success factors for user acceptance**
- Technical assistance systems shall adapt to work flow in EMS
- One-button-press philosophy
- Customized applications
- Automated inspection and recovery of service quality (internet dialup, powercycling modems, failure detection & recovery, ...)

**Interoperability enables integration of different products/manufactures**
- Providing open interfaces for connecting new devices – no exclusive usage of specific manufacturers
- Using standard technologies and protocols
- Integrating approved and certified medical products without the demand for a new certification process (MPG)

**Further optimization**
- Data prioritization on different layers
- Hub concept (inside/outside ambulance)
- Voice communication is based on three different operators – still usage of circuit switched telephony
- Reduced size and weight of portable communication unit (peeqBOX)
- Intelligent power on/off mechanism
- Easy-to-use user interface
Operation of teleconsultation service

From research to reality ...

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2007-2010

2010-2013
Implementation of teleconsultation service in German EMS

Preparation
- Requirements management:
  - Definition of the application domain and specific usage scenarios
  - Definition of technical requirements
- Customer specific pre-calculation of necessary resources
- Negotiation with health insurances

Introduction
- Approval by EMS authority
- Modification of ambulance vehicle
- Technical interconnection between ambulances and teleconsultation center
- Training
- Change management und organizational implementation of teleconsultation service (Employee committee, procedure instructions, etc.)

Operation
- 24/7 teleconsultation service
- Technical and organizational support
- Maintenance
- Training
- Quality management & reporting

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Integration of customer specific monitor/defibrillator

- Connection of various sensors including tele-medical application
- Independence from medical device manufacturer
- No impact on certification by Medicinal Devices Act

Operation of teleconsultation service
Operation of teleconsultation service

Workplace at the control center of the Fire Department in the City of Aachen
Expanding teleconsultation service

A STEPWISE GLOBAL ROLL-OUT

Regional Introduction
Pilot introduction of a Regional Teleconsultation Center (TCC) in North-Rhine-Westphalia (NRW)

National Deployment
- National reach-out
- Cooperation/load balancing among TCCs

International Roll-Out
Introduction and deployment of TCCs in other mature medicine markets

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