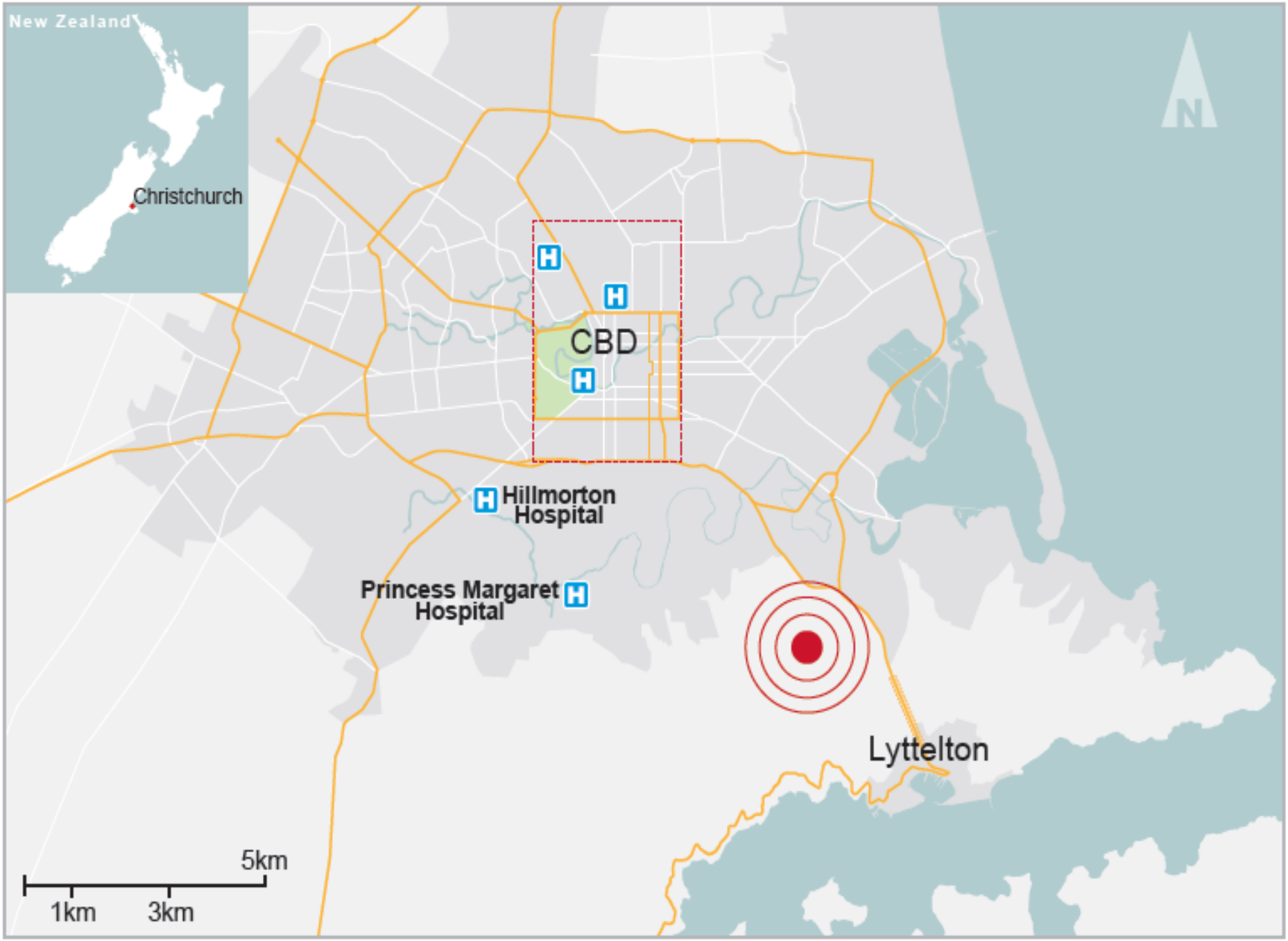
The Christchurch earthquake February 22nd 2011

Plan

- The quake
- Overview of injuries
- Care provided other than at Christchurch Hospital
- Care provided at Christchurch Hospital
- 10 lessons learned

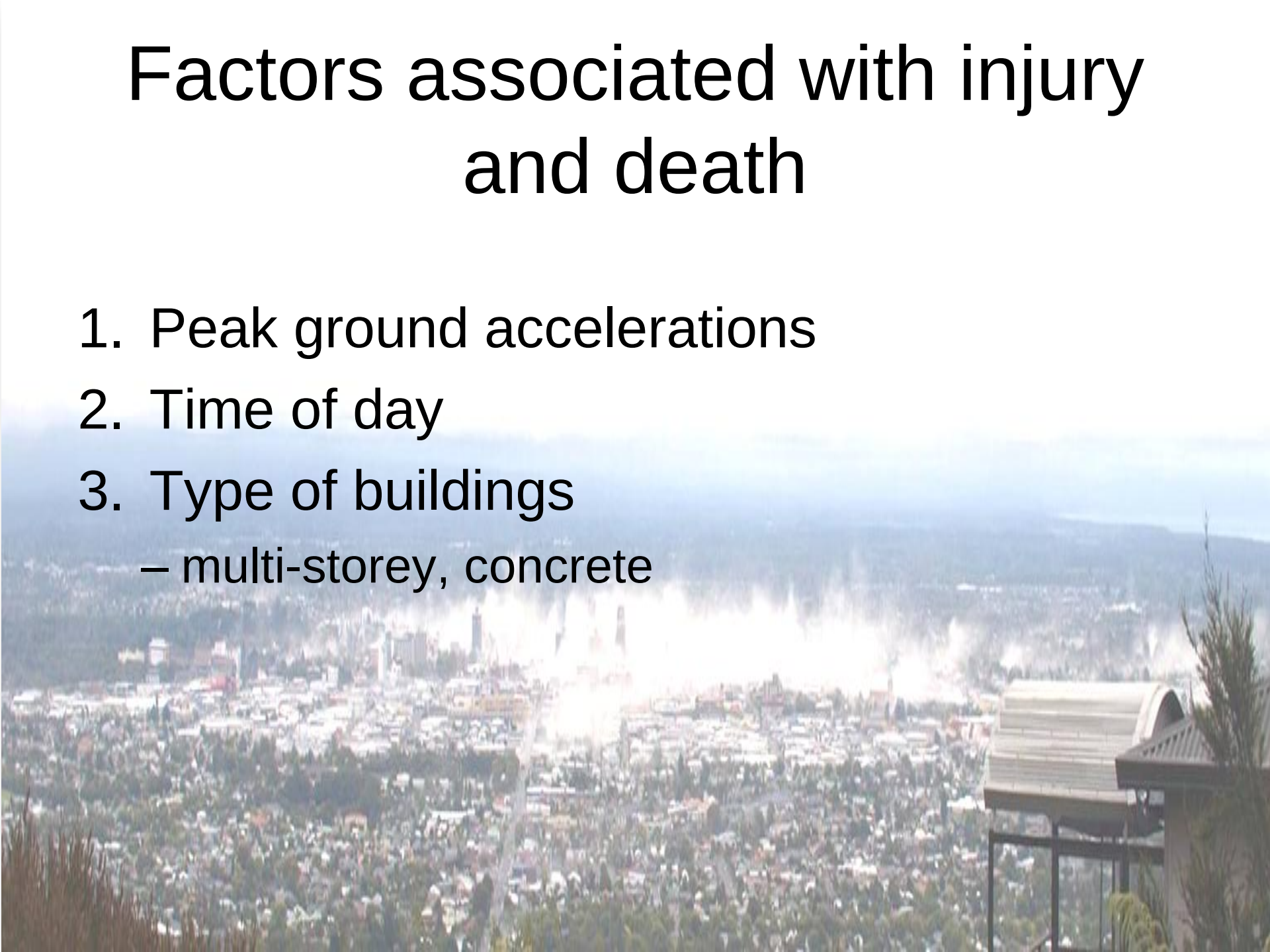
Christchurch

- 12.51pm, Tuesday Feb 22, 2011
- 6.3 magnitude, 10k SE of CBD, 5k deep
- Accelerations up to 2.2G
  - Among the highest ever recorded
  - The greatest vertical accelerations on record
- Widespread loss of phone and power
- Consequent loss of communications

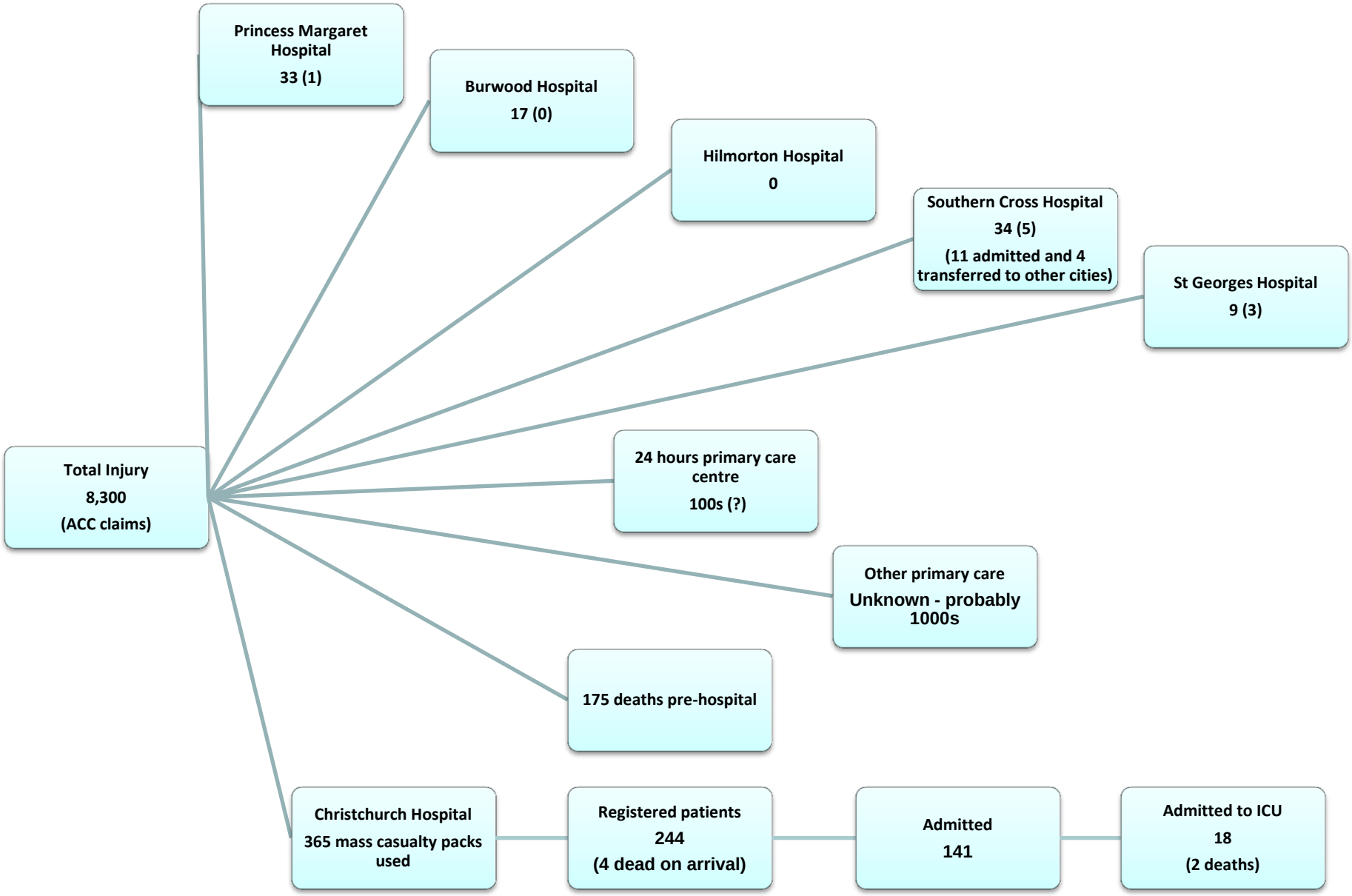

New Zealand
Christchurch
N
CBD
Hillmorton Hospital
Princess Margaret Hospital
Lyttelton
5km
1km
3km

Factors associated with injury and death

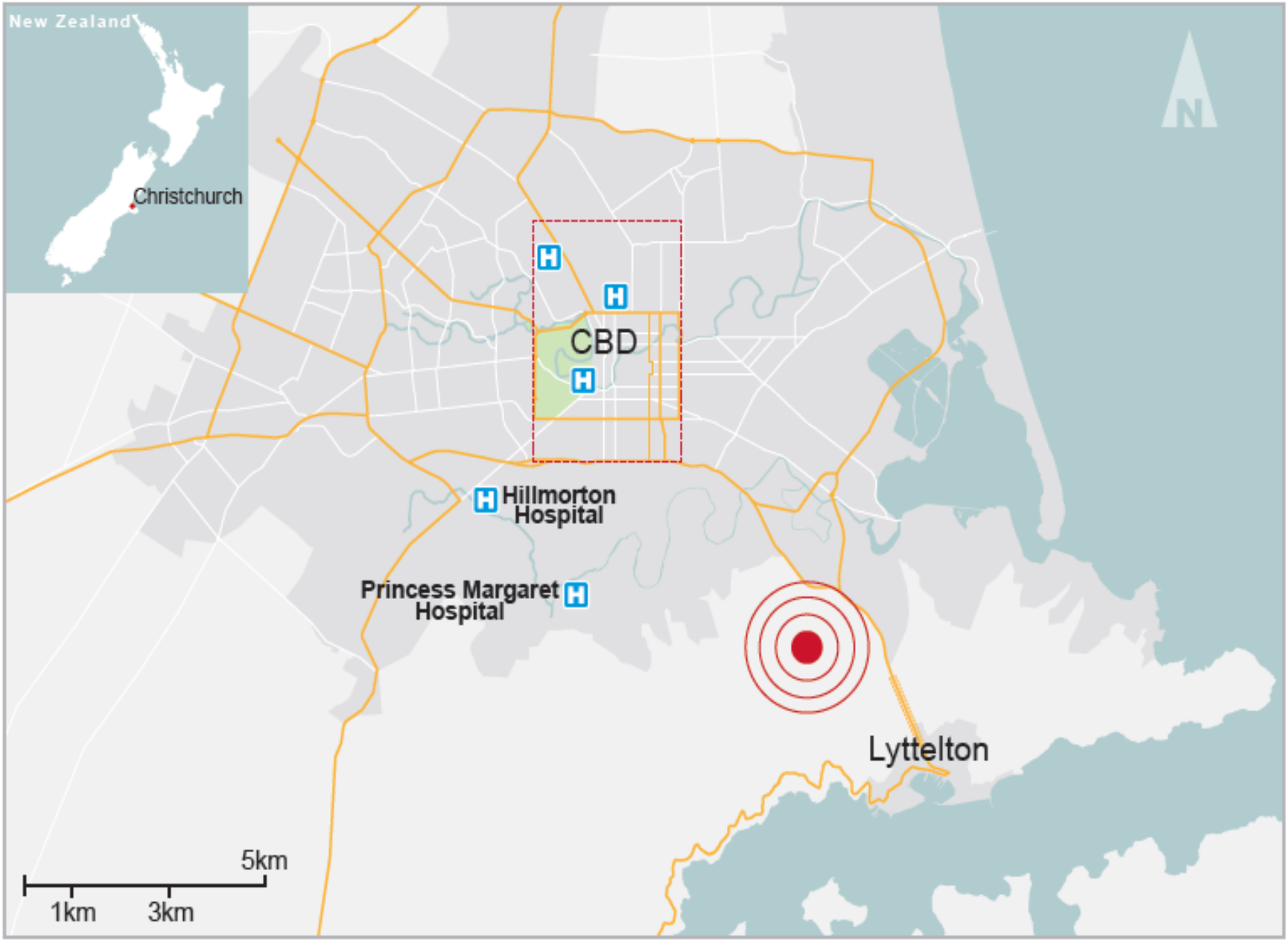
1. Peak ground accelerations
2. Time of day
3. Type of buildings
   – multi-storey, concrete



	Christchurch (NZ)	Port-au-Prince (Haiti)	Los Angeles (USA)	Bam (Iran)	Kobe
Date	22 Feb 2011	12 Jan 2010	17 Jan 1994	26 Dec 2003	17 Jan 1995
Local Time (24 h clock)	12.51	16.53	4.30	5.26	5.46
Magnitude	6.3	7.0	6.7	6.6-6.7	7.2
PGA (g)	1.8-2.2	<0.1-1.24	1.0-1.78	0.87-0.98	0.82
Urban population affected (n)	450,000	3,000,000	14,500,000	97,000	1,500,000
Urban area affected (km^2)	864	38	1,200	19.5	1,798
Population density affected (n/ km^2)	520	78,947	11,960	4,974	2,697
Numbers injured	8300	300,000	5000	30,000	>36,000
Numbers killed	181	230,000	60	26,000	5,488


Princess Margaret Hospital
33 (1)
Burwood Hospital
17 (0)
Hilmorton Hospital
0
Southern Cross Hospital
34 (5)
(11 admitted and 4 transferred to other cities)
St Georges Hospital
9 (3)
Total Injury
8,300
(ACC claims)
24 hours primary care centre
100s (?)
Other primary care
Unknown - probably 1000s
175 deaths pre-hospital
Christchurch Hospital
365 mass casualty packs used
Registered patients
244
(4 dead on arrival)
Admitted
141
Admitted to ICU
18
(2 deaths)

Injury care provided other than at Christchurch Hospital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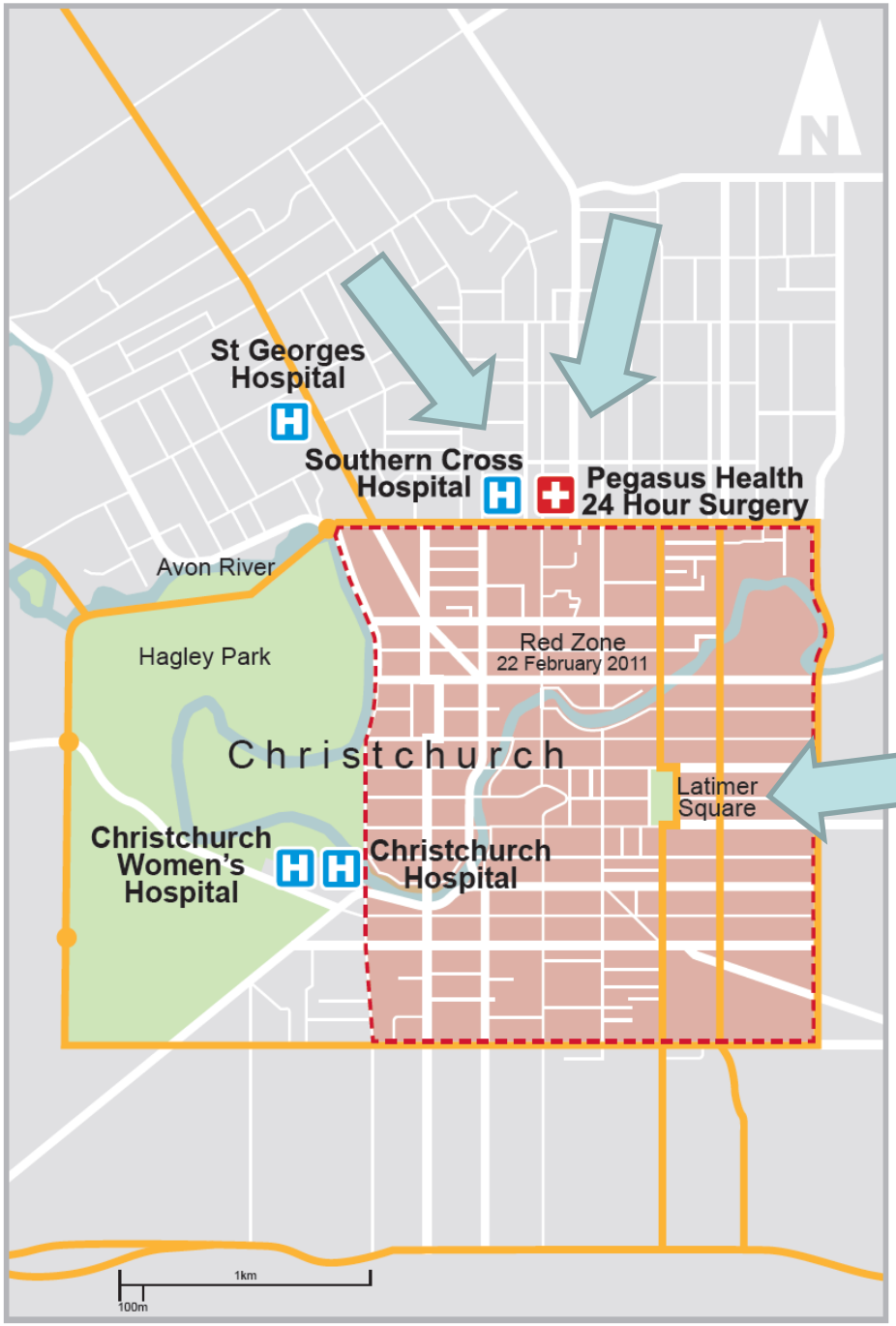
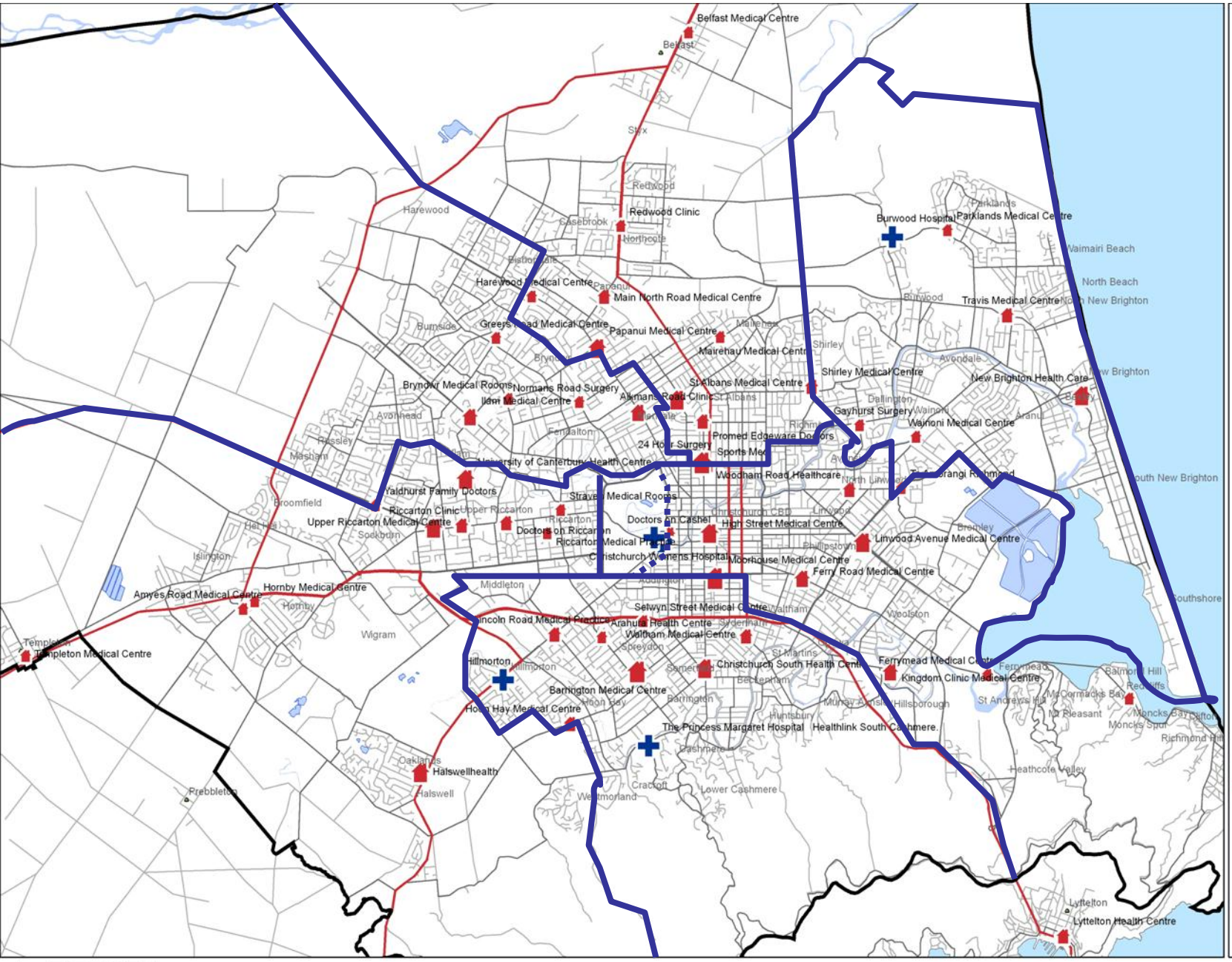

N
St Georges Hospital
Southern Cross Hospital
Pegasus Health 24 Hour Surgery
Avon River
Hagley Park
Red Zone
22 February 2011
Christchurch
Latimer Square
Christchurch Women's Hospital
Christchurch Hospital
1km
100m


24
HOUR
SURGERY
URGENT
PHARMACY
ST JOHN
AMBULANCE


NewstalkZB
CALL III
HEYDO



General Medical Practices
3+ Full Time Equivalents

CDHB Hospitals

Medical Practices 3+ FTEs

- 3
- 4
- 5
- 6 - 7
- 8 - 9

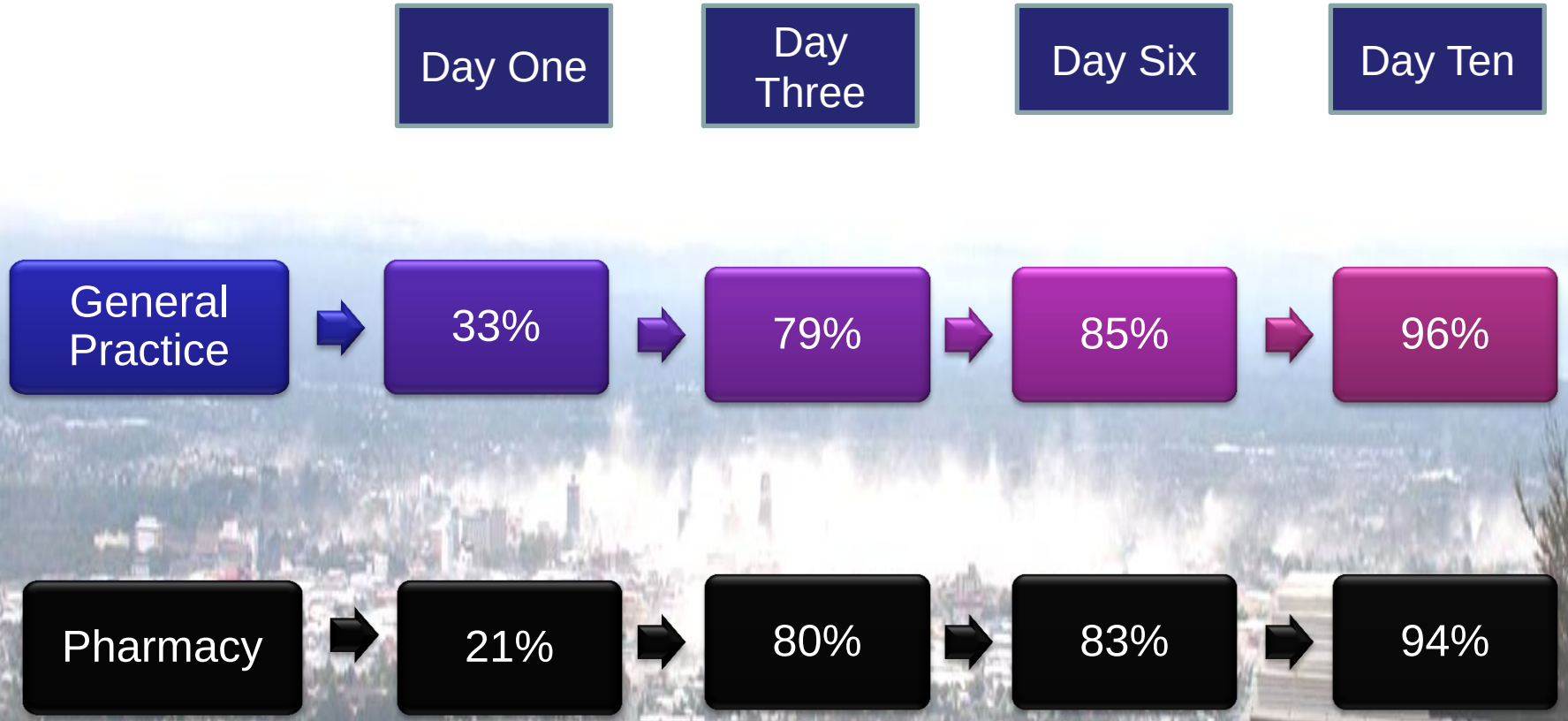
Highways
Arterial Roads
Roads
TLA Boundary

Canterbury
District Health Board
Te Poari Hauora ō Waitaha

Map produced by Community and Public Health
051124_GPs3Plus_christchurch.mxd


CITY
FISH & CHIP
PH 377 448
CITY FISH & CHIPS
Freshly Cooked
CLEAR
TF1
CLEAR
Coca-Cola
enjoy
TF1
CLEAR

Functioning General Practices and Pharmacies



Injury care provided at Christchurch Hospital

Christchurch ED

- ED was full, but well staffed
- Severe shaking
  - Staff unable to stand
  - Trolleys shunted across rooms
  - Waiting room ceiling collapsed
  - Many patients left
  - Frequent aftershocks
  - Recurrent loss of power


RESEARCH SAVES LIVES
Canterbury Medical Research Foundation
CJG268


NURSE

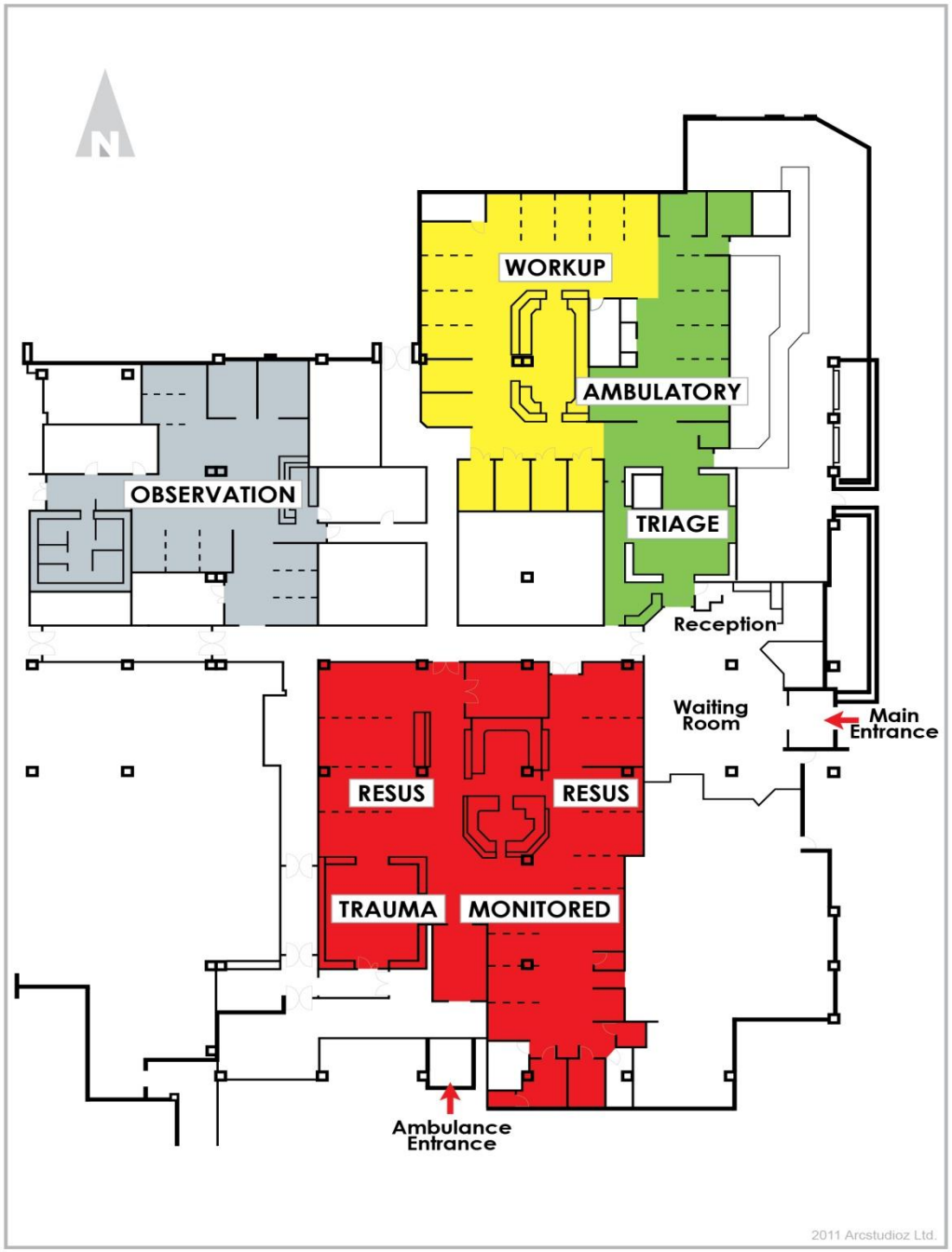
Patients

- First patient a child unconscious and blue, brought in by a stranger
- First briefing from ED registrar who ran in from town

  "It's carnage; the city is flattened"
- About 100 registered in first two hours
- Probably 100 more not registered

Patient types

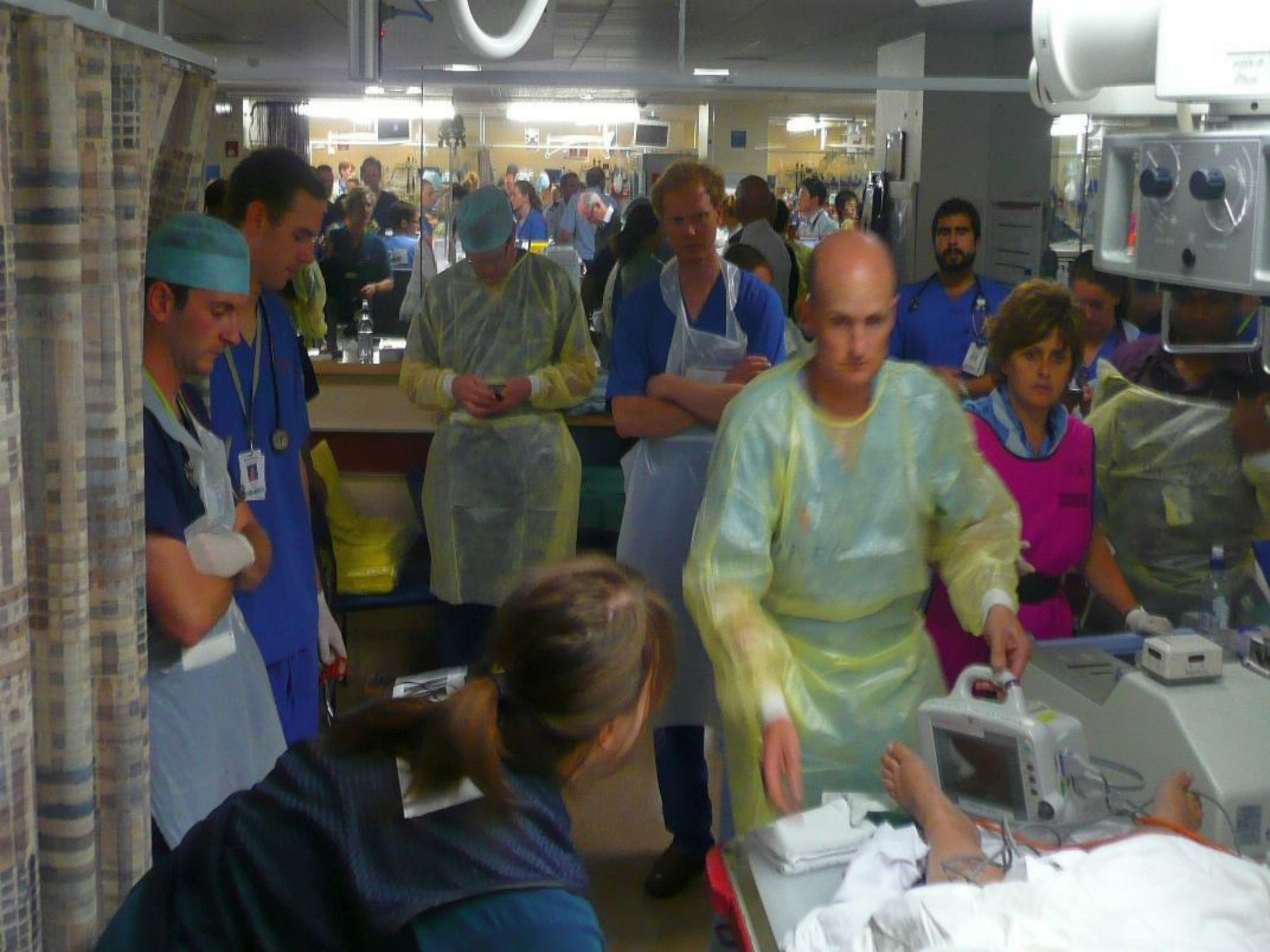
- Every sort of blunt trauma
- Second wave had severe crush injury syndrome, with
  - Hyperkalaemia
  - myoglobinuria
  - compartment syndrome
  - amputations
- No burns
- Majority of surgery required was orthopaedic


N
WORKUP
AMBULATORY
OBSERVATION
TRIAGE
Reception
Waiting Room
Main Entrance
RESUS
RESUS
TRAUMA
MONITORED
Ambulance Entrance
2011 Arcstudioz Ltd.

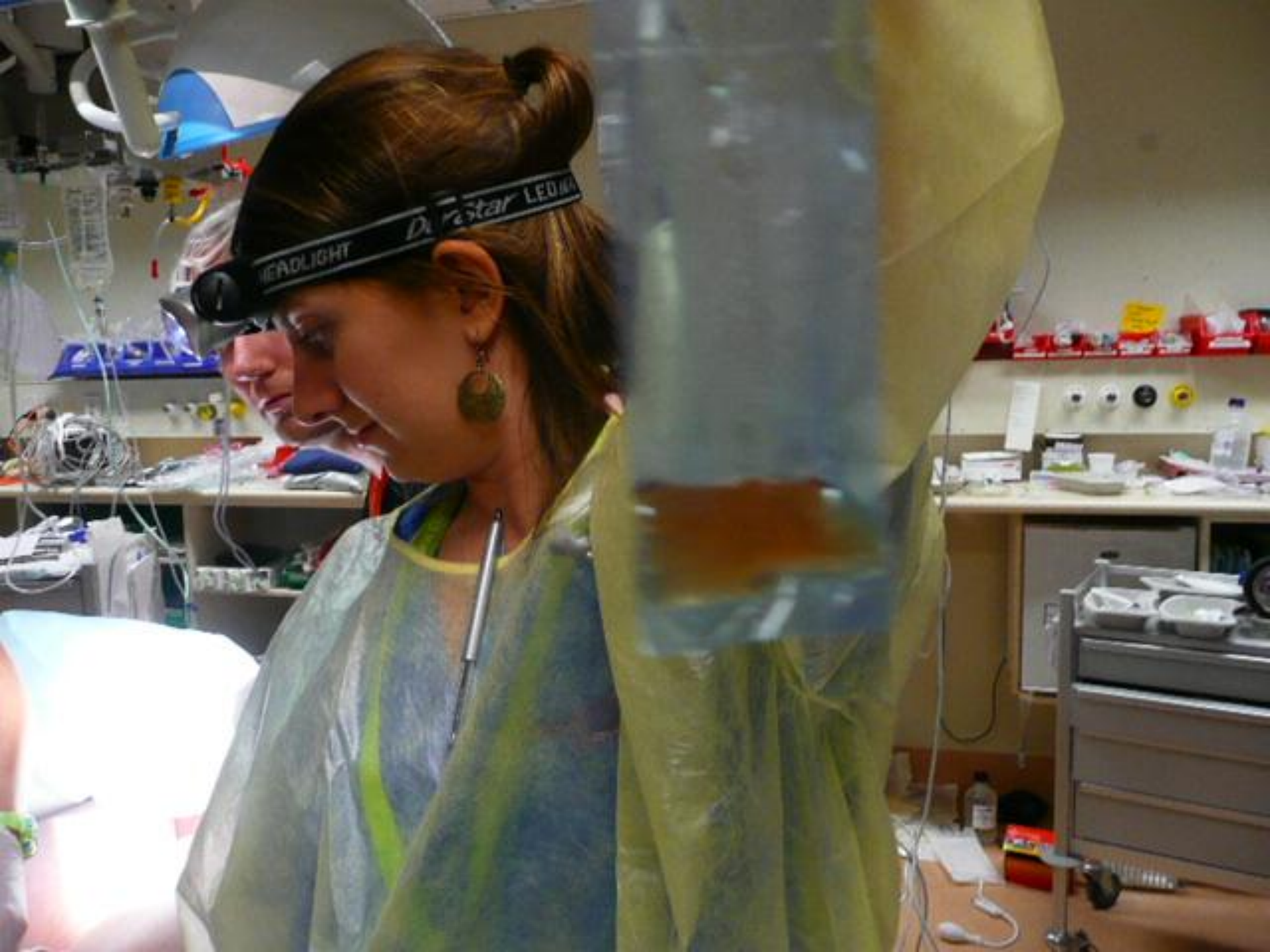
Major External Incident Plan

- Medical and nursing controllers overall and for each area
- Controllers for specialities
- Single point of triage
- Pre prepared disaster packs
- St John liaison based in ED
- Hospital control room to deal with both internal and external incident


ST JOHN




AMBULAN
ASB



Some specific injury details

107 Orthopaedic admissions

- 65 in first 24 hours
- Mean age 56, with 24 pts over 80 years
- 82 patients went to theatre (9 that night)
  - 7 amputations in 4 patients (2 pre-hospital)
  - 10 fasciotomies
- Mostly limb injuries (38 crush injuries)
- 19 spinal, 4 with neurology

18 ICU admissions

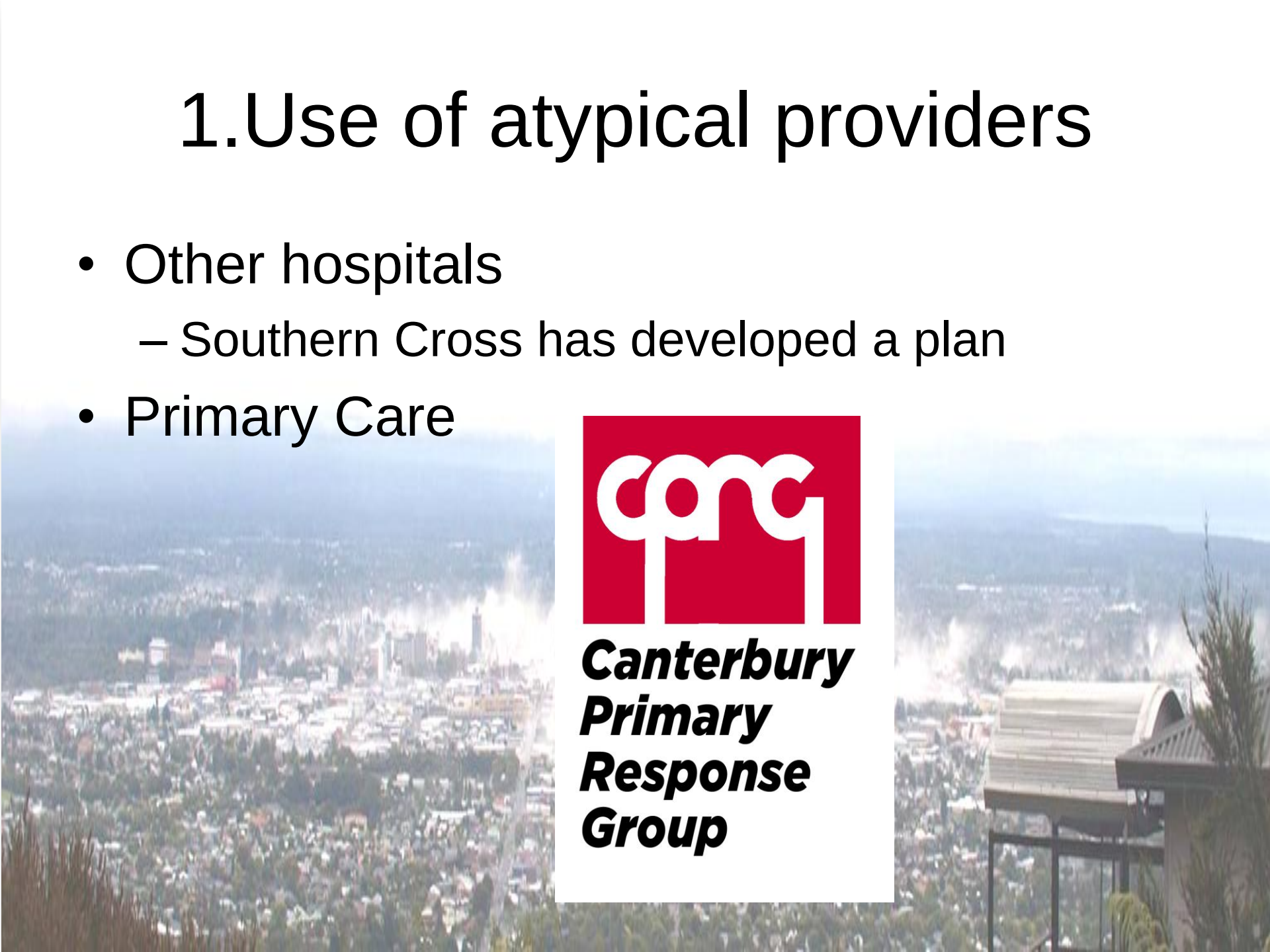
- **18 total ventilator beds**
  - **4 available at time of quake**
  - **4 more freed up by transferring patients**
- **2 deaths**
  - **both with non-survivable injuries and dying within a few hours of the quake**
- **14 transfers to other cities**
  - **3 before midnight**
  - **6 more before dawn**
  - **5 more during the next day**
- **14 crush injury syndrome**
  - **6 needed RRT (3 in Chch, 3 elsewhere)**

Lessons

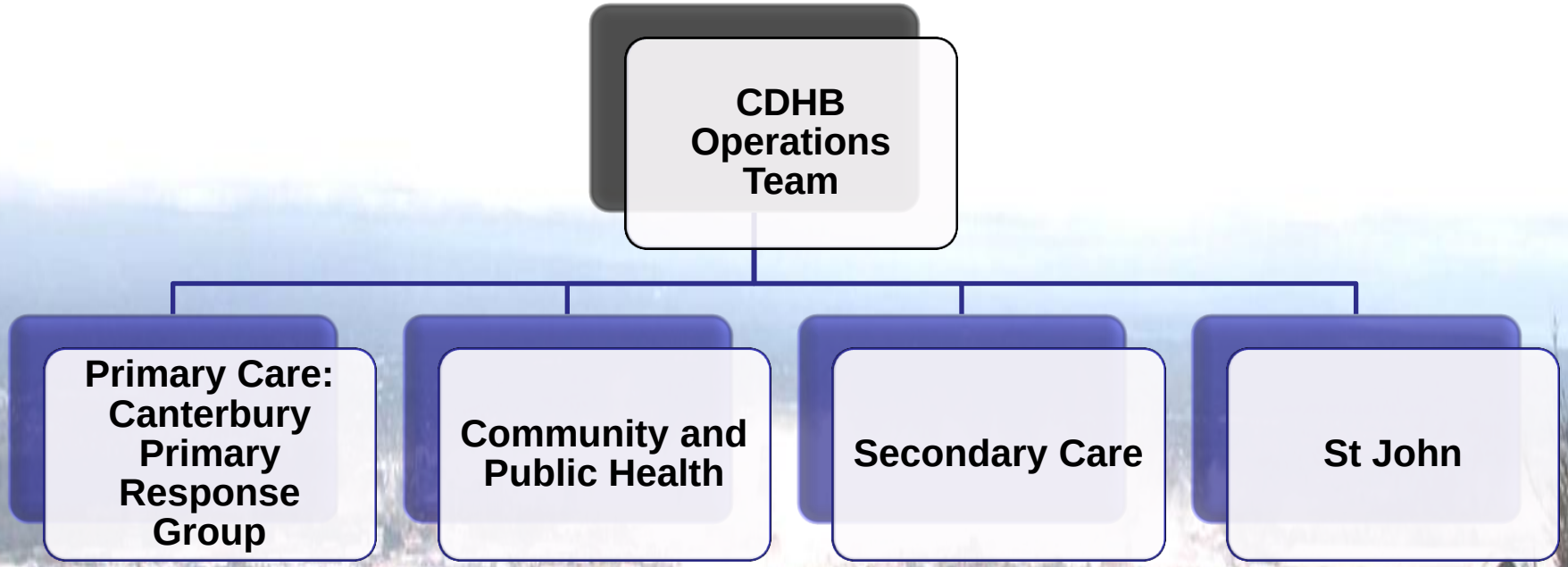
1. **Use of atypical providers**
2. **Pre-hospital care and transport**
3. **Registration and tracking**
4. **Frightened patients**
5. **Electricity**
6. **Numbers of health professionals**
7. **Communication**
8. **Media**
9. **Innovation**
10. **Teamwork**

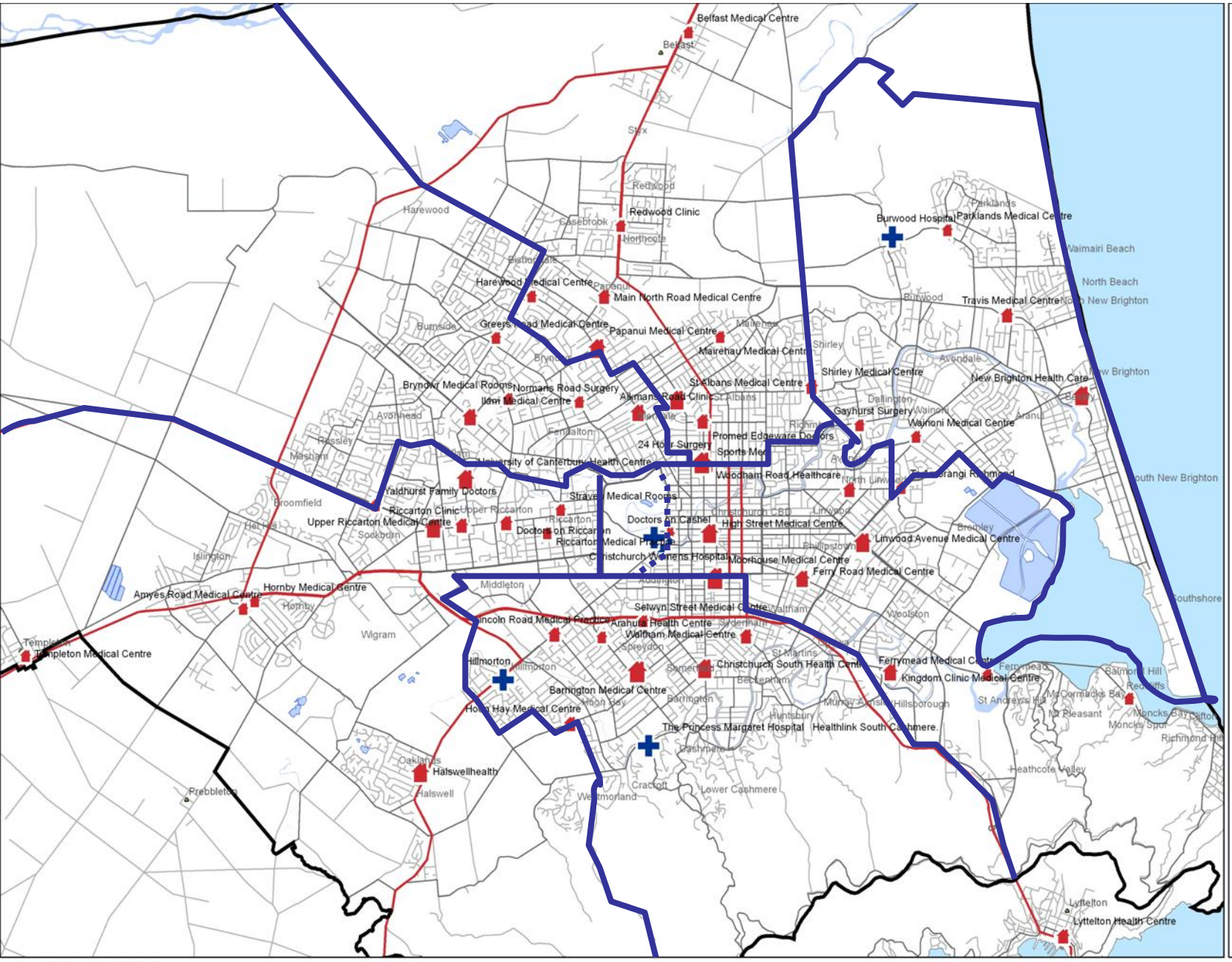
1.Use of atypical providers

- Other hospitals
  - Southern Cross has developed a plan
- Primary Care



Emergency Planning: Whole of Health Response





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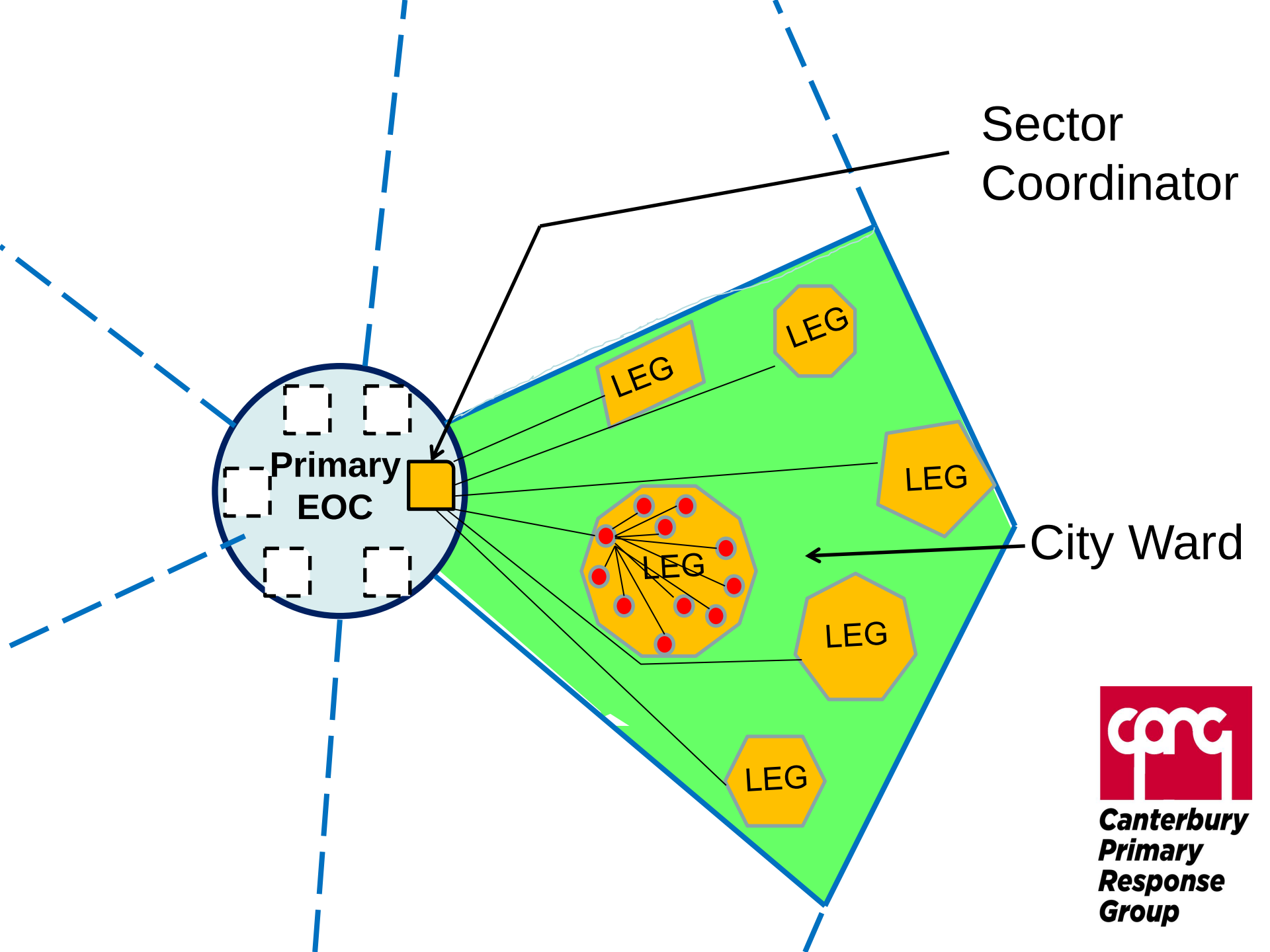
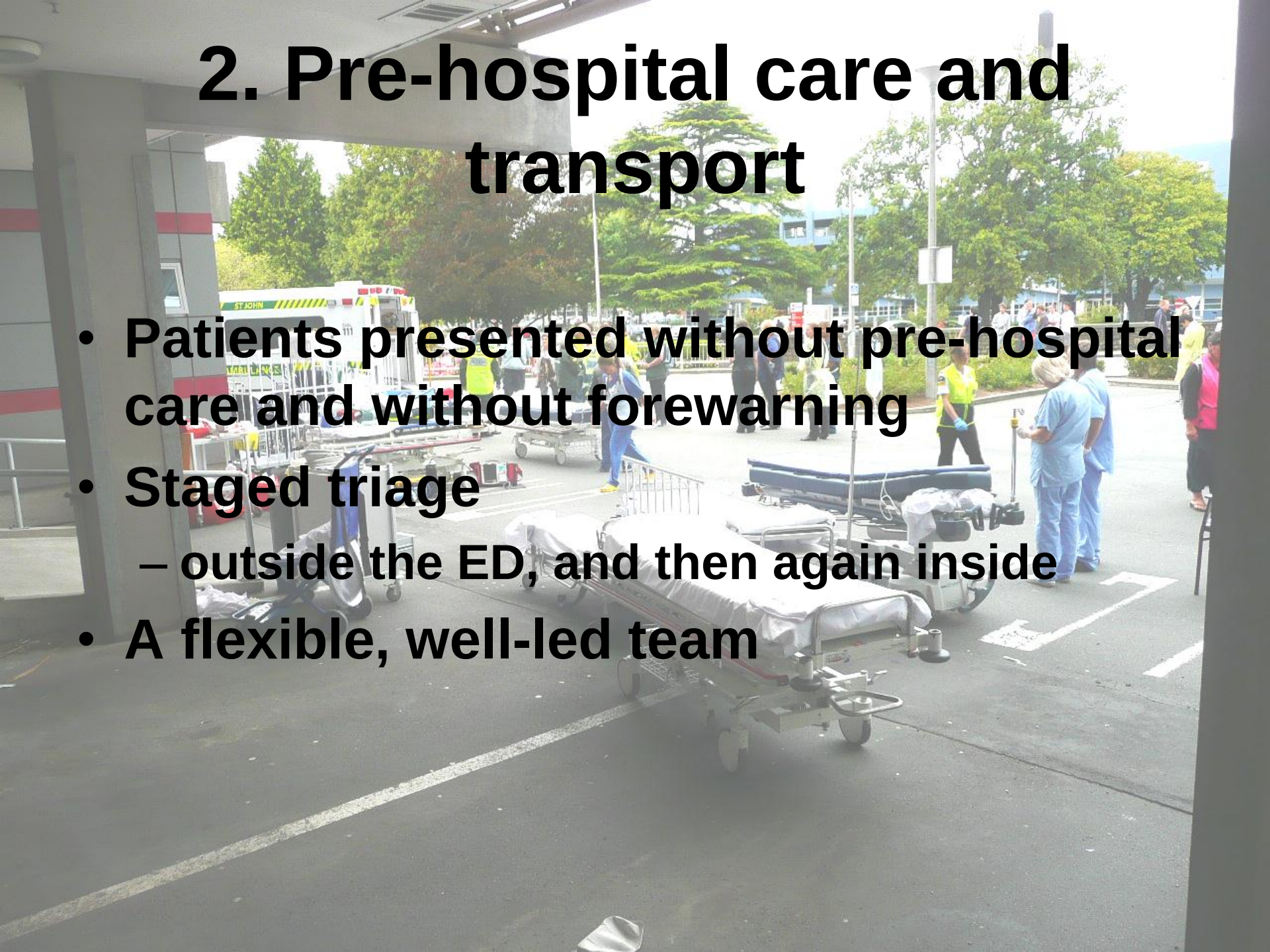

Sector
Coordinator
LEG
LEG
LEG
LEG
LEG
LEG
Primary
EOC
City Ward
Canterbury
Primary
Response
Group

2. Pre-hospital care and transport



- Patients presented without pre-hospital care and without forewarning
- Staged triage
  - outside the ED, and then again inside
- A flexible, well-led team

3. Registration and tracking

- Manual registration
- Prepared packs
- Pre-allocated emergency NHI numbers
    - Unique identifier
- Pre-labelled blood and x-ray forms
- ‘Trackers’ at each exit to record patient movements
- Social workers for relatives
- However, still challenging

4. Frightened patients


AMBULAN
ASB

5. Electricity

- Good back up generator system
  - Clean diesel tanks
  - Regular practice/use
  - Check who is on essential services power
- Contingencies for no power
  - Charged batteries
  - Battery operated lights and head lamps
  - Manual systems
  - Medical students

6. Numbers of health professionals

- Gown with name and position on chest
- Central repository of expertise
  - Specialists
  - Ultrasonographers
  - *i*stat blood results
- Teams in bays with ED doc and nurse
- Clear communication over loud speaker system

7. Communications

- Overhead loud speaker system
- Walkie talkies
- Role specific cell phones
- St John liaison in ED

8. Media

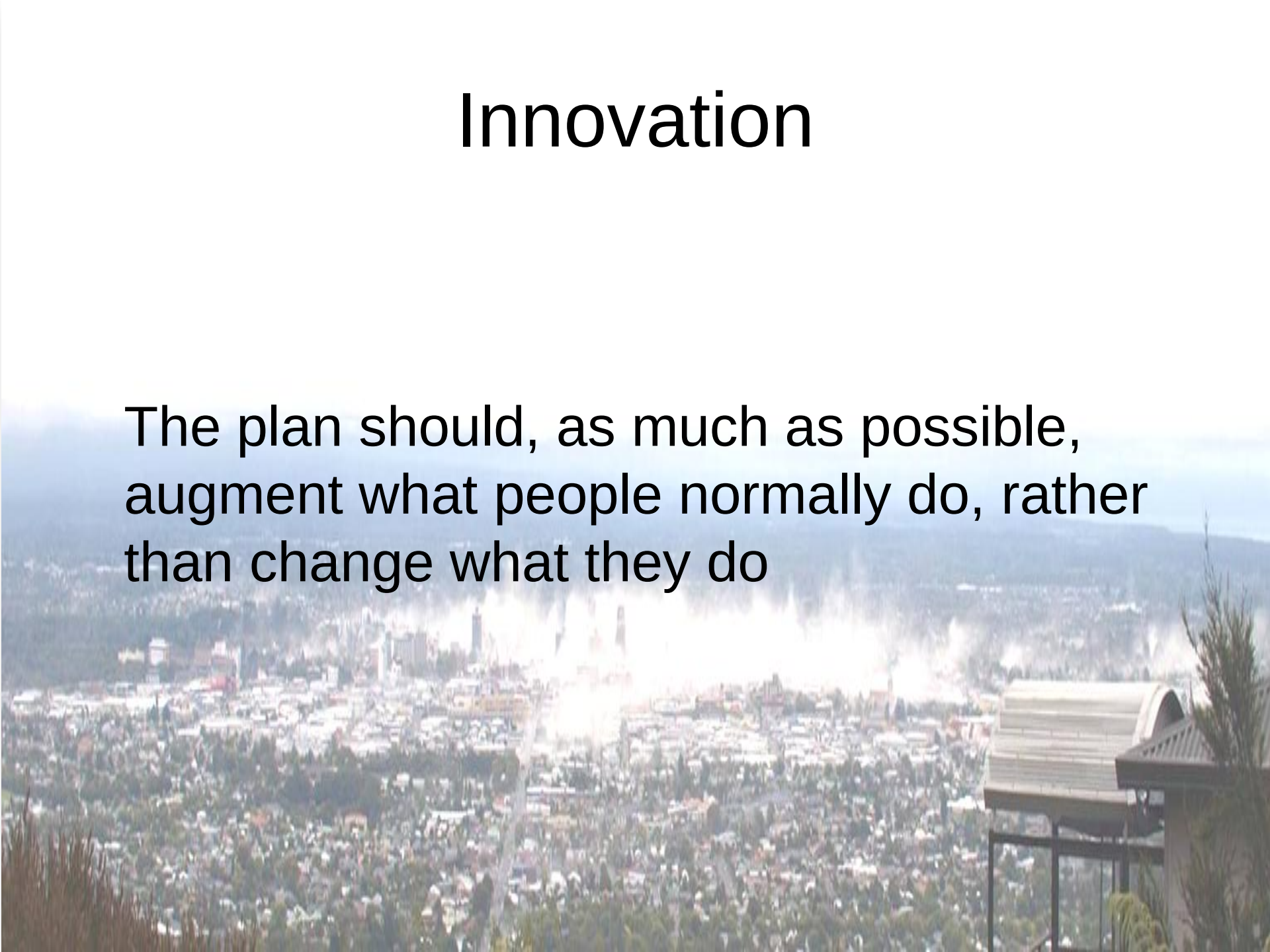
Need to be part of the plan

9. Innovation

- **Good**
  - **Movement of patients to non-traditional settings was necessary**
- **Not so good**
  - **Movement of patients to non-traditional settings threatened to compromise care**
  - **Pressure to triage to black**
  - **Pressure to move patients out of town before packaging**

Innovation

The plan should, as much as possible, augment what people normally do, rather than change what they do



Beware of doing things differently

Those who can come will come within the first couple of hours

Those trapped will trickle in as they are extricated

Those extricated late will be well, or dead

Do things the way you normally do them for as long as you can

10. Team work

- Leadership
  - Clear, level-headed leadership in ED, ICU, Surgery, Orthopaedics, and elsewhere
- Relationships
  - Well established in hospital and between hospital and community
  - Patient flow projects, Canterbury Health Pathways, Swine Flu, and a previous quake helped.

Over the next few weeks

- ED presentation numbers down by about one third
- Higher admission proportion
- Spike in chest pain/cardiology – as seen post September quake
- Less alcohol related presentations
- More psychosis but less self harm

Come work at Christchurch Emergency Department

It’s not a tankless job.