Defining Disaster Effects on Healthcare
Small-world Networks

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Motivation and Background

• Health networks can be thought of as Small-world networks based on natural connectivity.

• Disasters are unnatural events.

• Hypothesis: Using a GIS to model the effect of disasters on a Healthcare SWN will reveal inefficiencies which can be solved by prepositioning POC equipment.
1) Healthcare networks are defined by their SWN properties.

2) Describe how POC supports evidence-based medical decisions at the point-of-need.

3) Spatial Carepaths can help understanding inefficiencies.

4) How a GIS was used to model a Tsunami in Phang Nga Thailand to understand vulnerabilities.
Example of a Small-world Network

Kost et al. (2010)
ASSURED Qualities

- Affordable
- Sensitive
- Specific
- User-Friendly
- Rapid/Robust
- Equipment-free
- Deliverable
A Spatial Carepath
Study Area Phang Nga, Thailand

• December, 2004 Tsunami
  – Over 250,000 Killed
  – 1.5 Million Displaced

• Phang Nga, Thailand
  – Population (2011): 250,000
  – Over 4,000 deaths

Results

• Three analyses were performed.
  – Normal conditions
  – Normal conditions with new POC at Regional Hospitals
  – After Tsunami with new POC at Regional Hospitals

<table>
<thead>
<tr>
<th></th>
<th>Normal conditions</th>
<th>New device placement in regional hospital without tsunami incapacitation</th>
<th>New device placement in regional hospital and tsunami incapacitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD) km</td>
<td>37.3 (19.8)</td>
<td>15.4 (10.6)</td>
<td>22.9 (14.3)</td>
</tr>
<tr>
<td>Median (Max/Min)</td>
<td>40.7 (75.2/0)</td>
<td>15.1 (41/0)</td>
<td>22.2 (61.2/0)</td>
</tr>
<tr>
<td>HRF &gt; 10 miles</td>
<td>80% (64/80)</td>
<td>46% (37/80)</td>
<td>66% (53/80)</td>
</tr>
</tbody>
</table>

*Simulates if cTnI resource was placed in regional hospitals.
Abbreviations: cTnI, cardiac Troponin I; HRF, Health Resource Facility.
Thank you for your attention!


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