Medical Response To Radiation Incidents

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HPS Items

- HPS Membership benefits
- HPS Committee assignments
- HPS Nominations
- Media Relations initiative
Good News

- Ionizing radiation and its effects known since the late 1800’s
- If you suspect it, you can detect it
- Increased awareness since 9/11
- Federal agency and professional society involvement
Bad News

- In US, medical response infrastructure untested for major radiation event
- Physicians generally unaware of diagnosis and proper treatment of radiation injuries
- Medical staff fearful of radiation
- Increased scrutiny of radiation events
Explosion off Baymeadows leads to radiation scare

Firefighters are checked for radiation exposure after leaving the Unison building where they responded to an explosion Monday. Employees and rescue personnel near the explosion site were treated for possible exposure to radioactive gas.

AT A GLANCE

Radiation of X-ray power

The blast: A canister the size of a scuba tank used in the manufacture of jet engines exploded at Unison Industries at 7575 Baymeadows Way. The cause is under investigation.

The gas: The tank held a small amount of krypton-85, a radioactive gas. Krypton-85 is a colorless, odorless gas that is not absorbed into the body, either into tissues or the lungs.

The radiation: The amount of radiation in a single canister is roughly equivalent to the level of radiation in an X-ray. Exposure was not expected to cause health problems. There is no threat to the surrounding community or returning workers.

What is Unison Industries? A
Types of Events

- Transportation
- Industrial
- Accidental needle stick
- Response to fire at a licensed facility
- Reactor accidents
- RDD, RED, IND
St. Luke’s Hospital/Mayo Clinic
Jacksonville, Florida

Emergency Response Plan for Terrorism-Related Events

NUCLEAR TERRORISM RESPONSE PLAN
Table of Contents

Introduction

General Guidelines for a Suspected Nuclear Event:

A. Detection of Event
B. Sources of Radiation
C. Events Which Could Cause Acute High Dose Radiation
D. Radiation Exposure Potential to Patients and Staff
E. Syndrome-based Criteria
F. Patient Management
G. Initial Response to Suspected Exposure to Radioactive Materials
H. Patients Later Found To Be Exposed Or Contaminated
I. Notification of Local/State Health Departments, Law Enforcement and Emergency Medical Services.
RADIATION INCIDENT RESPONSE PLAN COMPONENTS

• Detection of Event
• Events Which Could Cause Acute High Dose Radiation
• General Classification of Radiation Incidents
• Communication – Initial Internal and External Contacts
• Healthcare Facility EOC Considerations
• Facility Lockdown
• Ventilation Control
• Management of Hospital’s Patient Census
• Patient Management and Decontamination
• Radiation Protectants/Pharmacotherapy
• Required Supplies
• Communication – Medical Staff and Patients
• Laboratory Support
• Training
• Post-Mortem Considerations
• Post-Traumatic Event Counseling
Communications - Internal

- Who is responsible?
- List of contacts
  - Nursing Supervisor
  - Administration
  - Medical Director
  - Nuclear Medicine Physician
  - RSO
Communications - External

- Who determines when calls are made?
- Are contact lists up to date?
  - County Health Dept
    - Patient census for each area hospital
    - Designating triage/decontamination centers
    - Communications with public
  - State Health Dept/NRC
  - FBI
  - REAC/TS – MRAT – radiobiologic assistance
Facility Lockdown

- Securing and limiting entrances to healthcare facility
- Worried well
- Who is responsible?
- Is security staff adequate?
- How is it accomplished?
  - Physical barriers?
  - Signage?
Ventilation Control

- When is it required?
- Who is responsible?
Management of Patient Census

- When is it required?
- Who is responsible?
- Restrictions on hospital admissions
- Discharge of patients
Patient Management

- Patients requiring resuscitation or stabilization
- Patients suspected to be contaminated NOT requiring resuscitation or stabilization
- Patients suspected to have received a large dose of radiation
- Worried Well
- Patients later found to be exposed or contaminated
Triage Strategy

● Categorize by risk
  – Medium to high – significant exposure or internal contamination
  – Low – some exposure or contamination
  – Negligible – minimal to no exposure or contamination

● Start 2 Finish
  – Black – Imminent death
  – Red – Immediate treatment – Priority I
  – Yellow – Urgent evaluation needed – Priority II
  – Green – Delay treatment; ambulatory – Priority III
Patients Requiring Resuscitation or Stabilization

- TREAT IMMEDIATELY without regard to contamination
- Universal precautions and double gloving
- Remove victim’s outer clothing if possible
- Bag it & tag it
- Wrap in sheet and transport
- Shrapnel considerations
- Cover floor if time permits
- Label patient specimens
- Low radiation dose to healthcare workers
Patients suspected to be contaminated NOT requiring resuscitation or stabilization

- Planning considerations
  - # of patients that could be decontaminated/hr
  - Source of tepid water
  - Climate
  - Relationship of decontamination facility to ED
  - Contaminated vs. non-contaminated casualties
  - Segregation of sexes
  - Decontamination of non-ambulatory casualties
  - Knowledgeable decontamination team members
  - Clearly identify triage and decontamination stations
Patients suspected to be contaminated NOT requiring resuscitation or stabilization

- Remove patient’s outer clothing
  - Eliminates 70 to 90% of contamination
  - Use privacy screens
  - Bag it and tag it

- Monitor patient using GM meter
  - Protect probe
  - Scan slowly and close to surface

- Gentle rinsing/scrubbing with soap and water
Patients suspected to be contaminated NOT requiring resuscitation or stabilization

- Decontamination priorities
  - Wounds
    - Drape with waterproof dressing
    - Scrub gently with surgical sponge and irrigate
  - Orifices (mouth, nose, eyes and ears)
    - Special concern because of rapid absorption
  - Skin
    - Complete decontamination usually not possible
    - Pick action level – usually 2-3 x bkg
Patients suspected to be contaminated NOT requiring resuscitation or stabilization

- Decontamination considerations
  - Periodically check bkg. in decon area
  - Monitor all individuals leaving decon or ED treatment areas
Patients suspected to have received a large dose of radiation

- Rare event
- Combined injury vs. atraumatic irradiation
- Get history – ask key questions
- Look for
  - Rise in core body temperature
  - Nausea
  - Vomiting
  - Fatigue
  - Weakness
Patients suspected to have received a large dose of radiation

- Time frame for vomiting post exposure critical
- CBC with differential – initial and every six hours for at least 48 hours
- Lymphocyte count useful if dose > several Gy
- Surgery required? Complete within 36-48 hrs
Worried Well

- Major concern in MCI event
  - Ex – Goiania, Brazil 1987 – Event first identified 10 days post release; 249 significantly exposed; 112,000 monitored
- Self referred and will probably arrive before critically injured
- Effective triage essential
- Must be able to address concerns
  - Technical experts
  - Fact sheets
Patients later found to be exposed or contaminated

- Contact RSO immediately
- RSO and staff to decon as necessary
- Physician follow-up with patient’s primary care physician
Radiation Protectants/Pharmacotherapy

- Useful in limited internal uptake scenarios
- Time dependent administration
- May need to begin treatment absent complete picture
- MCI demand may exceed supply
- Seek qualified medical assistance
  - FDA
  - CDC
  - REAC/TS
  - MRAT
Laboratory Support

- Baseline CBC with differential
  - Track absolute lymphocyte counts
- Collect and save additional blood samples in heparinized tubes for later analysis
- Urine analysis
  - 24 hour urine sample collection
  - Monitor excretion for radioactivity
- How will samples be collected and labeled in an MCI event?
- Where will the samples be analyzed?
Post-Mortum Considerations

- Supply of body bags
- Autopsies not performed on site
  - Special instructions may be necessary
- Funeral directors
  - Special instructions may be necessary
- CDC developing guidance in this area
Post-Traumatic Event Counseling

- Anticipate anxiety
- Identify or consult with health physics specialists or physicians familiar with biological effects of radiation
- Possible discussion topics
  - Short term acute effects
  - Long term cancer risks
  - Genetic risks
  - Fetal risks
- Fact sheets from qualified sources may be useful
Training

- At minimum, Awareness level training for ED and Primary Care physicians and ED staff
- Operations level training expected by OSHA for staff that treat or triage casualties before they are decontaminated or participate as part of the Decontamination Team
- Resources - numerous
  - HPS (http://hps.org/hsc/responsemed.html)
  - CDC (http://www.bt.cdc.gov/radiation/)
  - REAC/TS (http://orise.orau.gov/reacts/)
Health Physics Society

Specialists in Radiation Safety • Founded 1956 • http://hps.org/

Your Gateway to Radiation Safety

The Health Physics Society is a nonprofit scientific professional organization whose mission is to promote the practice of radiation safety. Since its formation in 1956, the Society has grown to include more than 6,000 scientists, physicians, engineers, and professionals representing academia, industry, government, and other organizations.

Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits.

Our Web site contains information on all Society activities and on HPS structure and objectives, membership, news and events, publications, education, and public information. You can join the Society or "Ask the Experts" using interactive features of this Web site.
Conclusions

- Develop a healthcare facility radiation response plan
- Integrate healthcare facility plan with city or county plan
- Integrate radiation medical response plan with existing triage techniques
- We can live with a little contamination
Radiation Protectants/Pharmacotherapy

- **Radioiodines – KI**
  - Target organ - thyroid
  - Competes for binding sites
  - 50% effective at 4 hrs

- **Radiocesium and Radiothallium – Prussian Blue**
  - Target organ - kidney
  - Binds isotopes in GI tract and promotes fecal excretion
  - Treat for minimum of 30 days
Radiation Protectants/Pharmacotherapy

- Transuranics – Ca-DTPA, Zn-DTPA
  - Chelating agent
  - Most effective if given within 6 hr post exposure
  - Ca-DTPA 10X more effective than Zn-DTPA in first 24 hrs
  - Zn-DTPA should be used for sensitive groups
  - Do NOT use for uranium or neptunium uptake

- Strontium – Aluminum Antacids
  - Reduces GI absorption