ICT-Tools to Facilitate Physician-to-Physician Communication

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Abstract. We developed two applications to improve physician-to-physician-communication in trauma care. The first one connects an emergency physician directly to the physician on duty at the hospital, the second one transfers radiological images to support patient transfers between hospitals. Both systems were tested in Münster and have been rolled out to the area of the Trauma Network North-West in Germany. Currently, 102 physicians in 18 hospitals are connected and transferred 26193 images so far. The evaluation, with focus on usability and transfer speed, is ongoing.

Keywords. Telemedicine, data transmission, emergency medical service

Introduction

US studies have shown that the turnaround time of ambulances transporting severely injured patients is just under an hour.[1] Due to the fact that the chance of mortality grows in blunt abdominal trauma by one percent every three minutes it is very important that the patient gets appropriate treatment as soon as possible.[2] Emergency Medical Service (EMS) in Germany is usually coordinated by the local fire brigade.[3] Therefore, the EMS dispatcher often has to forward the information from the emergency physician to the treating hospital.

Different initiatives are carried out with the goal to improve the outcome of severely injured people. One of the most promising approaches are trauma networks – associations of adjoining hospitals.[4] These hospitals are usually graded into three different levels by their medical capabilities in acute trauma care. Trauma units in Germany and neighbouring countries are, on a voluntary basis, categorized into three different levels.[5,6] 44 hospitals take part in the “Trauma Network North-West”, one of the biggest trauma networks in Germany. Accident victims or seriously ill individuals are often transported to a hospital specialized for their needs.[3] If the diagnosis turn out that the injuries are more severe, the patient will be transferred to another hospital with extended treatment capabilities.

Direct Physician-to-physician-communication independent from their location can avoid misunderstandings and speed-up diagnostics and treatment. This includes the transport from accident sites to rural hospitals as well as the transfer of patients to
another hospital. In case of patient transfer, currently there is often no other option than saving radiological images to compact discs and sending them with the patient.

1. Methods

The goals of the project are to shorten the time gap between accident and admission to the appropriate hospital, to create effective ways of communication and to support the development and implementation of common pre- and in-hospital standards for trauma care. To support and improve the communication between physicians involved in the trauma patient’s treatment, we developed two systems with different focus: H.E.L.P. and MedSix.

We built a smartphone application to support emergency physicians choosing a suitable hospital for the patient. A focus group of paramedics, emergency physicians and computer scientists specified the requirements of hardware and software. The product had to be robust enough to withstand the surrounding of an accident site. The first prototype of H.E.L.P. was developed for a normal mobile phone and was tested for 6 months in Münster.

During the development of MedSix it turned out that nearly every clinical desktop system was able to run Java Applets. Furthermore, every radiological employee was capable of burning images and DICOM-data to compact discs. Moreover, every workstation was equipped with a web browser and HTTPS-connections were mainly unfiltered. The system prototype was implemented as a web application. The functionality included creating new transfers, showing preview images and downloading data. The upload of images was realized by a Java-Applet capable of reading DICOM-CDs. After rollout to six hospitals in Münster users complained about the fussiness of burning CDs due to existing network connections. So we integrated a direct PACS-Query into the Upload-Applet by using the dcm4che framework. Another user request was the opportunity to invite practitioner for single transmissions. Thus, we implemented a system for creating accounts with 48 hours validity. These users can only transfer data to the hospital which created their account.

2. Results

The systems have been running since 2010. Three H.E.L.P.-devices are used by the fire department Münster on their emergency physician’s vehicles. Although the treatment options of the hospitals are well known by the emergency physicians, the callback functionality is appreciated. The main functionality of H.E.L.P. was accepted by the users. Besides the utilization for trauma patients the integration of further medical indications has been requested.

MedSix has been rolled out in the Münsterland, the region surrounding Münster. Currently 18 hospitals are connected with each other and three of them even integrated their local PACS. There are 102 physician accounts within the system. Between January 2011 and March 2012 a total of 26193 images from 43 patients have been transmitted, mostly to hospitals with a superior trauma level.
3. Discussion

There are many projects focused on telemedicine for rescue operations. Some of them concentrate on transmitting EKGs and EEGs to the admitting hospital.[7] But, to our knowledge, none of them provides simple phone calls directly to the physician on duty at the hospital. Additionally, nearly no setup or configuration is needed to use our system. The application only has to be activated once by the fire department headquarters. There is no need for specialized hardware or specially equipped vehicles. Furthermore, the fire department is considered in every workflow. Our major task at this moment is connecting H.E.L.P to the command and control system of the fire department to exchange further relevant data, e.g. operation locations.

In addition to MedSix other systems targeting on tele-radiology already exist, but many require local software installations which causes additional efforts for rollout and maintenance. Some research groups already tried to photograph x-rays with consumer cameras and proved that the quality loss is acceptable.[8] Nevertheless, this quality reduction conflicts with German x-ray-regulations. We tried to design MedSix as an easy to use application and this seems to be appreciated by the involved users. Although training courses are offered to connected hospitals and emergency physicians, most of the users can use the system without further instructions.

Studies ten years ago pointed out that direct communication between physicians is beneficial for patients and saves cost, although bandwidth and technical possibilities were limited in the past.[4]

References