DO WHAT? ... IN CANADA?

HOSPITAL EVACUATION (ONE EXPERIENCE)

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What is a Hospital

Definition: An institution providing medical care for sick and injured
- (Oxford Dictionary)

Role rather than place:
- intersection between health sector & community
- Provides care BUT also promotes health & wellness
- Often a major & visible community employer
- Significant part of any community
  - Social safety net
  - Part of community’s critical infrastructure
    - Eg – try removing an ED

Rural Hospital
- May be even more significant & visible
  - “Not one of many – but one of one”
Hospitals & Disasters
Almost always involved & impacted by any disaster (real / threatened)

- No longer just first-receivers - Are “First Responders”
- 60% victims present directly to hospital (not by EHS)
  - Post 9/11

Roles following a disaster

- To triage & treat victims
- To expand to accommodate (surge)
- To maintain co-existing demands
- Societal expectation for hospitals to be prepared and ready to assist the community following a disaster
- But you need to be there....
" Appropriately educated and prepared health care professionals are the *most essential components* to reducing mortality and morbidity..."

Djalali et al., 2009 – Prehospital & Disaster Medicine 24: 565

How Important are Hospitals Following a Disaster?
Last decade: ↑’d growth / interest...

- Disaster & Emergency Management (DEM) profession
- Hospital Emergency Preparedness:
  - Code Orange (MCI)
  - Infectious Disease Outbreak (SARS, H1N1)
- Specialty of Disaster Medicine (Health) - internationally
  - Exception - Canada
BUT - What Happens When the Hospital is the VICTIM?

Due to:

- **Internal threat**
  - (i.e. utility failure, fire, human threat)
- **External threat** (isolated)
- **External community threat**
  (Both community and hospital threatened)
Hospital Evacuation is serious
(Considered / Undertaken)

- Not just the physical act of moving patients
- Also the significant impact upon:
  - Patients in the hospital (families)
  - Staff working in hospital (families) – may also be evacuated
  - EMS - may not have a local hospital to deliver to
  - Communities they serve
    - Those in community that may be yet to require hospital care (disaster or other – AMI’s, GI bleeds, babies…)
      - Acute care
      - Mental health
Problem: Hospital Evacuations are relatively rare events

- extensive studies lacking
- No E-B studies
- No recipes
- Like much of disaster medicine
  - Case studies
  - Why lessons –learned from others are so important

- “hospital evacuations do occur...paucity of published data”

Haiti, 2010
1971-1999: 275 Hospital evacuations in USA
(Sternberg et al (2004); Prehospital Disaster Med 19(2): 150)

Rate per decade increasing
- 1970’s: 1 / yr
- 1980’s: 5.7 / yr
- 1990’s: 21 / yr
- estimated 2000’s: > 30 / yr
Case Study: Joplin, MO, (pop 50,000)

- **Joplin, MO – May 2011**
  - Tornado – largest recorded in US history
  - 158 dead; >1000 inj.
  - St John’s Regional Medical Center
    - Building shifted 4” on foundation
    - 28 killed
    - Never return – having to build a new hospital
  - Use temporary buildings
  - Transfer pts for certain invest/care

**Urban**
- One of several in city that may or may not be affected

**Rural**
- Next hospital is several hours away
Canada – ?

Mississauga, ON - November 10, 1979 (33 years ago)

- 478 pts - 292 dc’ed home; 186 transferred to other hospitals in GTA
- Train derailment – tanker leak / explosions - Potentially 80 t liquid chlorine

But there is no catalogue / study of Canadian hospital evacuations
Case Study: Salmon Arm, BC (pop ~ 12,000 in 1998)

- BC Interior - North Okanagan (Shuswap) Area
- 5 hrs from Vancouver
- Farming, forestry
- Tourism (summer) – Shuswap Lake (Houseboat capital)

1998 – typical hot, dry summer
Shuswap Lake General Hospital

- Typical Canadian “large” rural hospital
  - 40 acute beds
  - 3 bed ICU
  - 26 bed extended care
  - 24 hour ER
  - 3 GSx; 2 IM’s; ~ 16-18 FP’s
- Refer to
  - Vernon > 1h
  - Kelowna/Kamloops ~ 2hr
July 29, 1998

Lightening strike
- Fly Hills
- (10km southwest of town)
For 6 days it smoldered...}
Aug 5, 1998 – 2 pm

- **Sudden weather shift**
  - 80-100 kph winds towards town
- **Fire spread rapidly** (2-300 ft/min)
- From 10 to > 6,000 hectares
4-8 pm

- **Fire now threatening town**
  - no control (firestorm)

- **Hwy’s in/out - threatened**
  - 2 of 3 routes compromised
  - Same rts to referral hospitals

- **Smoke ++**
  - Overwhelming town
  - Overwhelming hospital ventilation
  - Affecting pts. and staff

- **Partial town evacuation**
  - ~ 2000 people
Formed ICC — (Senior hospital admin; CoS, CED, local chief BCAS)

Had to create a plan
- No plans existed for interface fire threat (wastepaper basket)
- No hospital evacuation plans
- Hospitals contacted – no plans

Get community / regional resources
- Ambulance – 3 in town (BCAS regional office – Kamloops)
- RCMP, fire, mental health, ESS
- Alert potential receiving hospitals (Vernon, Kelowna, Kamloops – most 1-3 hrs away)

Began to contact medical /nursing staff
- Communicate risks, plans, possibility of evacuation
- Inform patients (families), staff
- What needed to go with them (records, meds, personals)

Kept asking: Stay or evacuate ???
SLGH: Stay or Go?

**Stay**
- Not physically threatened
  - Yet – but potentially in next 12+ hours
- No actual evacuation plans existed
  - No previous experience
- Parts of town being evacuated
  - Staff homes – not available
- If evacuate – who would provide emergency care to community

**Evacuate**
- Air Quality
  - Bad and expected to worsen
  - Overwhelming hospital ventilation
  - Patient care already affected
- Highways threatened
  - Would roads be open later if needed to evacuate (hrs / days)
  - Next closest hospital 1.5-2hrs away
- Transport
  - Only had 2-3 ambulances in town
  - If delayed – could additional ambulances get to SA
2130 Evacuate!

- **40 acute care patients moved**
  - (including 3 ICU; 4 day 1 post-op; 26 LTC)
  - Ambulances / school buses
  - Vernon (1 hr); Kelowna (2h) away
  - Arrange staff to go with some (exceeded EMS capability – BLS)

- **Challenge:**
  - Staff home evacuations – same time
  - Difficulty communicating with home

- **0200 – Hospital empty...**
  - Fire line held
1\textsuperscript{st} hospital evacuation in BC (recorded)

Remained evacuated for 10 days:
- Risk to community remained
- Worsened - 6000 evacuated (~8000 total)

Challenge:
- Continue to provide emergency services
  - Responsibility to community & 1\textsuperscript{st} responders that came (> 17 Fire Departments)
  - No other ED for > 1 hr

BC’s 1\textsuperscript{st} declared Prov. State of Emergency
1. Why evacuate? (too rare to care)
2. Moving patients? (who goes first)
3. Where & How? (receiving & transport; tracking)
4. Then what? (community w/o a hospital – role?)
5. So what? (what did this teach - future planning & exercising)
1. Why hospitals evacuate

- No single reason
- Variety of reasons
  - Natural & man-made
  - #'s appear to be increasing

• 275 hospital evacuations (1971-99)
  - Sternberg et al (2004), Prehospital Disaster Med, 19(2)

<table>
<thead>
<tr>
<th>Reason</th>
<th>%</th>
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<tbody>
<tr>
<td>Fire IN hospital</td>
<td>23%</td>
</tr>
<tr>
<td>Hazmat IN hospital</td>
<td>18%</td>
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<tr>
<td>Hurricane / Tornado</td>
<td>14%</td>
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<tr>
<td>Human threat (bomb)</td>
<td>13%</td>
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<tr>
<td>Earthquake</td>
<td>9%</td>
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2011-2012: Canada

Aberdeen Hospital – Glasgow, NS
2011 – Bomb threat
94 evacuated

Hotel Dieu – Perth Andover, NB
2012 – River Flooding
21 evacuated

Ottawa Hospital
July 2012 – Roof Fire
40 evacuated from ED
After all - Isn’t everyday already a disaster in the ED?

So a disaster = just a particularly bad day?
Not prepared

- We had basic emergency plans – not widely known to staff
- We had **no** evacuation plan (never considered)
- While we managed...
  - Small hospital
  - Huge cooperation
  - A “one-off” – very little changed after
  - Local interest in DEM – rapidly declined with time
Canadian study – only one of it’s kind to date

- Hospital disaster/emergency preparedness plans
  - 2007 survey - 315 Canadian hospitals (ED’s)

**Findings:** (Response rate 11%)
- 80% hospitals have emergency plans (Code Orange)
- 70% have never exercised their “plan” last 5 yrs
- No defined “standard of care”
  - for hospital emergency plans / assessment of plans

**Not asked:** (personal comm, D. Kollek, sept 2012)
- Hospital Evacuation Plans

**How prepared Canadian hospitals are for evacuation?**
Hospital Evacuation - USA

- Recognized need
- Required part of Hospital Emergency Planning
- Tools available

Still in its infancy:

- "no cookbook of formulaic approach to hospital evacuation decision making"  

- "little guidance exists as to what issues should be addressed in a hospital evacuation plan"  
Why would you evacuate your hospital?

- **What is your risk / threat** (anticipated or encountered)?
  - Obvious / not obvious
- **How do you determine what to plan for?**

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Fukushima, Japan. March 2011

Joplin, MO. May 2011
Hazard Risk Assessment

- **Important first step: Hospital EP**
  - Determine the risks to your facility
  - Determine how vulnerable you are
  - Probability of those risks occurring

- Canadian Tool exists
  - Center for Emergency Preparedness Excellence (CEEP)
  - Risks:
    - **Immediate** – no warning
      - E.g. Fire, bomb – threat, earthquake
    - **Drop & go**
    - **Delayed** - 4-24hrs of warning
      - E.g. flood, hurricane (some warning)
      - Time for organized evacuation

Need to develop different evacuation plans for different risks

[www.ceep.ca](http://www.ceep.ca)
2. Moving patients

- **Salmon Arm**
  - Small #’s (~60) (+ 120 3 days later)
  - 3 ICU pts – not ventilated
  - Occurred around shift change – additional staff
  - Everyone helped (crises behavior)
Moving Patients – No EB best approach

- Hospital – mix of patients
- Evacuation = internal MCI
- Consider applying similar triage strategy

- Red
  - Critical care pts.
    - Non ambulatory
    - Difficult to move (resources)

- Yellow
  - Med/surg. pts.
    - Ambulatory / Non ambul.
    - Generally less resource intense
    - Easier to move

- Green
  - Ambulatory pts. (clinic pts.)
    - Some dc’d home

- Special Groups
  - Mental health
    - Ambulatory - possible security considerations

- May need at least 2 plans
  - Immediate evac
  - Delayed evac

- Your HRA will help determine
Northridge, CA – Earthquake (1994)
6 Hospitals Evacuated
Schultz et al (2003), NEJM 348: 1349-1355

- **5 hospitals** - ++ systems damage (power, water...)
  - No immediate threat collapse → time
  - Moved sickest first (ICU)
    - when had most staff available to help (hand ventilate, etc)
  - Then less sick (non-ambulatory → ambulatory)

- **1 hospital** – immediate risk of collapse
  - Applied MCI triage – “greatest good for greatest number”
  - Moved least sick first (most mobile) → Sickest last (most resource dep.)
  - Rapidly moved 334 patients

Neither right or wrong – different strategies for different perceived risks
Who decides? - patient moving tool

- **Patient Moving Team**
  - (Harvard School of PH)

- **Role:**
  - Decides who goes first...
  - Matches pts needs with appropriate beds at other facilities

- **Composition:**
  - Inpatient Clinical supervisor
  - Physician lead (work’s with MRP’s)
  - Specialist MD representation
  - EMS liaison officer

How to ‘Triage’ inpatients can be planned ahead of time – part of an evacuation plan
3. Where & How

**Salmon Arm:**
- Moved most acute care pts. by ambulance
- Staff augmented BLS when needed
- To hospitals 1-2 hrs away

**Worked**
- good adhoc communication
- Regional hospitals understood & stepped up
  - (no receiving plans)
Considerations: Sending patients

- **Receiving hospitals**
  - Do you have options (re: types / #’s patients) ? Yes/no
    - Urban vs rural

- **Patient transport**
  - Transport needs / options (ALS, BLS ambulance vans, buses, heli’s...) ?
    - Skill levels of EMS – need to augment with staff
    - How far do you need to send pts ?

- **Are your ‘receiving hospitals’ involved in your evacuation planning**
  - Are MoU’s needed...
  - Importance of both local and regional planning

- **Do your plans include being a ‘receiving hospital’**
  - May not be your disaster
What goes with patient

- **Salmon Arm** – simple
  - Before EMR’s
  - **Grabbed what we could**
    - RN Kardex
    - Charts
    - Meds (blister packed)
    - Made sure wrist-bands
    - Charted who went where
    - Notified FP / Family
Today...

- **EMR’s (within / between regions)**
  - Do they exist / can the communicate
  - Don’t assume that no paper is needed (KISS principle)

- **Should have some paper records to go with the patient**
  - Consider a 1 page summary sheet (EMR/manual) that includes:
    - Admitting diagnosis - Involved health professionals
    - Ongoing care plan - Family contacts
    - Meds / allergies

- **Evacuation is a time of duress / risk**

- **Good communication still needed**

- **Transfer = medical act**
  - Where possible  MD-MD; RN-RN (why SA worked)
  - Risk of miscommunication is high
Patient tracking in an evacuation

- **Salmon Arm**
  - Pts checked:
    - leaving floors (2)
    - Arriving at grd floor (ER)
    - Leaving ER to ambulance
      - ID’s, Charts, Kardex’s
      - Destination

- **Larger hospital**
  - more complex system may be needed
  - Establish a series of check-in / check-out points
    - Leaving pt care area
    - Arriving at transfer area
    - Leaving transfer area
    - Arriving at receiving hospital
  - manual – electronic (RFID)

The importance of efficient, accurate tracking can not be overlooked
4. Evacuated – Now what?

Is there still a need in the community to provide a place for emergency care?
Problem: No idea how long would be evacuated

- Next closest hospital > 1 hr away
- Still had a community at need (? Greater need)
  - Main highway
  - Hills full of fires and firefighters
  - People stressed (evacuating homes; exacerbations of chronic disease)
  - Unpredictable fire

Responsibility: Provide basic emergency care to the community

- Stabilize & transport critically ill/injured
- Transfer to other hospitals those that needed work-up / admission
- Treat / dc minor
Spent a lot of time while evacuated - Planned our options:

- Continue to use Emerg Dept – skeleton staff (basic labs, x-ray)
- If needed – plan for an alternate facility (field hospital...)

What options has your hospital considered?
Today: Hospital Alternatives (ie. MMU’s)

- Many province's have MMU’s
- ↑’d interest with DEM
- Could be driven to community
  - Part of your emergency plans
  - An outpost ER
    - Stabilize & transport
    - Tx / dc minor
  - Often without staff
  - Need to orientate / train staff
  - Time to arrive & set-up
5. Finally – importance of Planning (Salmon Arm + RRU)... 10 years

- Disasters / threats... do begin and affect local communities first
- Will involve local hospitals and HCP’s first
- Although we managed:
  - Evacuation planning should be considered a part of hospital emergency planning/exercising (like Code Orange):
    - Education / involvement of clinicians
    - Leadership
    - Readiness & availability
    - Coordinated teamwork
      - Locally / regionally ...
Pomerado Hospital, San Diego County, CA
Oct 2007

- 107 bed rural hospital evacuated due to Santa Ana Wildfire
- “success of the evacuation was attributed to communication, preplanning and leadership within the organization”
- Twice yearly regional disaster drills (Hospitals / EMS / Community DEM agencies)
Galion Community Hospital, Galion OH
Oct 1999

- 112 bed rural hospital
- Bomb threat - Evacuation

“cannot be stress enough...need to regularly review, update and practice the emergency preparedness plan”

Salmon Arm, BC experience

- Rural hospital & community threatened by a forest (interface) fire
  - Plan & Evacuated a hospital – no plans existed
  - Remain evacuated for 10 days – still had to provide emergency care for our community
  - Many of use were evacuated as well
    - ~8000 people of a town of 12,000
Hospital evacuation = complex topic

Fortunately rare – but significant when occurs

Think / plan for Hospitals to be responders
  • can be victims too

Evacuation needs to be in every hospital's emergency plan
  • Several plans may be needed

Plans must be regularly exercised / practiced

Successful evacuation depends upon:
  • Teamwork
  • Leadership
  • coordination

Getting patients safely out of buildings and to available receiving hospitals that are also part of the same emergency plan
Why Important?

- It’s not just your hospital - It’s your community; your families
- Encourage colleague clinicians to become involved
“Educated, prepared and involved health care professionals (hospitals) are the most essential components following a disaster.”

Djalali et al., 2009 – Prehospital & Disaster Medicine 24: 565-569
Tools

- **Hospital Evacuation Decision Guide – May 2010**
  - Agency for Healthcare Research and Quality
  - US Department of Health & Human Services
  - [www.ahrq.gov/prep/hospevacguide/](http://www.ahrq.gov/prep/hospevacguide/)

- **MDPH Hospital Evacuation Toolkit – 2012**
  - Harvard School of Public Health

- **Benchmarking for Hospital Evacuation: A Critical Data Collection Tool**
  - Schultz et al (2005), Prehospital Disaster Medicine, 20(5): 331-343
  - [http://pdm.medicine.wisc.edu](http://pdm.medicine.wisc.edu)

- **Hospital Evacuation: Principles & Practices**
  - American College of Emergency Physicians

- **Emergency Preparedness: Preparing Hospitals for Disasters**
  - Incident Planning Guide: Hospital Evacuation – complete or partial
  - California Hospital Association
  - [http://www.calhospitalprepare.org/](http://www.calhospitalprepare.org/)


Verni, C (2012). A hospital system’s response to a hurricane offers lessons, including the need for mandatory interfacility drills. *Health Affairs, 31*(8): 1814-1821