Telehealth in Geriatrics: A Hong Kong Experience

Elsie Hui, FRCP
Division of Geriatrics, The Chinese University of Hong Kong
Overview of presentation

• Electronic patient record

• Community Health Call Centre

• Telemedicine in Geriatrics
# Telemedicine (telegeriatrics) – what is it and why?

<table>
<thead>
<tr>
<th>Telephone/ Fax</th>
<th>Traditional consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>Photos &amp; X-rays, video clips</td>
</tr>
<tr>
<td>Internet</td>
<td>Health web sites, on-line assessment / education</td>
</tr>
<tr>
<td>Video-conference</td>
<td>Real-time, audio-video link</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient</th>
<th>Isolation Frailty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care provider</td>
<td>Limited resources Traveling time</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>I.T. hardware Broadband 3 &amp; 4 G</th>
</tr>
</thead>
</table>
Hong Kong Special Administrative Region, People’s Republic of China

- 7.8 million people
- 1104 m²
- Urban
- 95% Chinese
- GDP per capita US$31757 (8th in world)
- Gini coefficient 53.3
**HK Healthcare**

### Outcomes

- **Life expectancy:**
  - Years for men: HK 78.6, UK 76.6, OZ 75.4, US 74.1
  - Years for women: HK 84.6, UK 80.2, OZ 82.0, US 79.5
- **Infant mortality rate:**
  - Per 1000 live births: HK 5.4, UK 5.6, OZ 5.7, US 6.9
- **Total Health Expenditure**
  - As % of GDP: HK 5.3, UK 6.2, OZ 7.8, US 14.8
  - HK$: HK 67.9B

### Structure

**Primary Care**
- Hospital Authority: 56%
- Private: 24%
- Traditional Chinese Medicine: 20%

**Secondary & Tertiary**
- Hospital Authority: 93%
- Private: 7%

**Long Term Care**
- Hospital Authority: 100%
HK Public Healthcare – serves vast majority of elderly

HK$32B Expenditure in Public Sector is 47% of the Total and 12.2% of Government Budget

Public Health and Screening Services

Hospital: Specialist Clinics, and General Outpatient Clinics
Hospital Authority

- Established 1991
- 42 Public Hospitals
- 43 Specialist Outpatient Clinics (SOPD)
- 74 General Outpatient Clinics (GOPC)
- 28,000 Beds
- 52,500 Staff
- 19,300 Nurses
- 4,900 Doctors
- HK$28b Annual Operating Budget (~US$4 billion)
- 5,3m GOPC Attendances
- 8,3m SOPD Attendances
- 2,1m A&E Attendances
- 1,1m Inpatient Discharges
Comprehensive functionality developed in-house since early 90’s

High utilization by Clinicians

Mission Critical Systems

Increasing Strategic Importance
Evolution of Clinical IT Systems

- **1990** – “Green fields”
- **1991** – Patient Administration
- **1992** – Pharmacy system
- **1993** – Lab results online
- **1994** – Radiology information system
- **1995** – Clinical Management System (CMS Phase I)
- **2000** – CMS Phase II
- **2002** – Electronic Patient Record System (ePR)
- **2003** – eSARS
- **2004** – Image Distribution via ePR
- **2006** – Sharing ePR with Private Sector
- **2007+** – CMS Phase III
Patient Master Index - HKPMI

- Using Hong Kong Identity Number (HKID #)
- HKPMI, Admissions/Discharges and Appointments Booking implemented across all HA hospitals and clinics
- HA HKPMI contains 8 million people’s records

Uniquely identify all patients and can facilitate linking together episodes of care
Clinical Management System - CMS

**Phase I - Functions**
- Discharge summary
- Clinician coding of diagnosis & procedure codes
- Ordering of medications and laboratory tests
- Retrieving laboratory and radiology results
- Medication history
- Electronic booking of appointments
- Generate referral or reply letters and reports
- Cross hospital information enquiry

**Phase II - Modules**
- Generic Clinical Requests (Order Entry)
- Generic Results Reporting (Forms)
- Clinical Data Framework
- Outcome Documentation
- Medication Decision Support
- Clinical Data Analysis and Reporting
- *Electronic Patient Record (ePR)*
### ePR - Laboratory Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
<th>Value 5</th>
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<td>15/12/2002</td>
<td>9.1</td>
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<td>398</td>
<td>514</td>
<td>192</td>
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<tr>
<td>WBC</td>
<td>74</td>
<td></td>
<td>104.7</td>
<td>71</td>
<td>5.0</td>
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<tr>
<td>APTT</td>
<td>29.5</td>
<td></td>
<td>13.7</td>
<td>7.1</td>
<td></td>
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<tr>
<td>Prothrombin Time</td>
<td>11.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td></td>
<td></td>
<td>137</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td></td>
<td></td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urea</td>
<td></td>
<td></td>
<td>5.2</td>
<td></td>
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<tr>
<td>Creatinine</td>
<td></td>
<td></td>
<td>94.4</td>
<td></td>
<td></td>
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<tr>
<td>Protein, Total</td>
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<td></td>
<td></td>
<td>7.1</td>
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<tr>
<td>Albumin</td>
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<td></td>
<td>41.7</td>
<td></td>
<td></td>
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<tr>
<td>Bilirubin, Total</td>
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<td></td>
<td>7</td>
<td></td>
<td></td>
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<tr>
<td>Alkaline Phosphatase, Total</td>
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<td></td>
<td>91</td>
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</tbody>
</table>
URGENT PLAIN CT BRAIN.

Clinical History:
Head injury with LOC and vomiting. (history from ePR: patient has history of NPC and CA Lung).

Technique:
- 5mm non-contrast axial CT scans of the posterior cranial fossa.
- 10mm non-contrast axial CT scans of the rest of the brain.

Findings:
There is a hyperdense subdural haematoma in the left fronto-parietal region. It measures 9mm in thickness.
There is mild mass effect with ipsilateral sulcal, ventricular effacement and mild midline shift.
Image Distribution via ePR
Sharing HA ePR with Private Sector
Next generation’s CMS will be a system that supports the delivery of care in the HA with tools to improve quality and reduce errors, improve efficiency, and improve overall service management, and that will be an integral part of a community wide platform for sharing electronic health data.
CMS 3 - The Way Forward …

4 Strategic Objectives

• Develop the content
• Facilitate the process
• Improve the outcome
• **Extend to the Community**

9 Major Priorities

- Advanced Information Architecture and Systems Architecture
- The **Intelligent** Record
- Risk Reduction and **Patient Safety**
- Closed Loop **Medication Management**
- **Filmless** Hospital
- Replace Departmental Systems
- Enhance Informational Systems
- eHealth/ **Integrating Healthcare Sectors**
- Health Informatics as a Specialty
e-Health - A Collaborative Effort

Record Content
Identification
Terminology
Data Standard
Data Security
Messaging Standard

Professional Bodies
Government
Private Practitioners
International Standard Bodies
Private Hospitals

HA
The HA Community Health Call Centre (CHCC)
What is a health call centre?

- A health service that enables integrated delivery of health care for consumers using information and communications technologies that have the capacity to handle high volumes of transactions for large catchments.

- The range of services can include information, triage, advice, referral, counseling, assessment, intake and/or health management.
Overseas Experience

• Worldwide

• Australia - 3 models
  – National - Healthdirect Australia
  – Victoria – Nurse-on-call
  – Queensland – 13Health

• UK – NHS Direct
Objectives

• Provide telephone support and enhance management for high risk elderly, chronic diseases and mental illness

• Improve links between the public and primary/community healthcare service in both the public and private sectors

• Reduce avoidable A&E attendance and hospitalization

• Improve access to reliable healthcare advices to promote preventive care and early intervention
## Key Components

<table>
<thead>
<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Telephony and IT Systems</td>
</tr>
<tr>
<td>Health Information Database - HA Electronic Patient Record</td>
</tr>
<tr>
<td>Clinical Governance</td>
</tr>
<tr>
<td>Clinical Decision Support System</td>
</tr>
<tr>
<td>Quality Management and Reporting System</td>
</tr>
<tr>
<td>Workforce Management</td>
</tr>
<tr>
<td>Health Service Provider Directory</td>
</tr>
</tbody>
</table>
HA Patient Support Call Centre in Tang Shiu Kin Hospital

All round the year

- Mon – Fri: 8am to 8pm
- Sat, Sun & PH: 8am to 4pm
Workflow of Call Centre for High Risk Elderly Patients

Auto-filtering for “65+ MED patients discharged alive with HARRPE score ≥ 0.17”

Daily list of eligible patients for CHCC follow up

CHCC nurse proactively call the patient within 48 hours

Target clients’ key discharge issues

- Physical condition
- Medication management
- Remind follow up appointment
- Community resources need

If medical problems exist

Nursing assessment based on protocols

Health & care advice, refer to appropriate health & community resources

Documentation of problems, protocols used and advice
Our powerful ePR helps

More than 10 years of Data in 8.9 million persons
80 Clinical Protocols

- Abrasions
- Allergic Reaction
- Altered Level of Consciousness
- Ankle Problems
- Anxiety
- Arm/Hand Problems
- Asthma
- Bone, Joint & tissue Injury
- Bruising
- Chest Pain
- Decreased general condition
- Dehydration
- Depression
- Domestic Abuse
- Eye Injury
- Eye Problems
- Facial Pain
- Fainting
- Finger & Toe Problems
- Foot Problems
- Gas/Flatulence
- Head Injury
- Hearing Loss
- Heartbeat, Rapid
- Heartbeat, Slow
- Heartburn
- Hoarseness
- Hypothermia
- Jaundice
- Jaw pain
- Knee Pain/Swelling
- Mouth Problems
- Muscle Cramps
- Nausea/Vomiting
- Adult Neck Pain
- Nosebleed
- Overdose
- Refused Feeding
- Scabies
- Seizure
- Shoulder Pain
- Sore Throat
- Stools, Abnormal
- Suicide Attempt, Threat
- Swelling
- Tongue Problems
- Toothache
- Urination, Difficulty
- Urination, Painful
- Urine, Abnormal Color
- Vision Problems
- Wheezing
- Wound Healing & Infection
Incorporate Clinical Protocols

Call

Member / Patient Information
HKID: H4111111
Name: LAI, FULING
Sex: F
Age: 63
Phone: 2772130

General | Assessment | Intervention 1 | Intervention 2 | Referral | Update Log

Protocol Used

- Specialty: MED
- Protocol: Abdominal Pain
- Load

Triage Categories
- Emergency
- Urgent
- Not urgent

Specialist Consultation
- No
- Yes

Question 1: Are any of the following present?
- Severe pallor
- Loss of consciousness
- Signs of shock
- Severe persistent pain
- Fainting/lightheadedness
- Vomiting blood or dark coffee– ground-like emesis
- Rapidly worsening of symptoms
- Sweating heavily
- Shortness of breath
- Crushing pain like a tight band around your chest
- Pain which moves to your jaw or left arm

Advice: Seek Emergency Care

Click Here to Save Triage Result
## Summary of High Risk Elderly Program

(Full Year, Apr 2011 – Mar 2012)

<table>
<thead>
<tr>
<th>Description</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of successful calls made (Outbound call / Inbound call) (%)</td>
<td>118,575 calls</td>
</tr>
<tr>
<td></td>
<td>(83662 / 34913)</td>
</tr>
<tr>
<td></td>
<td>(70.6% / 29.4%)</td>
</tr>
<tr>
<td>No. of outbound calls per managed discharged episode</td>
<td>1.4 calls</td>
</tr>
<tr>
<td>Average duration per call (min)</td>
<td>5 min 56 sec</td>
</tr>
<tr>
<td>Average time for after call work (min)</td>
<td>6 min 2 sec</td>
</tr>
</tbody>
</table>
Evaluation Study: Results

- A&E attendances (Med) ↓ 30%
- A&E admission (Med) ↓ 28%
- Acute Patient days (Med) ↓ 22%
Telemedicine & Tele-rehabilitation in Elderly Care
Tele-geriatrics in residential care home setting

• Direct care
  – Physician (geriatrician, primary care)
  – Geriatric nursing
  – physiotherapy & occupational therapy
  – podiatry

• Specialist consultation
  – Dermatology
  – Psychiatry
  – Others (neurology, radiology ....)
Our History

• 1998 – 99
  Pilot study
  – SAGE Kwan Fong Nim Chee Care & Attention Home in Shatin
  – Medical, nursing, psychiatry, PT, OT, podiatry, dermatology

• Extension of telemedicine network
  – To other local residential care homes for elderly (RCHEs)
  – To other hospitals in New Territories and their local RCHEs
  – To a Home Care service provider

• 2003 - 04
  Community rehabilitation programmes
  – DM, OA, CVA, dementia, incontinence
NTE Geriatric Service Network

- 4 hospitals
- 9 RCHEs
- 5 elderly centres
- Broadband or ISDN (remote areas)
- Multi-point Videoconferencing machines

Also capable of connecting to anywhere in the world with an IP address and VC machine (386kbs)
Videoconferencing Hardware

Tandberg 880
(HKD 110 000)
- Shatin Hospital
- Norway
- 768kbps (IP/ISDN)
- Multi-point (max 4)
- max 4 video outputs
- 72° wide field of view

Polycom ViewStation FX
(HKD 75 000)
- Hospital and remote sites
- USA
- 512kbps (IP/ISDN)
- Multi-point (max 4)
- max 4 video outputs
- 48° field of view
Table 1. Summary of activities and feasibility of Telemedicine

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Patient-episodes</th>
<th>% adequate with telemed</th>
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<tbody>
<tr>
<td>Geriatrician</td>
<td>356</td>
<td>97.2</td>
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<tr>
<td>Psychogeriatrician</td>
<td>149</td>
<td>99.3</td>
</tr>
<tr>
<td>Dermatologist</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>Nurse</td>
<td>101</td>
<td>88.7</td>
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<td>PT</td>
<td>105</td>
<td>87.1</td>
</tr>
<tr>
<td>OT</td>
<td>117</td>
<td>59.8</td>
</tr>
<tr>
<td>Podiatrist</td>
<td>99</td>
<td>84.9</td>
</tr>
</tbody>
</table>
Telemedicine in rehabilitation and maintenance of chronic diseases
Rehabilitation programmes

• Chronic conditions
  – DM
  – dementia
  – OA
  – stroke
  – incontinence

• Content
  – exercise
  – education
  – group discussion
  – peer support

• Outcomes
  – objective
  – subjective
  – qualitative
  – teleconferencing as medium of instruction

• Role of lay personnel
  – staff of elderly centres
  – volunteers
  – patients
Shatin Hospital

Telehealth headquarters

ELCHK Social Services Network in Shatin

Day Care
Home Help
Community Clinic

Social Centre
Home Help

Social Centre
Day Care

Social Centre
Community Clinic

Social Centre
Why Tele-rehabilitation?

• More cost-effective
  – utilize community resources
  – multiple subjects / sites

• Real-time link allows interaction
  – instructor - subject
  – subject - subject

• ‘Group’ has advantages over 1:1 intervention
  – CDSMP model
Video conferencing link

Shatin Hospital

1.5Mbps Telemmed Fibre IP Link

Broadband Network

1.5Mbps Telemmed Fibre IP Link

Community centre
Exercise training

- The whole exercise session lasted for 30 minutes.
- It started with a 5-minute warm up.
- A 10-minute resistance training with the use of elastic tubing (Theraband®).
- Followed by a 10-minute aerobic dance.
- And ended with a 5-minute cool down or progressive muscle relaxation training.
Foot examination & blood sugar monitoring
Conclusions

• Community-based group rehabilitation programs incorporating exercise prescription, education and peer support can improve patients’ physical and psychological outcomes in various common chronic diseases.

• The programs should be part of a comprehensive care package offered to patients with chronic diseases.

• Community centres for older persons are the ideal location for running these programs.

• Teleconferencing is a feasible and acceptable means to deliver such programs, and allows health care professionals to reach out to more patients in the community.

Chan WM et al. The role of telenursing in the provision of geriatric outreach services to residential homes in Hong Kong. J Telemed Telecare 2001;7:38-46.


Tele-rehabilitation publications

Telemedicine in rehabilitation

DM

OA

Stroke

Dementia

Urinary incontinence
7

Telemedicine in Rehabilitation

Elsie Hui

Introduction

Telerehabilitation is the assessment, diagnosis, direct therapy, education, monitoring and support of patients at remote sites via telecommunication methods, ranging from use of the telephone to videoconferencing through the Internet or dedicated digital links. Rudimentary telerehabilitation was developed to provide care to disabled patients living in remote areas, who, due to their physical limitations, had particular difficulty in travelling to urban rehabilitation facilities. Since then, significant advances have been made in the technology involved, both in the equipment used to provide direct patient care and in the stations and networks used to link therapist and patient. It has been suggested that telerehabilitation could become an important modality to service providers who are seeking to extend post-acute care into a non-clinical setting. For example, by extending rehabilitation beyond the hospital and into the community or into the home, providers can continue to monitor patients’ progress, identify areas in need of improvement before complications set in, and ultimately improve patient function and decrease long-term disability and costs.

Overview

While many centres are using telemedicine to provide otherwise conventional rehabilitative care to patients with neurological diseases, some researchers are exploring the use of human–computer interface systems to enhance the quality of care provided and, hence, clinical outcomes. With the increasing availability and affordability of home computers and Internet connections, the cost of telerehabilitation has fallen substantially in recent years. Telerehabilitation has been applied in numerous neurological conditions, including stroke, brain and spinal injury, and cognitive impairment. In addition to direct links between patients and healthcare professionals, disease-specific websites provide important information on neurological conditions to patients and their families and carers.

Home-based teletherapy

Home-based teletherapy is the delivery of healthcare, in particular physical therapy, to disabled patients at home. Researchers at the Jim Thorpe Rehabilitation Center in
Way forward?

- Telehealth is an integral part of our health care system
- I.T. has great potential in the care of older patients
  - User-friendly, cheap, accessible, consistent, adaptable

- Driving forces
  - Providers
  - Users
  - Academics
  - Government
  - Industry
Special Acknowledgement to Dr D Dai & CHCC Team of HK Hospital Authority

THANK YOU!

huie@h.org.hk