Planning for a Nuclear Incident: Tackling the “Impossible”

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Objectives

- Scope of a Catastrophic Nuclear Incident
- Planning for Catastrophes
- Planning for Nuclear Catastrophes
- NYC Rad Planning Activities
Planning for the Aftermath of a Nuclear Incident
Estimated Initial Impact 10Kt

- Instant fatalities > 14 K
- Injured, but alive > 150 K
- Critical evacuation needed > 500K
- Shelter-in-place needed > 1.3 million
- Shadow evacuation > 3 -12 million
- Dose over 150 rem > 300K

2/10/08
Injury Predictions

**Combined Injuries**  
- Burns + Irradiation  
  40%  
- Burns + wounds + irradiation  
  20%  
- Wounds + irradiation  
  5%

**Single Injuries**  
- Irradiation  
  15-20%  
- Burns  
  15-20%  
- Wounds  
  <5%
Complicating Factors

- Electromagnetic Pulse (EMP) damage up to 1.2 km from GZ
- Loss of electrical power 1-4 weeks
- Loss of telecommunications 1-4 weeks
- Major Fires > 250
- Significant ground contamination
- Loss of supply chain (foods, medications ...)
Complicating Factors

- Significant loss of healthcare infrastructure
- Significant loss of responders and healthcare providers
Is it even possible to plan?
Levels of Preparedness

- **Level 1 Emergency** – Stressed locality/facilities with local resources intact
- **Level 2 Disaster** – Stressed but sustainable locality/facilities with damage to local resources/infrastructure
- **Level 3 Catastrophe** – Locality/facilities unsustainable in time frame of external support
Catastrophic Preparedness

- In catastrophes, the entire country will be impacted.
- Therefore, catastrophic response is a national response.
Preparedness Based on Regions

- Region of Primary Impact: greatest loss life, infrastructure & communication

- Region of Secondary Impact:
  - Infrastructure & communication mostly intact;
  - Includes area of significant fallout; and
  - May require significant shelter-in-place or evacuation to avoid acute health consequences

- Region of Tertiary Impact:
  - Infrastructure intact; and
  - No significant fallout
Regions of Primary Impact

- Plan for individual and facility self-reliance
  - 7 days sustainability
  - How to shelter-in-place/evacuate
- Plan for novel communications
- Hospitals: Plan for emergent care, shelter-in-place, evacuation
Regions of Primary Impact

- Self-Sufficiency Training for Citizenry
- Consider Hardening Communications
- Radiation Detection, Safety, and Equipment Training for 1st Responders and 1st Receivers
Regions of Secondary Impact

- Plan on rapid decisions for shelter-in-place *and* mass evacuation
- Plan on rapid dissemination of information
- Plan mass decontamination
Regions of Tertiary Impact/Support

- PLAN FOR RECEIVING

- Tertiary Impact

- PLAN FOR SENDING

- Primary & Secondary Impact

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Plan for Receiving

- Reception and Screening of Evacuees
- Reception and Triaging of Injured
- Reception and Integration of Support Teams and Portable Disaster Medical Facilities
Receiving Evacuees

- Evacuees will have extensive medical, psychological, and physical needs
- Decontamination may not have occurred prior to arrival
- All cities should have ability to detect radiation by 1st responders and 1st receivers
Receiving Evacuees

- Plan locations for Reception/Screening
- Plan locations for mass sheltering
- Plan locations for special needs sheltering
- Radiation Detection and Control Plan needed at each site

Photo Daniel Cima/American Red Cross
Potential Shelter Sites

- Aircraft hangers
- Military facilities
- Churches
- National Guard armories
- Community/recreation centers
- Surgical centers / medical clinics
- Convalescent care facilities
- Sports facilities / stadiums
- Fairgrounds
- Trailers
- Government buildings
- Tents
- Hotels/motels
- Warehouses
- Meeting halls
Recruit Radiation Trained Volunteers into MRCs/DMATS

- University Research Facilities Personnel
- Nuclear Power Facilities Personnel
- Health Physics Societies
- Radiation Safety Personnel

PHOTO: REAC/TS
http://www.orau.gov/reacts/

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Receiving Injured

- Plan for arrival of patients over days to weeks
  - Delays in Dose Reconstruction
  - Delays in Treatment
- Plan for burn, trauma, isolation, and psych surge capacity
- Plan for limited resources
- Plan for prioritizing care
  - “Greatest good for the greatest number”
- Radiation Detection and Control Plans for Mass Casualties needed at each Hospital

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Receiving Injured

- Plan Alternative Treatment Sites
  - Only if you have staff to spare
  - Or if to be staffed by external support teams from other regions/military/countries
Receiving Support Teams

- Federal Radiological Emergency Response
  - Radiological Assistance Program (RAP) Teams
  - EPA
- Domestic Emergency Support Teams
- Strategic National Stockpile
- DMAT/DMORT/DVET/PHS Teams
Plan for Sending

- Utilize EMAC
- Support Teams
  - Medical, Environmental, Logistical, Transport, etc.
- Supplies
Sending Support Teams

- Plan in advance
- Intact teams better than ad-hoc
- Plan for self-sufficiency for length of stay (food, water, PPE, detectors, ...)
- Train teams in radiation detection and safety

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Training for Staff

- **CDC on-line courses**
  - “Radiological Terrorism: Medical Response to Mass Casualties”
    http://www.bt.cdc.gov/radiation/masscasualties/training.asp
  - “Preparing for Radiological Population Monitoring and Decontamination”

- **REAC/TS courses**
  http://www.orau.gov/reacts/courses.htm

- **NYC DOHMH Radiation Equipment Training**
NYC Radiation Preparedness Projects

- Hospital Radiation Equipment Project
- Hospital Radiation Response Working Group
- EMS Radiation Equipment Project
- Hospital Radiation Materials Security Project
- Mass Screening Planning
- Internal Contamination for Mass Populations Project
- Burn Surge Project
NYC Hospital Radiation Detection Project

- 58/67 NYC hospitals participating
- Equipment includes:
  - Personal digital dosimeters, survey meters, and area monitors
- Training provided to all hospitals
- Plan to drill 2008-2009
NYC Hospital Radiation Response Working Group

- Creating NYC specific guidance on hospital response to contaminating radiation incidents
- Draft open for public comment
Emergency Department Schematic
Radiation Survey Meter Deployment during a Radiation Incident

1 — Red Area Survey Meter
Survey on entry to Red Area, surveys during treatment
2 — Post Decon Survey
Survey meter at Buffer areas. Surveys those leaving treatment areas to go into hospital
3 — Green Area Survey Meter
Survey’s prior to discharge

Controlled Green Treatment Area

Controlled Yellow Treatment Area

Controlled Red Treatment Area
NYC Burn Project

- Surge Capacity plan to increase burn beds from 71 to 400 using an additional 30 hospitals for up to 5 days
- Creating of Burn Care Training for clinicians and nurses centers
- Provided burn supply/equipment carts for participating hospitals
Conclusions

- Shift paradigm of planning for catastrophes to include secondary and tertiary regional response
- Rapid decisions for shelter-in-place / evacuation of primary importance
- Include radiation response plans for EMS, shelters, hospitals, cities
Questions?

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References & Resources

- Federal Radiological Monitoring and Assessment Center Program
  http://www.nv.doe.gov/nationalsecurity/homelandsecurity/frmac/default.htm
- Guidance for Radiation Accident Management, REAC/TS,
  http://www.orau.gov/reacts/guidance.htm
- Lawrence Livermore National Laboratories
  http://www.llnl.gov/nai/Programs/Counterterrorism/Nuclear_Incident_Response.php
  (Department of the Army, Office of The Surgeon General, Borden Institute, Washington, DC).