Fraunhofer Institut
Biomedizinische
Technik

TOPCARE

Implementation of a Telematic Homecare Platform in Cooperative Health Care Provider Networks

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Summary
The overall objective of TOPCARE is to develop technical devices and telecommunication structures and to lay the organisational groundwork for bringing co-operative health care services into the home of patients. A telematic homecare platform will be established and evaluated in European co-operative health care environments for home monitoring and treatment of patients needing
1) infusion therapies,
2) controlled ventilatory support and
3) monitored medication adjustment and adherence control when treated with anti-coagulants.

Problem
TOPCARE will address the need for reliable and safe ambulatory devices and services that foster patient compliance in the home environment. Recent self-diagnostic and home monitoring products provide store-and-forward functions to transmit vital data to diagnostic centres. User interaction for proper device operation are often demanding and require physical or mental fitness of the user.

Data exchange is commonly handled on a single device level resulting in complicated health monitoring systems when several diagnostic devices are needed. Device related vital data records are commonly incompatible with each other. Therefore they require multiple data storage at the receiving site.

Aim
The overall objective of TOPCARE is to develop technical devices and telecommunication structures and to lay the organisational groundwork for bringing co-operative health care services into the home of patients. Telematic communication technologies and modern vital sign monitoring is applied in order to enhance post-clinical treatment in an out-patient setting, to foster the communication between patient, practitioners and clinics, and to provide electronic assistance in documentation management for improved quality assurance. TOPCARE will address the need for reliable and safe ambulatory devices and services that foster patient compliance in the home environment. Continuity of care will be achieved by integrating the home based services into a network of health care providers
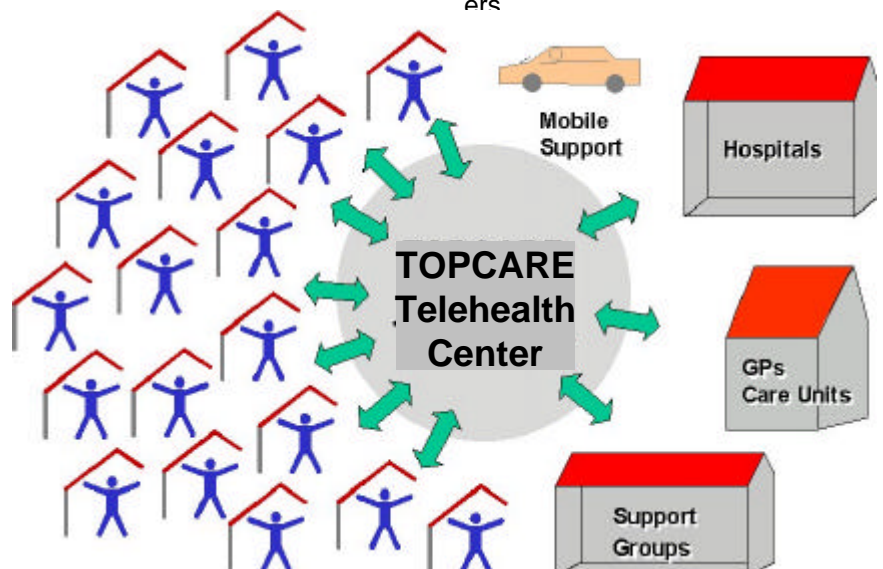
Technical results

A modular and secure e-homecare platform, the **TOPCARE Platform** has been developed in TOPCARE which serves for bringing co-operative healthcare to sick persons at home and which enables the supervision of homecare therapies by health care centres in many home health scenarios.

The TOPCARE Platform takes advantage of Internet technologies and makes use of the Internet itself to communicate medical data in a secure and trustful way between patients and their physicians and a telehealth centre. The backbone of the TOPCARE Platform is an e-homecare application server, the **TOPCARE Server**, that collects the medical data of the patients' homecare systems in a database, that manages the access of the health professional to the patients' health records and that administers the telecare networks. The content of the patient's health record is presented in WEB browser Access to trend curves of vital signs or device parameters and homecare scenario specific data is given to authorised health professionals who can document the treatment and configure the patients' systems over the Web interface. A cryptographic smart card is used together with state-of-the-art cryptography to give access to the patient's data, to ensure privacy and data integrity.

Two types of general purpose homecare systems for the patients are introduced in TOPCARE.

A so-called e-homecare box, the **TOPCARE Box**, is used for the connection of medical device, the collection of their measurement data and the transmission of the data to the TOPCARE Server by dial-up connections over phone lines, ISDN or cellular networks. Medical devices can be connected by serial lines wires or by a Bluetooth network to the TOPCARE Box.

In addition to the TOPCARE Box an e-homecare station, the TOPCARE Station is provided for the patient. The TOPCARE station is a PC based system with a touch screen that includes a fully integrated video communication solution.

Field trials

The structure, workflow and organisational procedures for telehealth centres have been defined in TOPCARE for the three homecare scenarios

- Ventilation/oxygen therapy:
  Patients with COPD and ventilatory support dependencies
- Infusion therapy
  Patients needing infusion therapy for painless, nutrition and chemotherapy
- Anti coagulation treatment
  Patients with stroke, heart insufficiencies or heart valve replacement

After successful technical evaluation, the TOPCARE Platform is going to be tested now in real multiple care provider environments. For each of the three 3 targeted patient groups pilot trials are initiated involving the setup of a 24h accessible telemedicine centre as an integral part in each of the proposed caregiver networks. First results of the trials are being expected until the end of 2003.

Project partners

- Co-ordination and telematic home-care platform:
  Fraunhofer Institute for Biomedical Technology (IBMT), Germany
- Security Architecture:
  Fraunhofer-Institute for Secure Telecooperation (SIT), Germany
- Telehealth centre software:
  Datamed S.A. Healthcare Integrator, Greece
- Device integration and wireless communication:
  National Technical University of Athens – ICCS, Greece
- Field trial for home ventilation support:
  Dräger Homecare Netherlands B.V., Netherlands
- Field trial for infusion therapy:
  Calea N.V. of Fresenius Kabi AG, Netherlands
- Field trial for anticoagulants treatment:
  Roche Diagnostics GmbH, Germany
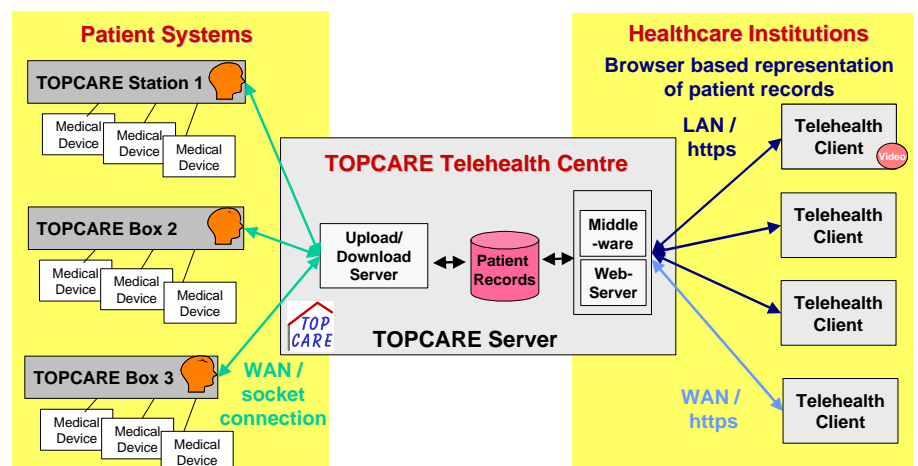
Architecture of the TOPCARE Platform.