STATEWIDE PLANNING FOR RADIOLOGICAL EMERGENCIES IN CONNECTICUT

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Bridgeport Hospital

Clinical Professor of Medicine
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Ed Wilds, Ph.D.
Director, Division of Radiation
State of Connecticut DEP
Bureau of Air Management
Objectives


2. Describe building of clinical biodosimetry laboratory surge capacity in Connecticut.

3. Understand potential value of Web EOC (web-enabled collaborative crisis IS) in exercises.

4. Review emerging partnership among academics, the Connecticut DEP and private sector for training.
YNHHS

Population: 3.4 million

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Largest, most integrated healthcare system in Connecticut
- 12,000 employees and 3,500 physicians
- 78,000 patient discharges and 1,300,000 outpatient visits
- 3 acute care hospitals, a children’s hospital and a psychiatric hospital
  - A Level 1 Burn Center and a Level 1 Trauma Center
- $1.5 billion in revenues and $1.9 billion in assets
- Primary teaching hospital of the Yale University School of Medicine (YSM)
- Designated by the State of Connecticut Department of Public Health in 2002 as a Center of Excellence for Bioterrorism Preparedness and Response to develop statewide emergency preparedness programs and services for healthcare delivery organizations

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Development of Radiation Preparedness Program

1. Identify Experts
2. Draft Hospital Plan
3. Enlarge Expert Group
4. Develop Consensus
5. State Committee Presentations

- Repeat Process for First Responder Plan
- Acceptance as State Plan
- Implement Plan
  - Coordinate Plan with Crisis Teams
  - Link with Neighboring States
  - Establish Epidemiological Monitoring System

- Develop capacity to survey and decontaminate
- Educate and train
- Drill and exercise
- Develop 24/7 on call schedule

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# Phases of Development of Radiation Response Plan

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Committee</th>
<th>Membership</th>
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<tr>
<td>August 2002 - Present</td>
<td>YNHHS Clinical Advisory Committee</td>
<td>Co-chairs: N. Dainiak and R. Femia</td>
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<td>September 2002 - March 2003</td>
<td>Radiation Subcommittee</td>
<td>Facilitator: D. Delli Carpini</td>
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<td>Members: N. Dainiak, M. Bohan, C. Morgan,</td>
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<td>D. Wyshko, E. Wilds, M. Werdmann</td>
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<td>April 2004</td>
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**Institutions:** Bridgeport Hospital, Greenwich Hospital, Hartford Hospital, State of Connecticut Department of Environmental Protection, State of Connecticut Office Emergency Preparedness, University of Connecticut Health Center, Yale-New Haven Hospital, Yale University School of Medicine.

**Organizations:** American Society for Therapeutic Radiology and Oncology, Capital Region Metropolitan Medical Response

N. Dainiak, MD
Development of a Statewide Hospital Plan for Radiologic Emergencies

Nicholas Dainiak, M.D., Domenico Delli Carpini, Ph.D, Michael Bohan, B.S., Michael Werdmann, M.D., Edward Wilds, Ph.D., Agnus Barlow, M.S., Charles Beck, B.S., M.S., M.A., David Cheng, M.D., Nancy Daly, M.S., M.P.H., Peter Glazer, M.D., Peter Mas, M.S., Ravinder Nath, Ph.D, Gregory Piontek, B.S., M.S., Kenneth Price, M.P.H./C.H.P., Joseph Albanese, Ph.D., Kenneth Roberts, M.D., Andrew L. Salner, M.D. and Sara Rockwell, Ph.D

Although general guidelines have been developed for triage of victims in the field and for hospitals to plan for a radiologic event, specific information for clinicians and administrators is not available for guidance in efficient management of radiation victims during their early encounter in the hospital. A consensus document was developed by staff members of four Connecticut hospitals, two institutions of higher learning, and the State of Connecticut Department of Environmental Protection and Office of Emergency Preparedness, with assistance of the American Society for Therapeutic Radiology and Oncology. The objective was to write a practical manual for clinicians (including radiation oncologists, emergency room physicians, and nursing staff), hospital administrators, radiation safety officers, and other individuals knowledgeable in radiation monitoring that would be useful for evaluation and management of radiation injury. The rationale for and process by which the radiation response plan was developed and implemented in the State of Connecticut are reviewed. Hospital admission pathways are described, based on classification of victims as exposed, contaminated, and/or physically injured. This manual will be of value to those involved in planning the health care response to a radiologic event.

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Assumptions

• A radiological event may involve one or more municipalities in Connecticut.

• A radiological event may occur without advanced warning.

• Victims of a radiological event may exhibit no or few non-specific symptoms.

• A significant psychological impact may occur in the setting of a very low dose exposure.

• Management of a radiological event requires that healthcare workers act in a calm and organized fashion.

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Response in the Emergency Department (ED)

- Classification of victims based on contamination, external exposure and/or physical injury
- Decontamination, if necessary
- Clinical assessment and initial laboratory monitoring
- Triage of patients to the operating room for surgery, hospitalization for therapy or discharge for ambulatory monitoring

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Classification of Victims

Exposed
  Yes  No
  Contaminated
    Yes  No
    Injured
      Yes  No
      Injured
        Yes  No
        Injured
          Yes  No

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Triage Measures

1. No exposure.
   - Psychosocial needs

2. Exposure, no contamination.
   - Process normally
   - Treat physical injuries

3. Contamination and minor injury.
   - Decontamination
   - Admit for observation, dose assessment

   - Treat life-threatening injury first
   - Decontamination
Data Collection

1. Document date/time and examiner

2. History:
   • Location of incident
   • Time of exposure
   • Duration of exposure
   • Activity at time of exposure
   • Occupation
   • Other

3. Physical Exam:
   • Vital signs (fever, hypotension, orthostasis)
   • Skin (edema, erythema, blistering, desquamation)
   • Cardiovascular (heart sounds, neck vein distention, rales)
   • Gastrointestinal (abdominal swelling or pain)
   • Hematological (ecchymoses, petechiae)
   • Neurological (papilledema, reflexes, motor, sensory, cognitive function)


Record all information on a flow chart or medical card that becomes part of the medical record. Data may be entered into a radiation casualty management software program (the Biological Assessment Tool*) and/or used to assign a “response category”.

*Available at the Armed Forces Radiobiology Research Institute website<www.afrri.usuhs.mil>
# Clinical Flow Chart

**Patient ID:**

**Date and time of examination:**

**Date/time of exposure:**

**Examiner:**

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<td>Days after exposure</td>
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Building Connecticut’s clinical biodosimetry laboratory surge capacity to mitigate the health consequences of radiological and nuclear disasters: A collaborative approach between the state biodosimetry laboratory and Connecticut’s medical infrastructure

Joseph Alabanese, Kelly Martens, Jeffrey L. Arnold, Katherine Kelley, Virginia Kristie, Elaine Forte, Mark Schneider, Nicholas Dainiak

Radiation Measurements 42 (2007) 1138-1142

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Metaphase Finding System for use in Dicentric Assay

Slide delivery system

Microscope & camera

Image analysis software

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Metaphase Finding System

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Overview of Radiation Dose Determination

1 day

Collect whole blood samples

Isolate lymphocytes

2 – 3 days

Grow cells for 2 – 3 days

1 day

Prepare slides for cytogenetic evaluation

1 – 2 days

Score dicentric chromosomes

5 – 7 days

Radiation Dose Estimation

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Surge capacity is defined as a health care system’s ability to rapidly expand beyond normal services to meet the increased demand for qualified personnel, medical care and public health in the event of large-scale public health emergencies or disasters.
Lymphocytes are cultured for 2-3 days at the Biodosimetry Laboratory.

Overview of Lymphocyte Isolation Protocol

1. **Resolve Lymphocyte band**
   - Centrifuge: RT, 400xg, 25 min
   - Lymphocytes

2. **Transfer cells To conical tubes & adjust volume to 10 mL PBS**

3. **Suspend cells in 10 mL PB-Max Medium**

4. **Centrifuge**
   - RT, 300xg, 10 min
   - Tissue culture flasks

*Samples are delivered in CPT vacutainer tubes which are ready for centrifugation.*

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Transportation Protocol for a Radiological Incident
Functional Drill to Test Proficiency of Sample Preparation

Objectives

- Determine quality of samples prepared by laboratorians (cell viability, contamination)
- Determine turn around times
- Assess efficacy of training provide
- Obtain feedback on drill process and lymphocyte isolation protocol

Results

- 18/19 labs and 37/79 trained lab professionals participated in the drill
- All samples were free of contamination and exhibited > 95% cell viability
- Average turn-around time = 199 minutes
An exercise was developed and conducted in cooperation with representatives of the YNHHS Delivery Network Institutions in collaboration with the State DPH. It was designed to build upon corrective actions identified in the 2008 Emergency Operation Center Management Functional Exercise Corrective Action Plan. Its overarching purpose was to expand the utility of WebEOC*.

*Web-enabled collaborative crisis information system designed to provide real-time situational awareness
Participating Organizations

Players: 86
Observers: 3
Simulators: 7
Evaluators: 5
Controllers: 5

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Findings

1. The Hospital Incident Command Structure (HICS) was staffed and the Emergency Operation Center was operationalized.

2. Response was appropriate and consistent with the State Radiation Response Plan.

3. Information for the public was developed and disseminated in a timely manner.

4. HICS effectively used WebEOC.

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Conclusions

1. Collaboration and consensus building are essential for plan development, and should include academics, radiation oncology, RSOs, ED leadership, state officials (Commissioner of Health) and state agencies such as DEP.

2. Surge capacity for biodosimetry may be addressed by training clinical laboratory personnel.

3. Partnerships among academics, state personnel and the private sector may aid training in radiation response.

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