TELEMEDICINE
Concepts, Scope & Experience in Major disasters in Pakistan

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Outline of today’s presentation

- Telemedicine / e-health concept & Scopes
- Earthquake in Pakistan - an overview
- Telemedicine - Role in disaster Management
- Telemedicine / E-Health Training Center
- Lessons Learnt!!
- Regional & International Collaboration

TELEMEDICINE
Concepts & Scopes

"The use of medical information exchanged from one site to another via electronic communication for the health and education of the patient or health care provider and for the purpose of improving patient care".

(The American Telemedicine Association)

TELEMEDICINE
REQUIREMENTS

1. Network, Connectivity
2. Telemedicine Tools
3. Trained Health Professionals
TELEMEDICINE REQUIREMENTS

CONNECTIVITY
- Telephone Lines
- ISDN, Lease Lines
- Fiber Optics
- Radio Modems
- Satellite Links

TELEMEDICINE REQUIREMENTS

TOOLS
- Computers
- Peripheral Attachments (etc ...)
- Video Conferencing
- Dedicated Software (customized to Pak.)

TELEMEDICINE METHODOLOGY

- Store & Forward
- Two way Interactive Television (Video Conferencing)

STORE & FORWARD

Useful for Non-Emergency Consultations

TELEMEDICINE APPLICATIONS

- Early Intervention
- Emergency & Trauma Care
- Tele- Surgery
- Tele – Dermatology
- Tele – Cardiology
- Tele – Psychiatry
- Tele – Radiology

TWO WAY INTERACTIVE CONFERENCING

Face to Face consultation in Real Time
Requires High Speed Internet (> 128 KBps, ISDN, Lease etc)
Dedicated Hardware and Software necessary for Professional Output
TELEMEDICINE APPLICATIONS
- EARLY INTERVENTION -
EMERGENCY & TRAUMA CARE URGENT 2nd OPINION

Distance Learning
Lecture of the week
Surgical Atlas
Tutorials

TELEMEDICINE APPLICATIONS
MEDICAL EDUCATION
• Telemedicine / e-health concept & Scopes
• Earthquake in Pakistan – an overview
• Telemedicine - Role in disaster Management
• Telemedicine / E-Health Training Center
• Lessons Learnt!!
• Regional & International Collaboration

Outline of today's presentation

TELEMEDICINE APPLICATIONS
MEDICAL EDUCATION
Demonstration of Procedures Online

Earth Quake of Pakistan
Earth Quake of Pakistan

Magnitude 7.6
86,000 people lost their lives
69,000 injured

Heaviest damage occurred in the Muzaffarabad area
Estimated 4 million people in the area left homeless

Earth Quake of Pakistan

<table>
<thead>
<tr>
<th>Table: Summary of Damage to Health Care Workers in the Affected Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Health Care Facility</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>Emergency Care Hospital</td>
</tr>
<tr>
<td>Secondary Care, District, Tribal Health Facilities and Civil Hospitals</td>
</tr>
<tr>
<td>First Level Care Health Facilities (DHO, RHCs and RHC+Care)</td>
</tr>
<tr>
<td>Other Health Facilities (Dispensaries, Tens &amp; Unit Posts)</td>
</tr>
<tr>
<td>Health Management Offices</td>
</tr>
<tr>
<td>Total Health Facilities</td>
</tr>
<tr>
<td>Loss of Critical Infrastructure (e.g., water, electricity)</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

RMC Allied Hospitals

- No of pts: 5544
- Surgeries Performed: 2035
- Amputations/paraplegia: 87/144
- Mortalities: 89
- No of discharges: 5169
- Present Admissions: 26
How did we respond!
How did we respond!

Remarkable

The entire Nation stood up to the Challenge
Surgeons from all over the country were no exception

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Telemedicine in Disasters

• Telemedicine applications for disaster emergencies by many countries.
• First Telemedicine application in disasters : Mid 1980's
• NASA to furnish disaster aid following earthquake in Mexico City : 1985

Disaster types

• Man Made
• Natural
Role of Telemedicine in Disaster Management
Pakistan Experience

Remains of T.H.Q Balakot

Remains of B.H.U Shohal
Najaf

Remains of Civil Hospital
Gharhee

Telemedicine in Disaster Management
- Experience in Pakistan

Initiative of!

MOIT
ITU
PASHA
INTEL
Telemedicine & e-health center holy family hospital

Telemedicine & E-health training center

Identified as only center in the country to play its role in Telemedicine in disaster situations.

- Hub at Holy Family Hospital
- Centers in NWFP
- Centers in AJK
- Two centers in referral step down hospitals
“Telemedicine / e-health Training Project”

Pak-US Collaboration in S&T

Telemedicine - Role in disaster Management
- Hub & Remote centers in disaster area
- Step down hospitals
- Follow up
- Rehabilitation
- Multitasking

Hub at Holy Family Hospital

Customization of Telemedicine Software for disaster relief
Training of Volunteers in Telemedicine consultations
Respond to Teleconsultations from relief camps at disaster site.
Coordination of relief activities with P.M RELIEF Cell in Islamabad.
Addressing day to day needs of Earthquake victims

Role of Hub at Holy family hospital

Role in Disaster Management
- Customization of Telemedicine Software for disaster relief

Role in Disaster Management
Training of Volunteers in Telemedicine consultations
Role in Disaster Management

- Setting of telemedicine centers
- Shoal Najaf / Balakot

Role in Disaster Management

- Collaboration with Foreign Relief Missions
- Cuba / Turkey / UAE
- NGO’S
- Pakistan Govt. relief missions

Role in Disaster Management

- Setting of telemedicine centers
  - Centers in AJK - Muzaffarabad

Role in Disaster Management

- Setting of telemedicine centers
  - Centers in AJK - Hattian Bala
Role in Disaster Management
- Setting of telemedicine centers
  - Centers in AJK - Muzaffarabad

Role in Disaster Management
- Collaboration with VCU / NASA Experts

Results
- Teleconsultations with Specialists
- Referred cases were sent to the tertiary hospitals in a state of complete "surgical preparedness".
- The stay in the hospital was minimized.
- Speedy treatment was ensured.

FOLLOW-UP OF EARTHQUAKE VICTIMS IN A REMOTE HOSPITAL USING TELEMEDICINE
- Telemedicine centers in Step down hospitals: Pindi Gheb / Attock

Remote Supervision
- Patient management by a team
  - a junior doctor (properly trained and certified by TETO)
  - Medical staff at step down hospital

- Consultation/Communication facilitated by
  - Assistance from an IT person

- Panel of consultants at Tertiary Care Hospital
  - General & Orthopedic surgeons
  - Whole time availability
RESULTS

Age: 4 - 70 years (mean 32)
Sex:

- Male: 57
- Female: 43

Mode of Injury

<table>
<thead>
<tr>
<th>Mode</th>
<th>% age of Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collapsed Roof</td>
<td>73</td>
</tr>
<tr>
<td>Under the Stones</td>
<td>16</td>
</tr>
<tr>
<td>Collapsing Walls</td>
<td>12</td>
</tr>
</tbody>
</table>

Time of sustaining injuries: mean 1.76 hrs

Evacuation

Time: 1-12 Days (Mean 5.37)

<table>
<thead>
<tr>
<th>Mode</th>
<th>% age of Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Lift</td>
<td>75</td>
</tr>
<tr>
<td>By Road</td>
<td>25</td>
</tr>
</tbody>
</table>

Injuries

<table>
<thead>
<tr>
<th>Injuries</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Limb Injuries</td>
<td></td>
</tr>
<tr>
<td>Fracture Humerus</td>
<td>3</td>
</tr>
<tr>
<td>Fracture Radius/Ulna</td>
<td>2</td>
</tr>
<tr>
<td>Shoulder dislocation</td>
<td>2</td>
</tr>
<tr>
<td>Fracture Clavicle</td>
<td>1</td>
</tr>
<tr>
<td>Other Injuries</td>
<td></td>
</tr>
<tr>
<td>Abrasions/Lacerations</td>
<td>2</td>
</tr>
<tr>
<td>Burn</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Injuries</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower limb injuries</td>
<td></td>
</tr>
<tr>
<td>Fracture Femur</td>
<td>9</td>
</tr>
<tr>
<td>Fracture Tibia/Fibula</td>
<td>11</td>
</tr>
<tr>
<td>Fracture Metatarsals</td>
<td>3</td>
</tr>
<tr>
<td>Fracture Pelvis</td>
<td>5</td>
</tr>
<tr>
<td>Knee injuries</td>
<td>2</td>
</tr>
<tr>
<td>Hip dislocation</td>
<td>1</td>
</tr>
<tr>
<td>Crushed leg</td>
<td>1</td>
</tr>
</tbody>
</table>

Multiple Injuries: 32%

Treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. of Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Knee Amputation</td>
<td>1</td>
</tr>
<tr>
<td>ORIF for fracture femur</td>
<td>8</td>
</tr>
<tr>
<td>DHS</td>
<td>1</td>
</tr>
<tr>
<td>Conservative treatment</td>
<td>5</td>
</tr>
<tr>
<td>External fixators for fracture tibia</td>
<td>6</td>
</tr>
<tr>
<td>MUA (POP &amp; traction)</td>
<td>9</td>
</tr>
<tr>
<td>K-wiring</td>
<td>2</td>
</tr>
<tr>
<td>Debridements</td>
<td>3</td>
</tr>
</tbody>
</table>
Duration of stay in hospital
Total hospital stay: 10-57 days (mean 36)
- Stay at Tertiary care hospital: 6 days
- Stay at Step down hospital: 30 days

CONCLUSION
- Significant reduction in readmissions to tertiary care hospitals.
- Reduces the burden on main trauma care centers.
- Peripheral hospitals can be safely upgraded through telemedicine during the disaster situation.

Telemedicine - Role in REHABILITATION
Experience in Paraplegics - victims of Earthquake

<table>
<thead>
<tr>
<th>PLACE OF STUDY</th>
<th>NUMBER OF PATIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rawalpindi medical college and allied hospitals</td>
<td>144</td>
</tr>
<tr>
<td>Melody relief and rehabilitation center, Islamabad</td>
<td>76</td>
</tr>
<tr>
<td>Total patients</td>
<td>216</td>
</tr>
<tr>
<td>Patients discharged before evaluation</td>
<td>22</td>
</tr>
<tr>
<td>Sample for research</td>
<td>194</td>
</tr>
</tbody>
</table>

AGE DISTRIBUTION

- Children: 8.76%
- Young: 77.83%
- Middle Age: 11.34%
- Old Age: 1.07%

GEOGRAPHIC DISTRIBUTION

EDUCATION LEVEL OF PARAPLEGIC PATIENTS

- 12TH GRADE: 29%
- 10TH GRADE: 29%
- 8TH GRADE: 19%
- 5TH GRADE: 7%
- NOT EDUCATED: 3%
CHECKING BASIC COMPUTER SKILLS OF PARAPLEGICS

RESULTS OF BASIC COMPUTER SKILL PROFORMA

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer user</td>
<td>92%</td>
<td>08%</td>
</tr>
<tr>
<td>Comfortable with computer use</td>
<td>92%</td>
<td>08%</td>
</tr>
<tr>
<td>Internet users</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>Comfortable with internet use</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>Operate MS office</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

WILLINGNESS FOR COMPUTER TRAINING

- 85% patients are willing for computer training.
- 9% patients have basic computer skills.
- Among illiterate patients 70%(137) have at least one educated family member.

WILLING FOR COMPUTER TRAINING

WORKSHOP FOR PARAPLEGICS AT TELEMEDICINE TRAINING CENTRE

CONCLUSION

- Computer skills of paraplegics and their attendants can be used as a tool in their rehabilitation.
- Rehabilitation while based at tertiary centers should include basic training of paraplegics and their attendants.

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What have we learnt!!!

Disaster plans ???
Emergency preparedness

LESSONS:
Lack of & Difficulties in Co-ordination !!

LESSONS!
One of the most significant problems in mass casualty management is that we do not prepare for disasters; we respond to them.
Major Concerns

- Impact of disaster - immediate and consequences linger over time
- Health surveillance must survey extent and patterns of injuries
- Immediate response requires documentation regarding incidence
- Relay of accurate information to command and control

Information usage

According to International Federation of Red Cross:

- Information alone can save lives. But there are gaps in the way we gather and share this powerful resource.
- Timely information is a form of disaster response in its own right.
- Information reduces suffering in the wake of disaster.

(Sources: International Federation of Red Cross. World Disaster report 2005)

Options for communication

- Wired (point to point connectivity)
  - Plain old telephone system (POTS)
  - Fiber optic lines
- Wireless (point to multi-site connectivity)
  - Cellular phone network
  - Radio Frequency (RF) communication
  - Satellite phone communication

Options for data relay

- Low Earth Orbiting Satellite
  - Option 1: using point-to-point dialup to H.324 server
  - Option 2: using dial up Internet provider
  - Option 3: using Low Earth Orbiting Satellite (per minute charges accrue)
  - Option 4: using HF radio (HAM) through Ionosphere

Conclusions

- It is essential to develop cost-effective equipment, software, interface elements and increased access to the communication satellite capacity.
- It is important to exchange information on medical practices and to standardize the medical data format.
- Integrate the application of telemedicine into other thematic areas: natural disaster management and environmental monitoring.

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4th APT workshop, Rawalpindi 2006
Jointly organized by
- APT
- ITU
- Tokai University, Japan,
- Telemedicine Association of Pakistan
- Telemedicine / E-Health Training Center.

Special session on Role of Telemedicine in Major Disasters

Thank you!

Websites
- www.telemedicine.pk
- www.tapak.org