Prehospital Telemedicine

Stroke-Emergency-Mobile (STEMO) – a prehospital health care solution for acute stroke patients as part of the hyper acute stroke clinical pathway

VIMED® STEMO

2nd Edition

- **Advanced triage of stroke with special questionnaire during the emergency call**
- **Prehospital CT-diagnostics including angiography and blood analyzer**
- **Remote follow up and support for the emergency team with involvement of the radiologist**
- **Quick decision-making about the lysis on board and logistical transport of the patient to the nearest specialized hospital**

There are 17 million people worldwide who suffer a stroke and the number of the patients is growing each year. Stroke is a significant cause of both death and of disability. Strokes are caused by the sudden interruption of the normal blood circulation leads to the reduction of the oxygen delivery into the brain cells and furthermore to the changes in normal brain activities. The widespread consequences of that are partial paralysis, aphasia and other tactile functions. Stroke affected people often need to relearn essential skills such as walking, speaking, independent eating as a scope of ADL (Activities of Daily Living) skills. To reduce the consequences of suffering a stroke, the patient needs swift hospitalization into the nearest specialized hospital stroke, or a hospital with a neurosurgical department, or a hospital equipped with catheter workstations for mechanical thrombectomy (mechanical recanalization).

Development Partnership with the Center for Stroke Research of Charité Universitätsmedizin as the lead of consortium and Berlin Fire Department.

This project is funded by TSB Technology Foundation from the budget of the Future Fond in the State Berlin, co-financed by the European Community - European Regional Development Fund.
Invest for your future!

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN

BERLINER FEUERWEHR

TSB TECHNOLOGIESTIFTUNG BERLIN

LAND BRANDENBURG Ministerium für Wirtschaft und Europaangelegenheiten

EFRE ...eine Chance durch Europa!

Investition in Ihre Zukunft! EUROPÄISCHE UNION Europäischer Fonds für Regionale Entwicklung www.efre.brandenburg.de

MEYTEC

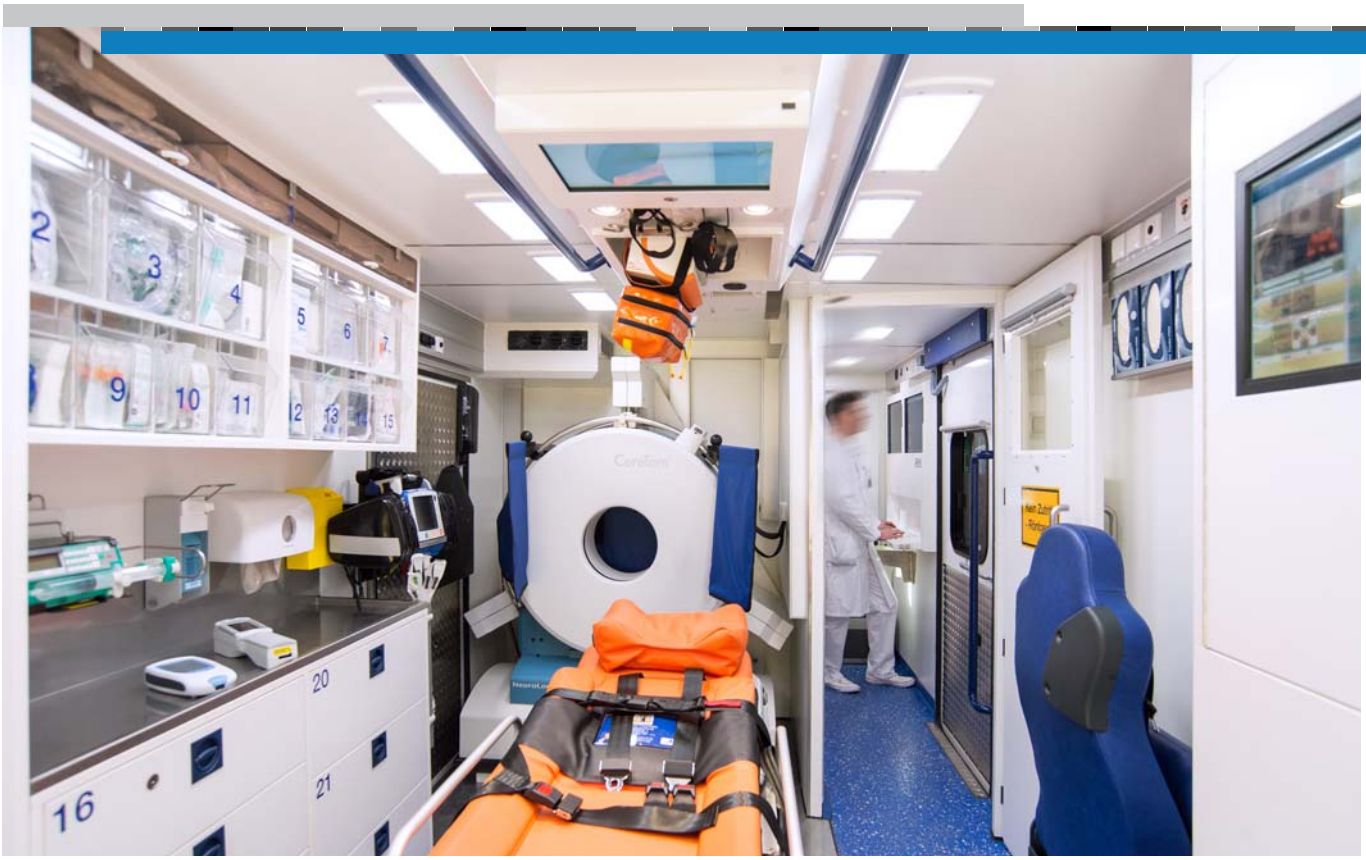

Photo: UKB

The figure above shows the interior of the VIMED® STEMO with one of the smallest computer tomographs (CT) worldwide for head diagnostics. Additional to this there is modern laboratory equipment, telemedicine solutions for remote teleconsultation and step-by-step documentation as well as standard equipment of the emergency vehicle. The specially trained personnel make the head scan directly on board of VIMED® STEMO. The scope of the diagnostic data and related information from the patient are provided through the broadband channels to the remote neuroradiologist.

The special equipped vehicle VIMED® STEMO is staffed with the professional team of stroke paramedics and rescue workers. The VIMED® STEMO solution helps to detect acute stroke outside of the specialized stroke unit definitively. The latest clinical data show, that the mobile stroke units can deliver the needed emergency care to more stroke patients during the so called "golden hour" after onset.

Photo: UKB

The "gold standard" for precise detection of the cause of stroke is a radiological examination of the blood vessels and so called "haemogram". After the disclosing of the contraindications the physician makes a decision for the medicinal destruction of the thrombus with a lysing-solution (lysis therapy) or for the thrombectomy procedure (neurosurgical interventions into the occluded vessel). Time is of the essence with every minute counting and the loss of time can result the above mentioned disfunctions. It is important to remember the maxim "time is brain", time saved in delivering the right kind of clinical care and treatment to the patient can significantly impact on the quality of their lives post stroke. Pin-pointing the actual timing of the onset of stroke either by the individuals themselves or by their relatives is crucial. In addition to this, the informational and organisational improvement of the entire rescue-sequence including the prehospital laboratory, the inspection with medical devices and the neurological examinations are significant factors in saving time.

The result of all these attendant factors is that the critical period is extended before possible treatment can begin. The analysis of such process steps leads to the perception, that the execution of all operational procedures without any external distraction, improves the diagnosis and therapy of

stroke. As a result, any delivery times between procedures can be reduced and the distraction from other emergencies can be avoided.
Furthermore, the presence of a stroke specialists onboard the emergency vehicle adds to the crucial argument of the improvement of care for the patient. The opportunity to begin treatment (where possible) within the first hour of the stroke onset onboard the emergency rescue vehicle has a significant effect on the wellbeing of the stroke patient.
During the pilot in the Berlin city the average time needed for the first emergency care was reduced by 25 minutes. The time needed from the emergency call to the start with the therapy on board of the VIMED® STEMO was reduced to 52 minutes. At the same time the number of the lysis therapies increased at the average from 21% to the 33%. It is important to note, that the major effect of the lysis can be achieved during the first 3 and max. 4.5 hours after onset. Patients, who are contraindicated against the lysis can benefit from the organization of the emergency procedure avoiding longer waiting times through transportation to the neurosurgical department. The telemedicine solutions in VIMED® STEMO help reduce risks by decision making through the second

Photos: MEYTEC

The figure shows the mobile biochemical blood laboratory. It helps by the decision making for therapy. The figure shows the laboratory equipment of the VIMED® STEMO.

VIMED® STEMO solution for prehospital diagnostics and therapy, the lives of the stroke patients helps to determine and to reduce the consequences of stroke significantly.

opinion of the remote specialists, as well as through the quick transmission of the digitalized medical data of the patient and the data of the diagnostics to reduce the time of the registration in the stroke unit. Furthermore, the patient in such an emergency situation will be transported to the most appropriate hospital directly, without time delay.
Special cryptographic algorithms and secured communication channels (VPN tunnels) provide a high secure level of the personalized patient data.
The project for the prehospital emergency health care STEMO was developed in cooperation by the scientific Center for Stroke Research of the Charité Universitätsmedizin, Berlin Fire Department and MEYTEC Company. The special emergency vehicle is equipped with the required medical and lab devices as well as with professional telemedicine systems for the step-by-step recording of the results of diagnostics and audiovisual communication.
VIMED® STEMO acts as mobile radiology centre, equipped with CT-scanner diagnostics and the required built-in radiation protection components, conforming to radiation protection regulations. Additionally to this the biochemical lab devices provide quick diagnostic data on board the VIMED® STEMO. Real-time audiovisual communication with the remote neurologist and/or with the other required specialist from the medical hospital as well as the provision of the teleradiological results for the rescue personnel constitutes valuable assistance on site, especially when the medical decisions and therapy should start quickly. The audiovisual communication between the rescue staff and medical specialist in the remote hospitals will be provided by 3G/4G network. Additionally to the bundling of the data channels aimed to the protection of the maximum reliability and availability of the network, the VIMED® STEMO solution can perform the communication and data transfer via satellite.
According to the statistical data one emergency stroke occurs every hour in Berlin (Date: 2014, population more than 3.5 millions inhabitants). Within the scope of the clinical trial PHANTOM-S (Prehospital Acute Neurological Treatment and Optimization of Medical care in Stroke) conducted in Berlin from May 2011 to January 2013 the VIMED® STEMO solution was deployed more than 1.800 times. VIMED® STEMO is included into the service range of the Berlin Fire Department (Berlin-Wilmersdorf) since 2011. In accordance with the supply concept the catchment area of the one VIMED® STEMO unit includes around 1.2 millions of inhabitants. Dependent on traffic, in 75% of cases, STEMO takes between 4-16 minutes (maximum) to reach the patient. There are economic advantages of the prehospital

The left upper picture shows the cockpit with two displays to perform diagnostics (left) and electronic recording of patient dataf / video communication.
The right picture shows controls of the CT-lock, the CT-control monitor and the CT- emergency stop switch.

Photos: MEYTEC

diagnostics and treatment on board the VIMED® STEMO unit, early emergency health care of acute stroke in the prehospital environment, can reduce the post-hospital care costs of stroke patients. It is important to know, that stroke is one of the most established cause of disability worldwide. High costs for the health care and rehabilitation of stroke patients are a serious challenge for the health care systems worldwide, including Germany. In consideration of the fact, that the German population is ageing and the number of the young stroke patients has increased, there is a constant need to provide new supply concepts for the emergency health care. VIMED® STEMO is an effective and proven concept in the fight against stroke.
Understanding VIMED® STEMO is understanding the future of the medical care of stroke. VIMED® STEMO as well as the other telemedicine solutions can be provided by MEYTEC GmbH Medizinsysteme.

* Autors: Ebinger M, Winter B, Wendt M, Weber JE, Waldschmidt C, Rozanski M, Kunz A, Koch P, Kellner PA, Gierhake D, Villringer K, Fiebach JB, Grittner U, Hartmann A, Mackert BM, Endres M, Audebert HJ; Effect of the Use of Ambulance-Based Thrombolysis on Time to Thrombolysis in Acute Ischemic Stroke A Randomized Clinical Trial. JAMA. 2014; 311(16):1622-1631.

Development and Production
MEYTEC GmbH Informationssysteme
Akazienstraße 13 | D-16356 Werneuchen
Germany
Phone +49-33398-78-200 | Fax +49-33398-78-299
info@meytec.com | www.meytec.com

Sales and Service
MEYTEC GmbH Medizinsysteme
Akazienstraße 13 | D-16356 Werneuchen
Germany
Phone +49-33398-78-300 | Fax +49-33398-78-399
info@vimed.de | www.vimed.de