

Telemedicine

What is Telemedicine ?

Tele- (from Greek: far, at a distance, remote)

Telemedicine utilizes information and telecommunications technology to transfer medical information for diagnosis, therapy and education.



Necessity of Telemedicine and Telecare

- Extension of Access to Healthcare Services:
 - Remote rural areas
 - Areas cut off from normal transport at certain times of the year by bad weather
 - Prisoners
 - Psychiatric patients
- Healthcare Provision for Travelers:
 - At the sea
 - In the air
- Military Applications

Why Go For Telemedicine and Telecare

- Home Telecare
 - Increase in the proportion of older people in the population
 - Increased incidence of chronic, long-term conditions
 - Majority of elderly people prefer to live in their own homes
 - Tele-visits by a video link and transmission of up to date information and vital signs
- Cost Reduction
 - Smaller transport expenses
 - Allow specialist services at remote locations where employment of healthcare workers not economically justified
- Market Development
- Health Policy and Strategy

Technological Advancements supporting Telemedicine

- Computing and Information Technology
 - Falling equipment costs
 - Increased power on the desktop, Ease-of-use
 - Modern developments in videoconferencing
 - Increase in the reliability of equipment
- Network and Telecommunications Infrastructure
 - Faster and more reliable network connections
 - Low-performance modems based on copper wire transmission supplemented by faster media and technologies using fiber-optic cables
 - Introduction of new communication protocols (e.g. ADSL and ATM)
 - Major developments in wireless and satellite technologies

The Future for Telemedicine

- Moving telemedicine out of the pilot study phase and into the mainstream
- Health policy and strategy
- Telecare to play a significant role given the ageing populations throughout the world
- The role of the Internet
 - Education of both care providers and patients
 - Transmission of health information and images
- Enhancing healthcare in underdeveloped countries
 - By developed countries, commercial companies and non-profit organizations

Types of Telemedicine

- Teleconsultation
- Tele-education
- Telemonitoring
- Telesurgery

Teleconsultation

- Medical consultation is at the heart of clinical practice
- Teleconsultation to support clinical decision making is the most frequent example of telemedical procedures (35%)
- Actors
 - Health providers without a patient
 - Health provides and a patient (changed relationship provider: patient)
- Mode of communication
 - Telephone
 - Video conferencing link in real time
 - *Store-and-forward* mode (most frequently in teleradiology for large X-ray files transmission)

Teleeducation

Types of tele-education depending on who is the recipient and what is the purpose of the transmission:

- Clinical education from teleconsultation
- Clinical education via the Internet
- Academic study via the Internet
- Public education via the Internet

Telemonitoring

Telemonitoring is the use of a telecommunications link to gather routine or repeated data on a patient's condition (e.g. blood pressure, ECG, ultrasound ...)

- Data acquisition process:
 - Manual, then electronic transmission
 - Automatic, then electronic transmission
- The purpose of monitoring is to decide if and when an adjustment is needed to the patient's treatment
- The adjustment can be communicated verbally by telephone or automatically using a touch-tone telephone and a computer telephone integrated (CTI) system

Telesurgery

- Compared to other 'tele' applications, telesurgery in its infancy
- Types:
 - Telemonitoring: assistance given by specialists to surgeons carrying out a surgical procedure at a remote location
 - Telepresence surgery: guides robotic arms to carry out remote surgical procedures
 - Distance can be small (same room) using *movement scaling* technique (large movement of surgeon's hands scaled down to very precise, tremor-free movements)
 - *Data Glove* for hand's movement transmission
 - *Virtual reality* operation simulation before the real surgery

Benefits of Telemedicine

- Better access to healthcare
- Access to better healthcare
- Improved communication between carers
- Easier and better continuing education
- Better access to information
- Better resource utilization
- Reduced costs

Limitations of Telemedicine

- Poor patient-healthcare provider relationships
- Poor relationships between healthcare professionals
- Impersonal technology
- Organizational disruption
- Additional training needs
- Difficult protocol development
- Uncertain quality of health information
- Low rates of utilization

Technology of Telemedicine Systems

- Types of telemedicine information
 - Text and data
 - Audio
 - Still (single) images
 - Video (sequential images)
- Important transmission parameters
 - Still image and video compression
 - Frame rate and bandwidth
 - Telecommunication standards
- Teleconsultation system components
 - Videoconferencing system
 - Multipoint videoconferencing system
 - Image display system
 - Telemonitoring devices

Technology...(cont.)

- Telecommunication media suitable for telemedicine system implementation
 - Public Switched Telephone Network
 - Leased lines
 - ISDN
 - Satellite
 - Wireless Technologies
 - ATM
 - ADSL

Technology ... (cont.)

- Integration and operational issues
 - Integration with other healthcare information systems (e.g. Electronic medical record)
 - *Store-and-forward* operation
 - Real-time telemedicine

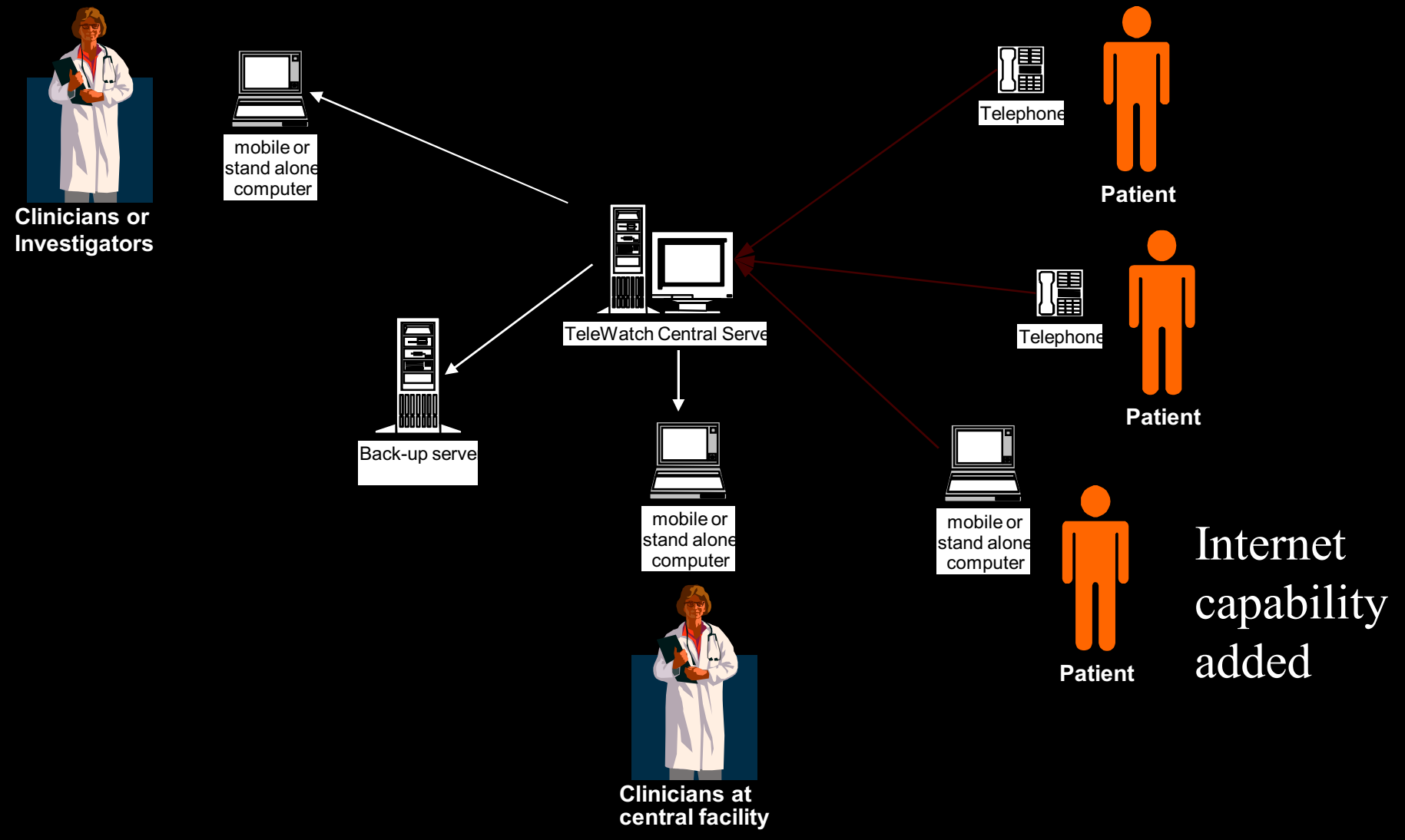
Telemedicine Service Providers and Applications

- Mainstream health sector services
 - General practitioners and Primary Care Services
 - Monitoring of conditions
 - Minor injuries and emergencies
 - Better coordination with secondary care
 - Acute hospital and Secondary care services
 - Tele-radiology
 - Tele-dermatology
 - Tele-neurophysiology
 - Tele-cardiology
 - Tele-psychiatry
 - Tele-ophthalmology
 - Tele-pathology
 - Tele-obstetrics
 - Tele-oncology

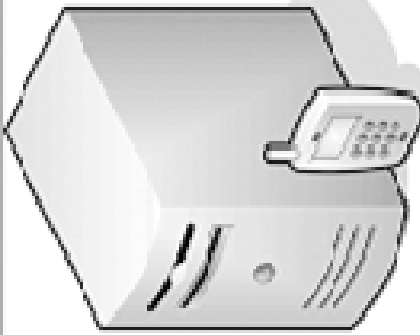
Providers and Applications... (cont.)

- Pharmacy services
 - Electronic prescriptions
 - Buying drugs over the Internet
- Commercial services and other agencies
 - Managed care organizations
 - Transport services
 - Military agencies
 - Space exploration agencies

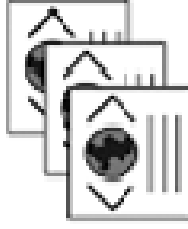
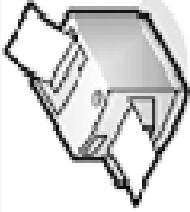
Information Flow Originally Designed for Patient Care



Hospital



Server



XML



Database

Internet

Patient's House



RS232



ECG

Heart Rate

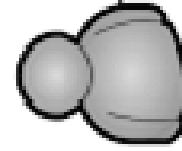
Blood Pressure

SPO2

Respiration Rate

Temperature

Patient Monitor



Patient

Conclusion

A lot of improvements is yet to be done in this field. Growing use of internet and IT industries provide a great support for the development of telemedicine. Telecare to play a significant role given the ageing populations throughout the world. Enhancing healthcare in underdeveloped countries By developed countries, commercial companies and non-profit organizations.

Thank You

Questions ?