Radiological Preparedness: Building Surveillance and Response Capabilities

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Objectives

• Explain the genesis of the radiological preparedness effort in the St. Louis region; why we are doing it and how we got it started.

• Describe the STLRRRMRC’s radiological capabilities, the equipment and supplies it has acquired and the exercises conducted thus far.

• Describe the epidemiological component of a radiological response, as well as the types and uses of public health surveillance.
Local Radiological Threats

• Dirty Bomb or Radiological Dispersal Device (RDD)
• Radiological Exposure Device (RED)
• Transportation accidents
• Occupational accidents
• Environmental exposures (e.g., West Lake Landfill)
• Improvised nuclear device (IND)
Public Health Emergency Preparedness (PHEP) Grant

• This funding helps health departments build and strengthen their abilities to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events.

• Preparedness activities funded by PHEP are targeted specifically for the development of emergency-ready public health departments that are flexible and adaptable.
Purpose of the SLRRRMRC

Medical Reserve Corps Vision
The Saint Louis Regional Radiological Response Medical Reserve Corps will be a recognized and respected community resource in the event of a regional radiological event.

Medical Reserve Corps Mission
In the event of a radiological emergency or disaster, mobilize a trained volunteer workforce in the bi-state area to set up and operate a Community Reception Center.
The Department’s Progress:

1. Developed a Medical Reserve Corps
   • Saint Louis Regional Radiological Response Medical Reserve Corps (SLRRRMRC)
   • Kick-Off Meeting
The Department’s Progress:

2. Funding was acquired
3. Developed a Community Reception Center (CRC) Plan
4. Recruited volunteers
The Department’s Progress:

5. Provided training
   • Center for Rad/Nuclear Training (CTOS)

6. Purchased equipment

7. Affiliations and partners

8. Conducted/participated in exercises
   • West Lake TTX, Calloway County TTX, Calloway County’s FSE
   • 2 Regional Full Scale Exercises (FSE)
St. Louis Regional Radiological Response MRC Volunteer Backgrounds

- Radiological/Nuclear: 33%
- Medical/EMS: 21%
- Mental Health: 9%
- Public Health: 9%
- Other: 28%

** Volunteers in the Bi-State region = 76 **
Radiation basics

Ionizing radiation damages living tissue
TYPES OF RADIATION AND PENETRATION

α: Alpha (Paper)
β: Beta
γ: X-ray (Thin plates made of wood, aluminum, etc.)
γ: Gamma (Lead, iron, and other thick metal plates)
γ: Neutron (Water, concrete, etc.)
Protection from Radiation

TIME

DISTANCE

SHIELDING

Less time spent near source: less radiation received.

Greater distance from source: less radiation received.

Behind shielding from source: less radiation received.
Radiation Exposure vs Contamination

**RADIATION EXPOSURE**
Another word for radiation exposure is irradiation. Radioactive materials give off a form of energy that travels in waves or particles. A person exposed to radiation is not necessarily contaminated with radioactive material. For a person to be contaminated, radioactive material must be on or inside of his or her body.

When a person has an x-ray, he or she is exposed to radiation but is not contaminated.

When a person is exposed to certain types of radiation, the energy may penetrate the body.

**EXTERNAL CONTAMINATION**
External contamination occurs when radioactive material comes into contact with a person’s skin, hair, or clothing.

**INTERNAL CONTAMINATION**
Internal contamination can occur when radioactive material is swallowed or breathed in.

Internal contamination can also occur when radioactive material enters the body through an open wound.

Different radioactive materials can accumulate in different body organs.

Material physically attached
Supplies and Equipment:

- 10 Friskers and several Geiger Counters
- 4 Canberra Dosimeters and 29 Pocket Dosimeters
- 4 Portal Monitors
- 4 Check Sources- Cs137 and a Fiesta Ware plate
Supplies and Equipment:

- Personal Protective Equipment (PPE)
- Disposable patient gowns and sandals
- Buckets, towels, spray bottles, baby baths, wipes, shampoo and sticky mats
Community Reception Center (CRC)

• Contamination Screening
• Decontamination
• Registration
• Population Monitoring - includes long-term tracking and medical follow-up for people who were exposed to high levels of radiation or contaminated with radioactive material
• Provide educational materials
• Refer to additional resources or a shelter
Scrap Yard Blues - Full Scale Exercise

• June 23rd 2017 at Ritenour High School
• Regional (Bi-State)
• Cross-disciplines
Scenario

A local scrap yard worker came across a pile of scrap medical equipment containing radiological material. He unknowingly exposed his co-workers and the community before showing up at a hospital with signs and symptoms of radiation poisoning.

It was determined that approximately 2,500 people were potentially contaminated with cesium-137.

Public Health charged with activating the SLRRRMRMRC and establishing a CRC.
Screening Form
Epidemiology & Radiological Preparedness

What role does epidemiology play in radiological preparedness?

• Data collection

• Patient monitoring

• Surveillance
Patient Tracking

- Exercise tested a two-tier system
Patient Tracking

- Exercise tested a two-tier system

Registration
Patient Tracking

• Exercise tested a two-tier system

Registration

• Complete paper form
• Registration station
• Staff enters basic demographic information, determines whether person is “high risk”
Patient Tracking

- Exercise tested a two-tier system

Registration

Low-risk
Patient Tracking

- Exercise tested a two-tier system

Registration

Low-risk

Discharge

- Person discharged with only minimal information collected
Patient Tracking

- Exercise tested a two-tier system
Patient Tracking

• Exercise tested a two-tier system

  Registration

  High-risk

  Epi

  Low-risk

  Discharge

• Using Epi Info
  • Additional info on exposure, symptoms, risk factors
  • Complete contact info for follow-up
Patient Tracking

- Exercise tested a two-tier system

Registration

- High-risk
- Low-risk

Epi

Discharge

- Using Epi Info
- Additional info on exposure, symptoms, risk factors
- Complete contact info for follow-up
For Registration Staff: Radiation Dose Assessment

Is the person pregnant or is it possible she may be pregnant? (Refer to Epi Assessment)

Did the person require decontamination? (Refer to Epi Assessment)

Is the person showing symptoms of acute radiation syndrome? (Refer to Epi Assessment)

Was this person suspected to have internal contamination? (Refer to Epi Assessment)
Patient Tracking: Registration

For Registration Staff: Radiation Dose Assessment

Is the person pregnant or is it possible she may be pregnant? (Refer to Epi Assessor)

Did the person require decontamination? (Refer to Epi Assessor)

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# Patient Tracking: Contact Info

<table>
<thead>
<tr>
<th><strong>Field</strong></th>
<th><strong>Details</strong></th>
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<tbody>
<tr>
<td><strong>First Name</strong></td>
<td></td>
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<tr>
<td><strong>Last Name</strong></td>
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</tr>
<tr>
<td><strong>Parent/Guardian Name if &lt;18</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>F-Female</td>
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<tr>
<td><strong>Are you or could you be pregnant?</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Patient Address (Street, PO Box, Apartment)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>County of Residence</strong></td>
<td>St. Louis County</td>
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<tr>
<td><strong>Other: Please Specify</strong></td>
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<td><strong>City</strong></td>
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<td><strong>State</strong></td>
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<tr>
<td><strong>Zip Code</strong></td>
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<td><strong>Primary Phone</strong></td>
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<td><strong>Alternate Phone</strong></td>
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<td><strong>Email Address</strong></td>
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</tbody>
</table>
Patient Tracking: Contact Info

- Is your vehicle being screened?
- Are you here with a pet?
- If yes, list Make/Model/ID number:
- If yes, list kind/name/ID number:
- Where are you going next?
  - Home
  - Friend/Relative/Hotel/Other
  - Unknown (Refer to Public Shelter)
Patient Tracking: Symptoms

* Symptoms: Since the incident, have you experienced any of the following?

- Vomiting
- Severe Headache
- Diarrhea
- Fever
- Confusion
- Loss of Consciousness
- Other Symptoms (specify:)

- [ ] No Symptoms
Patient Tracking: Needs

Do you need any of the following?

- Medications
- Medical Supplies
- Medical Care (e.g. Dialysis)
- Other
- Food
- Water
- Shelter
Surveillance

• One of the main roles of any health department is to monitor and understand disease incidence and prevalence

• How do we do this?
  • Establish baseline
  • Identify and investigate deviations from baseline

• Who are our partners?
  • Hospitals (EDs, ICPs), physicians’ offices, labs, schools, community members (!)
Surveillance

• Systematic, ongoing collection, collation, and analysis of data and the timely dissemination of information to those who need to know so that action can be taken
Surveillance

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Surveillance

• Active surveillance
  • Go out and find cases
  • Get all cases, but very resource intensive

• Passive surveillance
  • Cases get reported to us (by labs, hospitals, etc.)
  • How we get most of our cases, but only see tip of the iceberg

• Syndromic surveillance
  • Based on data that come before diagnosis (e.g., ED chief complaint data)
  • It’s FAST, but a lot of false + and false -
Surveillance

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• **Syndromic** surveillance
  • Based on data that come before diagnosis (**ED chief complaint** data)
  • It’s **FAST**, but a lot of **false + and false -**
ESSENCE Surveillance

- Algorithms calculate whether observed counts are higher than expected
ESSENCE Surveillance

- **Routine** surveillance
  - General (GI/resp/neuro illness)
  - Hospital (spike in one geographic area)
  - Flu

- **Enhanced** surveillance
  - Bomb-making
  - Bioterrorism
  - Eclipse
  - Unrest
Radiological Event Surveillance

• DPH is working on developing a query to identify a possible radiological event

• Run daily to establish a baseline, an increase over that expected baseline might indicate an undetected event

• Inputs will take some refinement
  • We want people GI symptoms like nausea and vomiting, but we don’t want people coming with food poisoning
  • We want fatigue and confusion, but not people with flu or neurological events
Radiological Event Surveillance

- Radiological event surveillance is very uncommon

- Challenges:
  - Developing query
  - Hard to test (we can assess false positives, but difficult to see if we correctly predicted or missed a true event)

- Even by trying, we’re at the forefront of radiological preparedness at the local level
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THANK YOU!

“SCRAP YARD BLUES” REGIONAL RADIOLOGICAL COMMUNITY RECEPTION CENTER FULL-SCALE EXERCISE