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-neuropsychology
    - 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

Clinicians or Investigators

TeleWatch Central Serve

Back-up serve

Clinicians at central facility

Internet capability added
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 ?