

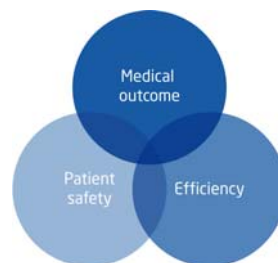
## **Pre-hospital eHealth – a way towards improved patient safety, more efficient utilization of resources and better medical outcome**

**As a result of higher requirements on patient safety, efficiency and medical outcome, pre-hospital healthcare is increasingly becoming an integral part of the overall healthcare system. The significance of care processes, fast tracks and cooperation between stakeholders and systems is growing. This implies a partly changed role, but also a need for new tools to support this way of working. Ortivus eHealth solution MobiMed is one such tool. It has been developed over a period of 20 years to meet the requirements and needs of today and the future.**

### **Focus on safety, efficiency and medical outcome**

In the future, the population will be subjected to mainly the same types of illnesses as today but will be older and suffer from chronic and multiple illnesses to a greater extent. Simultaneously, there will most probably be a relative reduction in care resources. This scenario will require new solutions and methods to increase efficiency and secure better medical outcome with the resources at hand. A variety of IT solutions will play an important role. These can often be included in the eHealth concept - an area where IT, telecom and “traditional” medical technology are brought together with both medical and care needs.

Care safety also needs to improve. Studies from different countries show a large number of unnecessary deaths and injuries every year as a result of mistakes or wrong treatment. Many of these could have been avoided if the system and processes had been designed differently, and if different supporting IT systems had been utilized. Focus on patient safety, more efficient utilization of resources as well as better medical outcome are, therefore, a requirement for the future, and eHealth is a tool that can be used in making these happen.



*Figure 1: The main healthcare challenges*

### **eHealth solutions change pre-hospital care**

Focus on safety, efficiency and medical outcome also applies to pre-hospital care. Finding new ways for smooth cooperation between stakeholders through, for example, integrated care processes and fast tracks for selected conditions is of great importance. It is also important to introduce an IT-based documentation and decision support system, as well as follow-up possibilities in all operations. This enables cooperation as well as development of the operations and processes. Good communication and integration between all involved activities and systems in eHealth solutions is a prerequisite.



*Figure 2: Pre-hospital eHealth*

### **Acute Myocardial Infarction (AMI) and stroke – examples where pre-hospital eHealth makes a great difference**

In the case of an AMI, the time to correct treatment is crucial. Previously, pre-hospital thrombolytic treatment supported by telemedicine has been the prevailing method. Since a few years back, however, the PCI procedure has become the preferred treatment. To optimize the treatment, it is important to identify the patients for whom this is the correct treatment already in the ambulance. A number of different means are available to facilitate the identification. By exchanging relevant clinical information between involved parties in the ambulance and in the hospital, the pre-hospital personnel can optimize the treatment and care process regarding both time and effort such as the logistics, for example, of transport to the most suitable hospital.

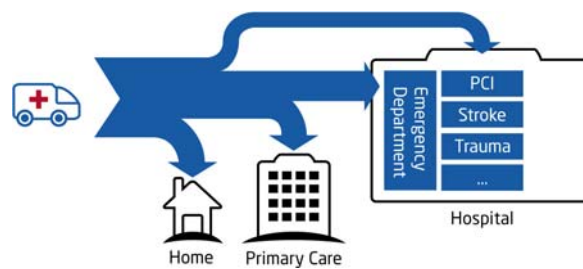
### **No easy methods available for evaluating stroke in the ambulance**

The treatment model for acute stroke is in many regards similar. In approximately 80 per cent of the cases, the condition is caused by an ischemic stroke, that is, an infarction. In these cases, you wish to start clot-dissolving treatment without unnecessary delays. In the remaining 20 percent of the cases, the cause is often bleeding and in such a case, the same treatment would be devastating. Early selection of the "right" patients is therefore crucial, but today there are no easy methods available in the ambulance to facilitate this. Instead, one has to rely on observations, checklists and evaluation schemes. So called fast tracks to the hospital can be produced where the final evaluation is made with, for example, a CT scan. In the pre-hospital context, this method is supported by eHealth solutions that facilitate cooperation between all parties involved.

Apart from acute chest pain and stroke, there are several other conditions, for example fractures and trauma, where optimized pre-hospital integrated processes can make a great difference in costs and medical outcome.

### **eHealth – not only for acute conditions**

It is not only the acute conditions that require carefully prepared pathways. Statistics from Great Britain show that 50 percent of the patients transported by routine to the emergency department do not belong there. Rather, they should be taken to a geriatric ward, or be treated at home, or referred to primary care. To be able to introduce a way of working where the pre-hospital personnel can make these assessments and referrals in a safe way already on the field, the necessary tools must be available. That is, eHealth solutions that facilitate decision support, documentation and communication between involved parties.



**Figure 3.** Well-designed eHealth solutions support processes and fast tracks. This leads to care at the right place and the right level without unnecessary delays.

### **Ortivus MobiMed – a modern pre-hospital eHealth solution built on 20 years of experience**

Ortivus MobiMed includes hardware and software components to shape pre-hospital eHealth solutions. The toolbox includes:

- Monitoring (3, 5 and 12-lead ECG, VCG, SpO<sub>2</sub>, NIBP, Respiration and EtCO<sub>2</sub>)
- Decision support (analysis of vital data, telemedicine, checklists, patient records, guidelines)
- Bi-directional messaging (chat function, fixed messages, prescriptions)
- Documentation (patient records, checklists, etc.)
- Communication (Mobitex, GSM, GPRS, Tetra, etc.)
- Integration (integration engine Ensemble from InterSystems, open and dedicated interfaces)
- Audit and follow-up (database, reports, statistics etc.)

The development of MobiMed started at Chalmers University of Technology in Gothenburg, Sweden, in the mid-eighties. Since the nineties, MobiMed is practically the norm in Sweden when it comes to programmes aiming at pre-hospital thrombolytic treatment and PCI logistics. Today, there are approximately 1000 ambulances in operation in Sweden, Norway, Finland, Great Britain, Italy, Spain, Germany, Switzerland and Canada.

### **Scalability and flexibility**

MobiMed is scalable, adaptable and flexible when it comes to installation scope, direction and compatibility with other systems and applications. The system is normally provided in two basic configurations: Clinical and ePR. The configurations can function as stand-alone as well as totally integrated solutions and can be developed according to need.

### **System structure**

An installation is made up of three main components; patient unit, Clinical Server and Clinical Workstation. The MobiMed patient unit is the mobile ambulance unit. It is made up of a portable tablet PC as well as a measuring unit. The measuring unit records vital data and sends these to the PC via Bluetooth. The PC processes, analyses and presents vital data, records other information and messages and transfers all information to a server. A number of communication alternatives can be used; Mobitex, GSM, GPRS and TETRA.



*Figure 4: MobiMed patient unit*

The Clinical Server is the heart of the installation, and provides services such as communication control, data storage and updates. The server receives information from mobile units and makes the information available for viewing and analysis on Clinical Workstations.

The Clinical Workstation is connected to the server via the network. An installation often includes several clinical workstations situated in hospitals or ambulance stations. Data from both active and archived transfers can be viewed.



*Figure 5: MobiMed Clinical Workstation*

#### **MobiMed Clinical and MobiMed ePR**

MobiMed Clinical monitors vital data (ECG, NIBP, SpO<sub>2</sub> and respiration including EtCO<sub>2</sub>), bi-directional messaging (chat), telemedicine and communication. It also handles simpler documentation (care report) as well as online support for medical procedures, guidelines and decision support. Recording of vital data occurs via Ortivus unique Bluetooth-based measuring unit. The measuring unit transfers data to the tablet PC that makes up the MobiMed patient unit. This solution facilitates high flexibility when working in an apartment or at any other location outside the ambulance.



*Figure 6: MobiMed measuring unit and patient unit*

MobiMed ePR is an electronic patient record optimized for ambulance care needs, and consists of one mobile and one stationary part. The stationary part is used in hospitals, ambulance stations or other locations for completion, signing, follow-up and reporting.

### **Integration with other systems**

There are great possibilities to integrate with other systems such as hospital patient record systems, ECG databases and clinical information systems. The integration can take place, for example, via the integration engine Ensemble (InterSystems). In the ambulance, MobiMed can be integrated with MDT (mobile data terminals) and thus make dispatch data, status etc. available automatically.

### **MobiMed and defibrillators**

In an ambulance, a defibrillator is of great importance for cardiac arrests. As MobiMed handles all normally occurring monitoring, only a plain defibrillator is needed as complement to handle these situations. A qualified AED easily fulfills this task. This has many benefits both considering weight and function. For the users that require so called external pacing, there are also low-weight alternatives available that can be combined and also integrated with MobiMed.

### **Safety, automatics and adaptation**

All information recorded or entered is regularly and automatically transferred to the server. This applies to ECG reports and graphs as well as other vital data, record notes etc. Normally, this update happens once a minute. Alarms and messages are transferred immediately. All information handled in a session is stored locally. In case of occasional communication interruptions, the communication is restored automatically and the information that was not transferred during the interruption is transferred as soon as the communication link is restored. If the interruption remains, all information can be transferred at a later stage.



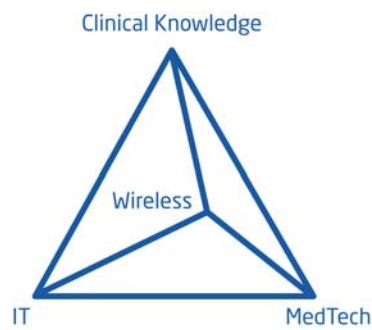
*Figure 7: MobiMed in ambulances*

MobiMed is also the IT platform to introduce new ways of working, such as, for example triage, referrals to other care providers, direct admittance to other care units or completed treatment at the location. All in all, customized solutions that promote improved patient safety, more efficient utilization of resources and better medical outcome.

MobiMed is classified as a medical device and is thus developed and validated in all parts, including the ePR, according to the EU Medical Device Directive (MDD).

### **About Ortivus**

Ortivus was established in 1985 and is listed on NASDAQ OMX Stockholm Small Cap list. The company is based in Danderyd, Sweden and has 100 employees in Sweden, the US, Canada and Great Britain. In total more than 2 600 emergency services, 1 000 ambulances and 500 beds at emergency hospitals are equipped with Ortivus solutions.



**Figure 8:** *Ortivus combines IT, medical technology and wireless with clinical knowledge*

Ortivus offers unique solutions by combining expertise in wireless, IT and medical technology with clinical knowledge. Ortivus solutions secure that the patients get accurate medical treatment and expertise instantly throughout the care process. This results in improved safety, better medical outcome as well as improved efficiency for the entire healthcare system.

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*For further information, visit: [www.ortivus.com](http://www.ortivus.com)*