Radiation Screening/Decontamination

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CHALLENGES IN INITIATING AND CONDUCTING LONG-TERM HEALTH MONITORING OF POPULATIONS FOLLOWING NUCLEAR AND RADIOPHYSICAL EMERGENCIES IN THE UNITED STATES

Workshop
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Purpose of Screening for Radiation Contamination

- Identify individuals whose health is in immediate danger and need immediate medical attention or decontamination.
- Identify people who may need further evaluation or short-term health monitoring.
- Register potentially affected populations for long-term health monitoring.
- Advise those who are advised to shelter in place or not visiting an established screening location on how to self-decontaminate and record information.

Photo credit: https://www.cdc.gov/nceh/radiation/energy.html
Considerations for Screening for Radiation Contamination

How will initial screening of those who are/believe they are contaminated be handled?

What agencies will be responsible for the initial screening and determination of thresholds for actions?

What agency will be responsible for long-term health monitoring?

How will registration information be transferred to those responsible for long-term health monitoring?

Who will have access to this data?

Do processes differ for tracking emergency workers vs public?

Photo credit: https://www.cdc.gov/nceh/radiation/energy.html
Screening Thresholds for Decontamination

- Jurisdictions will establish set level for screening thresholds requiring decontamination or follow up
  - based on wide range of guidance from FEMA, NCRP, IAEA, CRCPD, and EPA.

- Long term assessment needs to translate operational unit recorded back into estimated concentration and duration to allow for dose estimation.
  - Need to know what assumptions were used when determining operation units and procedures for screening and documentation.

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\frac{cpm_{\text{measured}} - cpm_{\text{background}}}{\text{efficiency}} = \frac{\text{activity}}{15 \text{ cm}^2}
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Image Credit: Steinmeyer, PR, RSO Magazine, Vol. 10, No. 5, 2005
• **External Contamination**
  - Responders are provided operational units (cpm) that correspond to an established contamination concentration determined by assumptions on equipment efficiency for radionuclide and screening techniques.
  - For more modern (non CD V-700) instruments with pancake detectors, thresholds can range from 1,000 cpm to 100,000 cpm for fixed and loose-plus-fixed.
  - For example,
    - Fixed contamination criterion, which is typically the more restrictive number, and is applied to people who have showered and changed clothes.
Screening for Internal Radiation Contamination

- Estimates of internal contamination can be made from:
  - tracing the physical location of individuals during the incident
  - measuring the extent of external contamination prior to washing can be helpful indicators of the likelihood and magnitude of internal contamination.
  - Elevated external measurements after multiple decontamination efforts.

- Laboratory results are necessary to provide definitive internal dose information, especially for alpha-emitting radionuclides.
Shelter in place or more complex flow matrix

Figure 4.1: The RTR system for a nuclear detonation response; theoretical zones in a 10 KT nuclear explosion at ground level

Adapted from Planning Guidance for Response to a Nuclear Detonation
General flow of public through screening pathways

Communicating to individuals outside established screening pathways

CDC Radiation Hazard Scale https://emergency.cdc.gov/radiation/radiationhazardscale.asp
Recording important registry information

- Demographics
  - name, age, sex, home address
- Basic Health information
- Exposure information
  - location, duration, and activities in affected areas
  - prior decontamination efforts
  - CRC screening measurements and decontamination
- Exposure-related health effects
- Immediate health and safety needs
- Health insurance

Exposure information questions may assist in determining those needing further screening for internal exposure or medical care.

Communication for individuals not in screening pathways to keep track of their own exposure information and report this when they are relocated (IND/RDD shelter)

ATSDR Rapid Response Registry https://www.atsdr.cdc.gov/rapidresponse/
Recording information for long-term monitoring

- Information collection routes:
  - Patient tracking by responders and hospitals
  - Self-moving population – through established triage or CRC
  - Self-moving population – to other locations/homes

- Collected information must be shared to agency managing registry
  - Quickly - if acute exposures possible from contamination to estimate dose and possible need for medical treatment or countermeasures
  - As incident stabilizes – if primarily stochastic risk then information collection is not as time sensitive
Questions

How can we plan for collection and transfer of information throughout a response to ensure we have adequate information for long-term monitoring?