MEDICAL PREPAREDNESS AND RESPONSE FOR A NUCLEAR OR RADIOLOGICAL EMERGENCY

: MESSAGE FROM IAEA WORKSHOP

" ASIAN NUCLEAR SAFETY NETWORK (ANSN) REGIONAL WORKSHOP ON THE ENHANCEMENT OF MEDICAL DOCTORS' COMPETENCE FOR RADIOLOGICAL EMERGENCIES PHUKET, THAILAND, 21-25 NOVEMBER 2016"

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In almost all nuclear and radiological emergencies, local emergency services (e.g. local medical, law enforcement, and fire brigades) have the most important role in the early response. Within hours, hospitals have an important role to play in the response at the local level. Since nuclear and radiological emergencies are rare, medical responders often have little or no experience in dealing with this type of emergency and inexperience may lead to an inadequate response. For this reason, training in medical preparedness and response for a nuclear or radiological emergency is an important aspect of preparedness and response activities.

As stated in the IAEA Safety Requirements on Preparedness and Response for a Nuclear or Radiological Emergency (IAEA Safety Standard Series No. GS-R-2), which establishes the requirements for an adequate level of preparedness for, and response to, a nuclear or radiological emergency in any State,

"On the presentation of medical symptoms of radiation exposure or other effects indicative of a possible radiological emergency, the medical practitioner or other responsible party who recognizes the indications shall notify the appropriate notification point and shall take response actions as appropriate."

The objective of this presentation is to summarize this IAEA training program which is intended to prepare the local medical emergency units to response for a nuclear or radiological emergency as concise following details:

On-Site Management for radiological emergency

Responders to an emergency must be prepared to deal with multiple hazards, including chemical, biological, radiological, and explosives. In a mass casualty event, uninjured individuals should be initially handled in a triage site or at decontamination centers and not directed/sent straight to the emergency department of hospitals.

1. Consider areas established by first responders who arrived earlier or establish action areas.
2. Notify the national health authority/agency responsible for the medical management of radiation emergencies.
3. Wear, as appropriate and if available, Personal Protective Equipments (PPEs), protective clothing, respiratory device, double gloves, boots, and personal dosimeters (electronic alarming dosimeters).
4. Follow guidance and instructions from radiation protection officers to protect yourself and victims from radiation exposure or contamination.

Initial medical management of injured individuals at the hospital level

1. Treat life-threatening injuries and medical conditions first. Attend to ABCs and standard trauma resuscitation. Then, address contamination issues.
2. Remove clothing, if that was not done at the scene. If visible pieces of metal are embedded in tissue, assume they are radioactive and promptly use long forceps to remove them. Store them in a labelled container in a shielded area away from people.
3. Survey and document contamination.
4. Collect samples for radiological analysis.
5. Decontaminate:
    a. Delay further decontamination until patient is stable.
    b. Follow decontamination priority, wounds, orifices, high-level skin areas, low-level skin areas.
6. Re-survey. Decontamination should be stopped whenever:
    a. Counting is 2-3 times background,
    b. Skin shows evidence of irritation, or
    c. No improvement is obtained from DECON efforts.
7. Exams:
    - Obtain CBC, differential and absolute lymphocyte count;
    - Routine biochemistry;
    - Type and cross-match;
    - Tissue typing and cytogenetic dosimetry (obtain samples early, before the lymphocyte count falls) when whole-body exposure is suspected or confirmed;
    - Begin 24 hour urine collection if internal contamination is suspected or confirmed.
8. Follow-up:
    a. If the patient has persistent vomiting, erythema, or fever, repeat CBC and differential every 4–6 hours.
        - NOTE: Lymphocyte dosimetry may be less reliable because of the physiological response to trauma and thermal injury, as well as hemoconcentration or hemodilution associated with injury or therapy, use of transfusion, etc.
    b. If the patient is suspected to have internal contamination, the internal burden assessment should be established, as directed by a health physicist (with whole body counting and bioassays).
9. Consult with experts when ARS or internal contamination is suspected.
10. Consider patient disposition:
    - Decisions to transfer for surgery, burn care or supportive care are based on the patient's injuries, clinical conditions, age, number of other patients, etc.
    - If surgery is needed in a patient with ARS, it should be completed within 48 to 72 hours of radiation exposure.
    - Usually, patients with combined injuries (radiation injury and trauma or thermal injury) should be hospitalized.

The end of this presentation also provides the lessons learned from past nuclear and radiological emergencies such as the nuclear power plant accident in Fukushima Daiichi, Japan and the radiotherapy accident in Indiana (Pennsylvania), USA. The attendees can learn from the real situations for the emergency management and the limitation in each accident.