Postgraduate Disaster Health Education in Australia: Incorporation of space-based technologies?

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Greetings from Australia!
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Overview of this session

• Brief background

• What we are doing in disaster health education in Australia

• Examples of how space technology can be applied to disaster health

• How we might be able to merge these into our programs
Disasters are increasing in frequency

Source: CRED
Cyclone/Typhoon over Philippines
GLOBAL WARMING

"The science is in. The facts are there that we have created, man has, a self-inflicted wound through global warming."
- Ansel Schwabacher
Governor, States of California, USA

Tuvaluan children watch as extra high tide floods neighborhood.
Sand & dust storms & bush fires near Sydney
UNCCD: Number of drought disasters 1974-2004

Number of drought disasters as recorded by EMDAT (1974–2004)

Drought events by administrative units
Number of recorded events
- 7 to 9
- 5 to 6
- 3 to 4
- 1 to 2

Data source: EM-DAT: The OFDA/CRED International Disaster Database
GIS analysis IRI, Columbia University
Cartography UNEP/GRID-Europe 2009
Need for disaster health education

“Human history becomes more and more a race between education and catastrophe.”

HG Wells. The Outline of History, Ch 15

“Five minutes before the party is no time to learn how to dance.”

Snoopy
Need for disaster health education

- World Association for Disaster and Emergency Medicine Education Committee
  “We need more and better education”
A General Complete Framework for Disaster Education

Sundnes et al. Prehosp Disast Med 2003; 7(3) 1-14
Disaster Health Education in Australia now informed by a consensus Framework

Disaster Health Education in Australia now informed by a consensus Framework

- The framework identifies seven educational levels along with educational outcomes for each level.
  - Aligns with WADEM Levels and links with qualifications framework in Australasia
- The framework also identifies the recommended contents at each level and assigns a rating of depth for each component.
  - The framework is not intended as a detailed curriculum but rather a guide for educationalists to develop specific programs at each level.
What Disaster Health education providers are there in Australia?

- Government
  - Federal: Emergency Management Australia
  - State programs
- Universities
  - Charles Sturt University
  - James Cook University
  - Queensland University of Technology
  - University of Queensland
James Cook University, Australia

- Postgraduate Certificate in Disaster and Refugee Health (PGCDisastRefugHlth) - 2004
  - Refugee Health (existing subject) - 1995
  - Disaster Health Management - 2004
  - 2 relevant electives

- Master of Public Health (Biosecurity and Disaster Preparedness) - 2004
  - Above subjects plus communicable disease control; Public Health and Bioterrorism
• Postgraduate Certificate of Aeromedical Retrieval -2006
  – Aeromedical Retrieval (Introduction
  – Clinical Care Skills in Aeromedical Retrieval
  – Flight Crew Skills in Aeromedical Retrieval
  – Plus elective (could be Clinical Audit/Logbook in Aeromedical Retrieval)

• Master of Public Health (Aeromedical Retrieval)
James Cook University, Australia

- Postgraduate Certificate in Disaster and Refugee Health (PGCDisastRefugHlth) - 2004
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    - Refugee Health (existing subject) - 1995
    - 2 relevant electives
- Master of Public Health (Biosecurity and Disaster Preparedness) -2004
  - Above subjects plus communicable disease control; bioterrorism and public health
Overall Aim of Disaster Health Management Program

“To provide students with an overview of the knowledge, skills and attitudes required for the successful management of disasters on the Australian and the global context with a special focus on problems with high likelihood and risk in the tropics.”
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Overview of subject Disaster Health Management

• 2 Weeks F/T Block Mode Course On campus

• 30-40 participants (25% international)

• Assessment is 3 hour written examination (70%) and a group presentation (30%)
Topics List: Disaster Health Management

- Overview
- Damage
- Risk & Planning
- Public Health
- Communicable Disease
- Roles of NGO, Gov, Military
- Prehospital and Hospital
- Command, Control & Communication
- Logistics
- Media
- Security
- Forensics
- Psychological Aspects of Disasters
- Recovery
- Education and Training
- Ethics and Law

- Tabletop/Emergo Exercise
- Natural Disasters
- Cyclones
- Transport Disasters
- Terrorism
- Mass Gatherings
- Industrial Disasters

- Complex Humanitarian Emergencies (CHE) - covered in Refugee Health
- Chemical, Biological, Radiological (CBR) as part of number sessions/also covered in new subjects (e.g. public health and bioterrorism)
Classroom work

• Lectures in morning
• Case Material and Syndicate Exercises in afternoon
• Video effectively used to help experience events

• Plus
Tabletop Exercise
Fieldwork

• Townsville Hospital
  – Major tertiary referral hospital
  – Close by!
  – Casualty simulation exercise
EMERGO Training
TOPICS
• Aitape Tsunami
• Hillsborough
• Ash Wednesday Fires
• Bhopal
• Hurricane Andrew
• Anthrax and US Post

FRAME WORK FOR PRESENTATION
• Mechanism of the Disaster
• Scope of the Impact and Damage
• Response
• Epidemiology and risk
• Public Health Measures
• Command, Communications and Control
• Psychological Impact
• Media Aspect
• Recovery
• Preparedness
• Lessons Learnt
Informal networking
The students

Class of 2005
The students

- 2/3 Elective MPH / MPH&TM
- 1/3 PGCDisaster & Refugee Health
- 1/3 Disaster Experience
- 1/2 Overseas Aid experience
- 2/3 indicated highly likely to be involved in disasters in the future
- Mix mid-career health professionals
Examples of Instructors Backgrounds

- Faculty, Emergency Management Australia (Federal agency)
- State Emergency Health Services/Disaster Coordinator
- Senior Medical Officer, & Chief Military Police Major Military Base
- Chief, TV News desk/Media Advisor
- NGO Staff
- Logistician
- Senior Meteorologist
- Clinical Psychologist
- Forensic Police
- Public Health Physicians
- Environmental health officer
- Emergency Physicians
- Aeromedical Retrieval staff
- Head of School
Incorporation of space-based technologies?

- How can we incorporate space-based technologies in our education programs?
- What do we cover/include?
Role of communication and Earth observation satellites

  – “While communication satellites help in disaster warning, relief mobilisation and telemedical support, Earth observation satellites provide the basic support in pre-disaster preparedness programmes, in disaster response and monitoring activities, and post-disaster reconstruction.” (p291)
Role for Telecommunication systems in disasters


- “For relief teams in remote or severely devastated areas, satellites have played a significant role in providing mobility and land-line independence for telemedicine.”
Global systems to support disaster management

• Kasturirangan, Space Policy 2007; 23: 159-166.
  – “Warning of an impending disaster and getting to the right people are the crux of disaster management strategies.
  – Often the time available is so little, and......the gap between information generation and final delivery needs to be very short to be effective.”
Review of space application support for disaster and emergency medicine

UN - SPIDER Woori Moon
August 2008
Which space technologies can be adapted in disaster health and epidemic control?

UN - SPIDER (Woori Moon, 2008)

• Geographic Information Systems
• Global Positioning Systems
• Telecommunication, including telemedicine
• Epidemic control/improved epidemiology (CRED)/information (Knowledge Portal)
GPS/GIS

- The Global Positioning System (GPS) is a satellite-based navigation system which provides exact position on the Earth anytime, anywhere, in any weather.
- Geographic Information System (GIS) is analysis that combines relational databases with spatial interpretation and outputs often in form of maps.
• GIS data from satellites can help workers clarify the contaminated region and separate it immediately.

• Early warning systems using satellite communication, GIS & GPS technology provide a fast & resilient way to distribute over geographical areas alarms & information to the population/workers to facilitate adequate protective measures for safeguarding health/safety in catastrophic events, such as a tsunami.

• GIS are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk management measures.
## Space supports for medical care in disaster

<table>
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<tr>
<th>Improve Surge capacity</th>
<th>Earth Observation &amp; Navigation</th>
<th>Satellite communication</th>
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<tbody>
<tr>
<td></td>
<td>Find the location of isolated patient in hidden area</td>
<td>Field based patient registration and transportation between health care facilities</td>
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<td>Provide map and navigation tools for vehicle tracking system for transport urgent patient</td>
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<td></td>
<td><strong>European Geostationary Navigation Overlay Service (EGNOS)</strong></td>
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<tr>
<td>Medical resource Management</td>
<td>Monitor real time status of critical medical resources availability by map data provided by satellite</td>
<td>Communication with health center to estimates of resource availability, including personnel, vehicles, hospital beds and/or specialized equipment for search and rescue or decontamination</td>
</tr>
<tr>
<td>Manage Infection and Contamination</td>
<td>Mapping the area exposed to infection source or Toxic materials by GIS mapping</td>
<td>Just-in-time distance education—HEPA filters, PPE suits, sanitation rule, decontamination</td>
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<td>Provide real time medical care</td>
<td>Global Positioning System (GPS) for navigating rescue helicopter, ambulance for any time medical rescue</td>
<td>Real time co-operated surgery by real-time communication tools</td>
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<td>Rapid patient data transmission for telediagnosis, teleconsultation, telemanagement</td>
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<td>Provide situational awareness</td>
<td>Mapping the dangerous neighborhood area for warning and prevention</td>
<td>Direct feedback from field to remote disaster management center</td>
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• Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve patients' health status.

• Currently extensively used ground based technology.

• In a disaster, may predominantly use satellite-based technology.
Various forms of telecommunication in disaster health

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<tr>
<th>Use of telecommunication in disaster medicine</th>
<th>Description</th>
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<tr>
<td>Telemedicine</td>
<td>The practice of medicine over distance with the use of telecommunications equipments</td>
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<tr>
<td>Telemanagement</td>
<td>The range of telecommunication activities designed to maintain control over disaster and emergency situation and to provide a framework for helping at risk persons to avoid or recover from the impact of the disaster</td>
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<tr>
<td>Teleconsulation</td>
<td>A medical team or expert in a hospital gives assistance in diagnosis and treatment to a doctor or rescuers with victims using telecommunication facilities</td>
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<tr>
<td>Telediagnosis</td>
<td>Telediagnosis is involves the doctor making an assessment without physical exam, but rather based on data transmitted from a remote location using telecommunications.</td>
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<tr>
<td>Information for transportation</td>
<td>The use of telecommunications to request helicopters, ambulances and other means of transportations, to assign patients to the proper treatment area and to establish maintain communication with medical facilities</td>
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Satellite technology can be used in communicable disease/epidemic control

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<th>Epidemic surveillance and prevention</th>
<th>Earth observation and Navigation</th>
<th>Satellite communication</th>
</tr>
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<tr>
<td>Provide geographic information required to monitor the risks of epidemic outbreaks and create prediction models</td>
<td>Support maps to monitor the risk of epidemic outbreak in ordinary times</td>
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<td><em>Ex. WHO public health &amp; GIS Earth observation technology for predicting malaria risk in Africa</em></td>
<td><em>Ex. SAFE(Satellite for Epidemiology)</em></td>
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<td><strong>Early warning</strong></td>
<td>Provide the essential geographic information to evaluate the risk of the region round primary disease area</td>
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<td>dangerous contaminated area from safe region in epidemic crisis</td>
<td>Tracing the immigration route of vector animal</td>
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<td><em>Ex. HEWS - Health Early Warning System a source of infection (ESA)</em></td>
<td>Urgent mobilization of Health security system in the levels of region, nation and world.</td>
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<td><strong>Response</strong></td>
<td>Infection population and medical resource assessments</td>
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<td>Fast arrangements of medicine, human, decontamination facility to high risk area</td>
<td>Fast access to medical information to limit spread disease</td>
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<td>Rapid Communication between health center and high risk outbreak region</td>
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UN-SPIDER Knowledge Portal
So, what are the possible directions for our Disaster Health Education in Australia?

- Train the trainer
- New Module/integration into subject activities simply providing an additional dimension for consideration
  - Role of International Agencies
    - UNOOSA / UN-SPIDER / International Charter
  - Applications of Space-based technologies
    - Space support for medical care in disasters
      - Satellite communication/telemedicine
      - GIS in medical management of disasters
      - GPS in safety of deployed staff
    - Epidemic control/improved epidemiology
Thank you

Red Spider Nebula