WhizMed – The Mobile Telemedicine Solution

WhizMed system has been developed to ease the pressure of medical professionals dealing with patients in remote or rural sites and on the move in emergency patient transfers. This system assists the remote or mobile healthcare professionals by providing a way of obtaining expert medical advice from medical specialists remotely.

In addition to multimedia and medical data transmission, WhizMed can provide extra features such as:

1. Electronic Patient Report Forms (ePRF) to effectively manage telemedicine sessions.
2. PC based dispatching to manage mobile health workers effectively via status messaging using SMS functionality. The mobile workers can send their status (e.g. on the way, arrived at scene, on the way to hospital, hospital arrived, ETA 10 mins etc.) using SMS messages through their mobile phones, which will be received at a PC based dispatcher. This dispatcher system can also generate messages for the mobile workers.

WhizMed Application and Operation Scenarios

Ambulance, Community Paramedics and other Rescue Services
- Through the transmission of medical and multimedia data, WhizMed provides the means for the ambulance crews, community paramedics, nurses, mountain rescuers etc. to get advice from specialists based in hospitals.
- The patient information helps the hospital to make the required preparations well in advance before the patient arrives.

Assistance to Community and Remote Hospitals
- Through WhizMed, main hospitals can provide assistance to remote and community hospitals where experienced clinicians are not available.
- WhizMed can be used to obtain second opinion from medical specialists wherever they are based.
- The real-time aspect of WhizMed helps the medical experts to ensure accurate diagnosis and to determine a suitable course of medical treatment for the patient at the remote end.

Consultancy for Offshore and Remote Sites
- Offshore installations such as oil rigs and remote sites such as Antarctic surveys or jungle expeditions can get remote consultancy from mainland hospitals in case of emergencies.
- Through WhizMed, the consultants can remotely establish whether the transfer of the patient is required and thereby saving cost on unnecessary medical evacuation by rescue vessels or helicopters.
- Routine medical checkups can be facilitated through WhizMed remotely, which will prevent the offshore or remote workers having to come to the mainland hospitals for medical checkups.

Out of hour service and on-call emergency assistance
- Consultants can provide service during out of office hours over dialup or broadband connections from home (using their laptops or desktops) to the hospital in case of emergency. The critically ill patients can be treated immediately and quickly under the remote observation of the consultant.
- WhizMed facilitates ships and airlines to receive assistance remotely in an emergency by directly connecting to a hospital’s Accident and Emergency (A&E) department.

**System Overview**

The illustration below is an overview of the key components of WhizMed. The details of each system component are provided in the section to follow.

![WhizMed System Diagram](image)

*Figure 1 – WhizMed System Diagram*
System Components

Components at the casualty scene (i.e. Client Side):

1 – Tablet PC: This is the hardware that the WhizMed client software runs on. Preferably, it should be a ruggedised laptop or a tablet PC to provide the robustness required by the user in a mobile operation scenario. However, an ordinary notebook/laptop PC is also technically suitable. This PC could be used in areas where access in case of an emergency is difficult (such as a mountain or a forest in a search and rescue operation). The recommended minimum technical specification for the Tablet PC is as follows:
   • Intel Pentium 2 GHz or higher processor clock speed (single or dual processor system or AMD K6/Athlon/Duron family or compatible processor.
   • 768 megabytes (MB) of RAM or higher.
   • 4 gigabytes (GB) of available hard disk space
   • Super VGA (800 x 600) or higher-resolution (ideally 1024 x 768) video adapter and monitor
   • Windows XP operating system
   • Internal microphone and built in speaker system
   • Bluetooth connectivity
   • RS232 Connectivity (this may also be provided via PCMCIA adaptors)

2 – WhizMed Client Application: This application runs on the tablet PC and is able to communicate with a medical monitor that is normally connected to a patient. The vital signs of the patient are acquired by the application and are displayed locally on the tablet PC in real-time. During display, the real-time data is also routed to a wireless handset (e.g. TETRA portable, GSM/GPRS handset, satellite phone etc.) for transmission over the air. The application is also able to compress video and audio suitable for transmission over the air interface. Instant and status messaging function also comes with the WhizMed Client application suite. For peer-to-peer applications, such as hospital to hospital, the application can also work over local area networks (i.e. LANs or WLANs).

3 – Medical Monitor: Medical monitor is a portable stand-alone device that connects to the patient via a set of cuffs and sensors and collects the vital signs of a patient such as electrocardiogram (ECG), non-invasive blood pressure (NIBP), pulse oximetry (SpO2) and heart rate (HR). The medical monitor interfaces the WhizMed client via serial or Bluetooth interface.

4 – Wireless camera: Visual information at the casualty site is captured by a web camera and is acquired by the tablet PC. The captured video is in colour and is compressed prior to transmission for efficient bandwidth use.

5 – Wireless handset: The packetised medical and audio visual information at the patient side is transmitted over the air using a wireless terminal. This wireless terminal can be compliant with one of the following: GSM/GPRS, TETRA, WiFi, 3G or Satellite.
Components at the Base End (i.e. Server/Dispatcher Side):

6 – Dispatcher PC: The information transmitted by the tablet PC over the wireless network is routed via the internet to the hospital. The dispatcher PC is a fixed machine with broadband connection or a connection to a LAN or WLAN that would typically be located at a hospital or a medical institution where medical consultants, surgeons or general practitioners would be present. Audio, video and medical data received by the dispatcher may be forwarded to other locations within the hospital or outside the hospital via the broadband connection as and when needed.

The recommended minimum technical specification for the dispatcher is as follows:

- Intel Pentium 2.4 GHz or higher processor clock speed (single or dual processor system or AMD K6/Athlon/Duron family or compatible processor.
- 1 GB of RAM or higher.
- 10 GB of available hard disk space
- Super VGA (1280 x 1024) or higher-resolution video adapter and monitor
- Windows XP operating system
- External microphone and speaker peripherals
- External webcam

7 – WhizMed Dispatcher Application: The dispatcher application collects and presents real-time medical, audiovisual and textual information received from the WhizMed client. The WhizMed server can transmit video, audio and text messages to the client simultaneously while receiving data. The dispatcher application is also able to send and receive SMS messages.

System Interfaces

Following connections are present between the various components in WhizMed.

- Medical Monitor – Tablet PC: RS232 / Bluetooth serial link
- Wireless Webcam – Client PC: WLAN 802.11
- Tablet PC – Wireless handset: RS232 serial link / Bluetooth, PCMCIA (or built in)
- Dispatcher PC – Internet: Broadband connection, LAN or WLAN (with static IP address)
- Client – Internet: GSM/GPRS, WiFi, TETRA, 3G, Satellite links, LAN, WLAN etc.