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CDC Roundtable on the Identification of Emerging Strategies for Hospital Management of Mass Casualties from a Radiological Incident, May 14 – 16, 2002

Summary Report

Background & Purpose

In May 2002, the Centers for Disease Control and Prevention (CDC) brought together public health, medical and other scientific experts to discuss practical strategies that hospitals can use in preparation for mass casualties from a radiological incident. These strategies will provide the basis for guidelines on this topic. CDC will then work with the local and state health departments and other partners to distribute these guidelines.

This report is a summary of the participants' contributions; it represents neither a consensus of the roundtable nor the opinion of the CDC, and may contain errors in fact.

Participants

The following individuals participated in the Roundtable:

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Process

The participants met in pre-assigned breakout groups to explore key issues relevant to the meeting purpose. There were 16 breakout sessions (organized according to four general themes); each individual participated in one session within each theme. Each breakout group presented a summary of their findings in the plenary sessions. During the plenary sessions the entire group of participants explored similarities and differences in themes, and developed common key points on the specific topic of discussion. The four commons themes for the breakout sessions were:

- Assessment and Containment
- Patient Treatment
- Provider Protection and Resources
- Community Planning/Relations

Key Points

Following is a summary of key points made by participants in the plenary session following each group of breakout sessions:

Common Themes and Suggestions

- Accurate information and communication are key to preparing staff, treating patients (especially the worried well), and working with the community during a mass casualty radiological incident. Both internal and external communication must be consistent and honest. If information is not provided to the media and the community, they will find information, even though it may be inaccurate. Information and education are key to reducing the number of worried well who seek help from the hospital.
- Hospitals should assess their internal and external resources in preparation for a mass casualty incident. The universal precautions used for these incidents, especially those pertaining to the use of personal protective equipment, may be adequate for a radiological incident.
- Hospitals should work with their community and the Federal Emergency Management Agency (FEMA) to develop a secondary assessment center that is separate from the local

hospital's Emergency Department to assess exposure, conduct triage, decontaminate as much as possible, and provide a location to reunite patients with their families.

- Hospitals should not use the potential threat of contamination as a reason to deny a patient treatment.
- "The hospital is not an island." It should coordinate and leverage existing community resources and volunteers in all areas including assessment, containment, patient treatment, provider training and protection, community planning, and communications. A hospital's response must be integrated with the response of the rest of the community.
- Hospitals should revise their current emergency response plan to create an "All Hazards" plan for mass causalities, including customized processes for radiological incidents.
- The first responders and hospital staff must be properly trained, prepared, and protected if the care provided in response to a mass casualty incident is to be effective.
- Hospitals should make arrangements to address legal issues – i.e., professional volunteers, Health Insurance Portability and Accountability Act (HIPPA), Consolidated Omnibus Budget Reconciliation Act (COBRA), etc.

Assessment and Containment

- First responders should use a radiation survey meter to assess and identify areas of contamination, noting the areas of significant contamination. They should also regularly assess the situation and their available resources.
- First responders should perform as much decontamination away from the hospital as practical –if possible, remove clothing of the injured individual before transporting him or her to a secondary assessment center or to the hospital.
- In most instances, removal of clothing gets rid of 90% or more of most external radiological contamination; however, staff should be sensitive to issues related to clothing removal – everything from individual modesty to weather conditions.
- Contaminated materials should be secured – bag and tag clothes, monitor personal items for level of contamination and save them for evidence and evaluation.
- Emergency Department staff should use complete blood counts (CBCs) with differentials to diagnose radiation sickness. They should conduct CBCs every 6 hours for someone who is suspected to have received a high dose of radiation. If resources and time permit, more time-consuming and advanced diagnostic tests should be considered.
- Key symptoms of serious exposure are vomiting, nausea, diarrhea, erythema, and fatigue. Symptoms are generalized, so the presence of these symptoms may not indicate that an individual has acute radiation syndrome.
- Triage occurs at several locations, not just at the scene.
- Hospitals should coordinate with outside resources, especially the police and security personnel, in an effort to control access and contamination within the hospital.

Patient Treatment

- Hospitals should not use potential or actual contamination as an excuse not to treat a person.
- Hospitals and Emergency Departments have radiation sources in them as part of every-day routine operating procedures.
  - The maximum amount of contamination you will find on or in someone is a small fraction of the amount originally present at the incident.
- Within the first 48 hours, the Emergency Department should provide patient treatment as in any other medical incident, taking into account the special circumstances of a mass casualty incident.
- Emergency Department staff should aggressively treat burns and infections as they would manage febrile neutropenic patients in other situations.
  - Staff should cover open wounds and any part of the body that could not successfully be decontaminated by first removing clothing and washing.
  - Hospitals should consider keeping potassium iodide (KI) in inventory to treat children within 4 hours of exposure to radioactive iodine. Hospitals also should consider its availability for use in treating all individuals exposed in the radioactive fallout zone.
  - If CBCs indicate the patient has received a large dose of radiation, as evidenced by a 50% drop in lymphocytes over 24 hours, then they should be treated according to the Armed Forces Radiobiology Research Institute (AFRRI) guidelines, *Medical Management of Radiological Causalities* (http://www.afrri.usuhs.mil/www/outreach/pdf/radiologicalhandbooksp99-2.pdf).
- Information and education are important for physical and psychological treatment.
  - Patients should be given timely and accurate information, not necessarily reassurance accurate information is preventive medicine for the worried well.
  - Individual and specific discharge information should include accurate information on potential long-term effects and important contact information.
- The worried well are those seeking information, but who are not showing signs of physical illness or psychological disturbance.
- Hospitals should try to separate the worried well from those who have profound psychological issues – staff included.
- Being worried is a natural response to any mass casualty incident.
- Special populations (e.g., pregnant women) will require specialized information about their risks.

Healthcare Provider Protection and Resources

- In most instances, universal precautions are sufficient to protect providers from radiation exposure.

- Hospitals should have a minimum "tool set" and a trained user for protection, detection, and decontamination tasks. A FEMA manual addressing this topic is currently under development by the Federal Radiological Preparedness Coordinating Committee (FRPCC), Subcommittee on Radiation. The staff person who is using this detection equipment should survey every patient that comes in. The minimum number of radiation detection monitors for the Emergency Department are 3 – 1 egress, 1 ingress, 1 in circulation.
- Use time/distance/shielding principles to protect Emergency Department providers.
- In general, the higher the risk to the hospital or to the provider, the more training that must be provided.
- Hospitals should:
  - Provide a brief and cost-effective "Radiation 101" training for all staff, and incorporate this in any "All Hazards" training.
  - Provide training on how to use and interpret radiation detectors and safety equipment.
  - Educate mental health professionals who are counseling patients in what happens because of radiation exposure. Counselors will need to go beyond patient debriefing and venting to provide quality information as well.
  - Know and utilize external training resources.
- There is a need for basic "All Hazards" training for coordinating all first responders in the community – hospitals should use evidence-based planning and training.
- Hospitals will need to attend to practitioner mental health.
  - Strongly encourage providers to seek mental health assistance.
  - Practitioners' concerns about the inability to treat everyone will need to be addressed.
  - If not already a radiation specialist in this field, health care providers are likely to share the same fears and concerns as the rest of the population.
  - Some signs and symptoms of stress might be the same as those for radiation exposure.
  - The hospital should dedicate someone to treat provider mental health issues.
  - The hospital should consider using more experienced employees to work with contaminated patients.
- The hospital should debrief providers after both training for a mass casualty incident or an actual event.
  - Conduct honest, tiered debriefing.
  - Ensure homogeneity of professions (grouping nurses, physicians, etc. together because of likely similarities in experiences) and share lessons learned from this.
- Hospitals need to consider data collection and surveillance.
  - Hospitals should ensure that record keeping is essential, simple, and short.

- Large-scale follow-up screening for cancer generally is not recommended, but obtain real-time assessment information to formulate an action plan.
- Hospitals should ensure they are tracking and recording appropriately, i.e., collecting incident data and patient history.
- Hospitals should designate an individual to be responsible for data collection and surveillance.

Community Planning/Relations

External Communications

- The key to all communications is planning – consider having printed information available, including a list of contacts and experts, processes, and responsible persons.
- Hospitals should ensure that all messages from key communicators are consistent, simple, and immediate (educate audiences about realities, facts, differences, etc.). Key messages should include:
  - If you think you are exposed …
  - If you are injured …
  - To find people …
  - Things that can empower individuals …
  - Likely effects …
  - To avoid contamination …
  - To contact experts or obtain more information…
- Key stakeholders are first responders, media, patients and patient families, emergency doctors and staff in the control zone, secondary assessment center staff, state and local emergency management and public health agencies, and internal audiences.
- Hospitals should work with media and other hospitals in the community to establish a lead hospital. Then each hospital should designate a media spokesperson trained in media relations and risk communications.
- The media is not the enemy. Hospitals should:
  - Engage in media triage.
  - Build relationships with the media prior to an event.
  - Dedicate a place to meet the media at regular intervals during an event.
  - When talking to the media, focus on what the organization is doing, not the incident.
  - Include media in planning and training for potential events.
  - Be alert for useful information you may receive from the media.

- Educate people in the community about the psychological and social issues related to an event.

Community Planning

- Communities should focus on the development of an "All Hazards" plan, with provisions for specific contaminants.
  - Remember that successful community planning is more than a 1-hour meeting, especially since during a mass casualty incident, community relationships are more important than the plan itself.
  - A plan needs to involve multiple stakeholders.
  - Be sure to include the hospital in the definition of first responders.
  - Plan, practice, and re-evaluate the community plan.
  - Capacity is short, so ensure there are updated mutual-aid agreements with other area hospitals and medical care facilities.
- A hospital has a role in its community emergency response plan. It should:
  - Help develop the plan – if no one else assumes responsibility, consider taking the lead.
  - Ensure the plan involves communication responsibilities.
  - Provide education prior to an incident.
  - Include strategies to increase capacity to treat more patients during a mass casualty incident.
  - Develop a decontamination policy for the hospital and designate resources to decontaminate at least one patient.
  - Have a planned follow-up strategy with medical experts and coordinated care.
  - Recognize that planning is necessary for an optimal response, including:
    - Developing a mitigation plan to reconstitute somewhere else if the hospital is downwind or in an affected area and must evacuate.
    - Developing plans to control access to the hospital.
    - Planning to coordinate staff and volunteers.
    - Conducting a post-incident debriefing.
- Each hospital should have its own Emergency Response Plan. Hospitals should:
  - Revise their current Emergency Response Plan by adding/augmenting radiological information to their existing plan.
  - For large hospitals, develop an incident command structure/system.
  - Protect hospital resources.
  - Clearly define indicators to signal when to 'trigger' the plan.

- Designate a liaison to notify key external resources and experts.
- Consider modular implementation of emergency response plan.

Breakout Session 1: Assessment and Containment

Signs and Symptoms of Radiation Exposure

What are the symptoms?

- Hospitals should refer to the International Atomic Energy Agency (IAEA) Safety Report #2 and the National Council on Radiation Protection and Measurements (NCRP) Publication #138. Symptoms include nausea, diarrhea, vomiting, fatigue, and possibly erythema. The Emergency Department should consider these symptoms in triaging patients. These symptoms may vary by radiation source.
- Utilize the following diagnostic tools when possible: complete blood count, patient interviews, and chromosome aberration tests from a specialized laboratory.
- During the first 48 hours, hospitals should conduct CBC blood work every 6 hours to help diagnose patients with acute radiation syndrome.
- The hospital should not stigmatize the medical needs of people with mental illness and not stigmatize people who come via mental health referrals.

Signs of Contamination, and Patient Decontamination

How do you know if someone is contaminated?

- Radiological contamination from a mass casualty event cannot be detected without specialized equipment.
- Initially, hospitals should obtain as much patient and situation history as possible, noting circumstances surrounding the patient and the situation that might indicate exposure. This also includes looking for corroborating evidence. AFRRI has developed a software program in conjunction with Radiation Emergency Assistance Center/Training Site (REAC/TS) that can be effectively used to record information. This software can also be used for dose assessment and treatment management. It can be found at: www.afrri.usuhs.mil/www/outreach/batpage.htm.
- Look for the symptoms of acute radiation syndrome. Perform a radiation survey if symptoms, patient history, and situation history indicate the possibility of contamination.
- Remember, most things needed for decontamination are already available in a hospital – the only additional recommended equipment is radiation survey equipment to measure beta and gamma rays. Survey equipment to detect contamination includes Geiger counters to detect beta and gamma rays and "pancake" probes for alpha radiation.
    - If available, Emergency Departments should borrow a Gamma camera to detect internal/external contamination on the patients.
    - Tritium is not detected by Geiger counters; it is only detectable in urinalysis.

- When conducting a radiation survey of the patient, the technician should initially conduct a quick scan of the face, hands, and feet. If the meter results are positive then the technician should conduct a thorough survey (5-8 minutes per person). The speed of the survey should not exceed 2 inches per second, and the distance between the probe and the patient should be approximately 1 inch. Staff should consider covering the survey probe in plastic to prevent contamination of the instrument.
- The provider should conduct bioassays if internal contamination is suspected.
- If a patient from the incident is found to be contaminated, staff can assume that additional patients from the same incident also are contaminated, and should begin decontamination processes.
- It is crucial to educate staff on the realities and history of contamination to be able to provide appropriate patient treatment:
  - Staff who work in an Emergency Department are exposed to certain risks, including ordinary hospital radiation sources; the additional element of risk introduced by a contaminated patient in the Emergency Department is negligible compared with usual daily work place risks.
  - Experience with international incidents indicates that self-reporting patients will likely have lower levels of contamination, if any.
  - Remember, FEMA's written policy for nuclear power plants states that when individuals are contaminated and injured, providers should treat the injury, addressing any medical problems first and ignoring contamination initially.

Decontamination

- Radiation decontamination should not interfere with medical care. The liability risk associated with refusing to treat an individual is greater than the risk to the providers of treating a contaminated patient.
- If possible, staff should screen and survey for levels of contamination before moving a patient into the facility; this will minimize staff and equipment exposure. As a control, staff should attempt a background reading of the facility before surveying the patient.
- The hospital should ensure that staff have proper personal protection equipment. Universal precautions as practiced with any other mass casualty incidents (chemical, biological, etc.) will be more than sufficient for protection from radiation contamination.
- Responders should attempt as much decontamination as possible either at the designated secondary assessment site or outside the hospital. Minimize the amount of contamination that actually enters the Emergency Department or the hospital. Decontamination areas should be separated from the hospital.
- Removing the clothing from the patient should remove 90% of the contamination. Staff or responders should bag and tag clothing, dressings, etc., for future evaluation and use as criminal evidence and should place small personal belongings (jewelry, wallet, etc.) in a plastic bag for patients to take home. If the patient is medically able to remove his/her

own clothing and wash, then they should do so; however, providers should maintain communication during the process.

- Staff should address privacy concerns of patients when they are undressing. A plastic poncho (or other disposable dressing gowns) can be provided for patients concerned about modesty and to ensure that the environment is appropriate to remove clothing (i.e., not too cold).
- The patient should be washed with water and soap, taking care not to abrade or irritate the skin. Water is the most important ally in this setting. Ambulatory patients can be washed easily; however, non-ambulatory patients must be on gurneys that can be washed.
- Staff should resurvey the patient after washing and rewash until a set threshold is achieved. Providers should isolate and cover any area with a plastic bag that is still positive after washing.
- Care should be taken with the washing procedure; this includes ensuring that radioactive materials are not incorporated into the wound.
- If a patient has high levels of internal contamination it may be a sign that he/she has radiated fragment(s) inside of them. These fragment(s) must be removed surgically using forceps to avoid burns.
- To ensure best use of the doctors' and nurses' time and resources, hospitals should attempt having other personnel perform the decontamination process.
- Once decontamination is complete, patients should either be sent home with written instructions or, if they meet Emergency Department criteria, admitted to the hospital.
- Hospitals should decontaminate the facility and staff who had contact with contaminated patients to prevent the spread of contamination.
- If the patient does not show any signs of contamination or meet hospital admittance criteria, providers should recommend they go home and take a thorough shower as soon as possible.

Triage

Planning Assumptions

- Triage is the sorting and allocation of treatment to patients, especially battle and disaster victims, according to a system of priorities designed to maximize the number of survivors.
- In most mass casualty incidents:
  - Citizens will most likely self-triage and go directly to the closest and most familiar hospitals; they will probably bypass field triage and treatment whether contaminated or not.
  - Hospitals will have little, if any, advance notification of incoming patients.

  - Most of the individuals who come to the hospital will be ambulatory, minimally injured, or the worried well. Studies show that only about 20% of incident casualties will require 1 night of hospital stay and be discharged the next day. Half of these patients were admitted not because of their injuries but because of their proximity to the disaster.

- Community medical needs continue despite the occurrence of a disaster.
- Hospitals must be able to transfer patients during disasters according to pre-arranged Memoranda of Understandings (MOU) or receive legal exemption from Emergency Medical Treatment and Labor Act (EMTALA).
- The key to a hospital's capacity to serve the critically ill is to recognize that "a hospital is not an island." The local hospital is an integral part of the community-wide system for emergency response. Every individual involved in the response to a mass casualty incident, especially the fire and police, should be familiar with the triage process and how to determine who should be sent to the hospital. The plan also must include a process for a community secondary assessment center.
- Hospitals must ensure that the triage process has an efficient record-keeping process to be sure injured persons are not missed. AFRRI and REAC/TS have developed and tested a record-keeping process and a system of tagging for triage, AFFRI's Biodosimetry Assessment Tool (BAT) software application, can be found at www.afrri.usuhs.mil/www/outreach/batpage.htm.

Triage Process

- The hospital triage plan should be based on the community plan. It should focus on training and exercises.
- Unfortunately, there are no existing universal triage schemes.
- Triage will be conducted at the scene and at the hospital, but communities and responders should attempt to do as much as possible at the scene.
- After a mass casualty or HazMat incident, hospitals should "lock down," providing only two entrances:
  - A site for triage and patients
  - A site for personnel, staff, press, officials, etc.
- It will require community support (police) to assist in the lock down but it is important because the hospital is an important disaster response asset.
- Casualty distribution to participating health care facilities is based on the community plan.
- Hospital space must be reserved for the most critically injured or ill.
- The secondary assessment center should be used for:
  - Observation
  - Further decontamination

- Further medical evaluation
- Limited treatment
- Reuniting with family members (if possible)

- Under the triage process for patients with life-threatening conditions, Emergency Department staff should:
  - Stabilize and treat physical symptoms according to standard procedures
  - Remove the patient's clothing
  - Decontaminate the patient
- Under the triage process for patients with non-life threatening conditions:
  - If the patient has been irradiated (internally or externally) or has been contaminated, then staff should:
    - Remove the patient's clothing
    - If contamination is obvious, give the patient a shower
    - Then treat physical symptoms according to standard procedures
  - If there is no obvious contamination, staff should survey for radiation.
    - If radiation is detected, wash the patient.
    - If radiation is still detected after washing, admit the patient as necessary.

Radiation Control and Containment

Key Principles of Contamination Containment

- Hospitals should use containment processes the staff are familiar with and apply principles of universal precautions and isolation techniques. Staff should avoid direct contact with patients when feasible, but do not use as a reason not to medically treat an individual.
- Staff should double bag, tie, seal, and label any contaminated material in plastic bags to be stored in a predetermined, secure storage area (labeling should include patient name and signature, hospital number, date, and time of day).
- In a mass casualty event, staff should dispose of the water used to decontaminate patients via the sewer system. (It is unlikely hospitals will have an effective water-holding system for any mass casualty event.)
- Hospitals should prepare personnel to rapidly identify and notify pre-identified resources that can provide assistance.
- Hospitals should use appropriately trained staff with properly maintained and tested survey meters to determine contamination. For example, staff should use a GM count rate meter along with a "pancake probe" to detect alpha, beta, gamma radiation; also, hospitals

should consider use of portal monitors. Hospitals should remember to test for background readings; the general rule is to define 2-3 times background as being radioactive.

- Hospitals should consider purchasing personal dosimeters for rapid response teams or others who might be subject to frequent contact with contaminated patients or materials (a self-reading card-sized dosimeter costs about $5). Use of these personal dosimeters for hospital staff provides documentation of exposure after the fact.
- Hospital staff should remember that it may take a while before a disaster is recognized as a radiological incident and assume contamination is present; however, the first time contamination is clearly identified, all staff and first responders must be notified.

Key Principles of Control

- Hospitals should designate a central point where patients are funneled into the hospital (ensure that it is within walking distance from the hospital).
- Hospitals should clearly identify demarcation points (use control points, pylons, or tape) where people will be monitored when coming in and going out of the hospital. The hospital should survey monitors at both points. This also includes the restriction of movement of staff.
  - Designate separate "clean" vs. "contaminated" areas in the hospital.
  - Segregate contaminated and non-contaminated patients and arrange a location where contaminated patients can be observed with limited staff contact.
- Hospitals should plan to augment hospital security staff, police, and possibly the National Guard to control facility ingress and egress (including the parking lot).
  - These security staff must control entrance of vehicles also.
  - They will also work with EMS to determine how to address contaminated EMS vehicles.
- Again, the secondary assessment center should be used to assess who needs to be sent to the hospital. Trained personnel with survey meters and security also should be present at the secondary assessment center.

Breakout Session 2: Patient Treatment

Patient Treatment

- Emergency Department staff must not allow the threat of contamination to be an excuse not to provide medical assistance. The right thing to do in almost every occasion when an individual who is contaminated also has a life-threatening condition is to admit him/her to the Emergency Department for care.

- In the first 48 hours, the basic premise is that physicians should conduct standard patient assessment, take care of immediately life-threatening problems, and take care of all other problems that require immediate attention. Emergency Department staff should:
  - Treat symptoms according to ordinary patient treatment practices and procedures.
  - Take care of wounds by irrigating, debriding, and covering to the best extent possible.
  - Aggressively treat for infections.
- Suggested supplies and medications to keep on hand and have easily accessible in large quantities include IVs, fluid support, and anti-diarrhea and inhibiting medications. Other suggested medications include potassium iodide (KI), diethylene thiamine pentaacetic acid (DTPA), and ferric ferrocyanide (Prussian Blue). Hospitals should:
  - Consider keeping a supply of KI to help prevent thyroid cancer from radioactive iodine exposure. KI is not as effective more than 4 hours after exposure or for individuals over 40 years old. It should be available to those in a radioactive fallout area.
  - Consider issues of toxicity when using KI. Experience from the Chernobyl event indicates there were 2-3 deaths in 7-9 million people because some people were highly allergic to KI.
  - Avoid giving the perception to patients and the community that KI prevents general radiation effects.
  - Understand that offering KI may help address some patient psychological concerns.
  - Maintain a ready supply of iodine in the hospital, such as Betadine®, if possible, in a form where the iodine can be applied to the skin with a brush.
- Emergency Department staff can use CBCs to assess level of acute radiation exposure.

Care of Special Populations

- Special populations include pregnant women, immunocompromised patients, equipment-dependent patients (especially those requiring ventilators), disabled persons requiring wheelchairs or other mechanisms of assistance, nursing home and jail residents, people with various physical challenges, mentally ill people, children, elderly, and persons with cultural and language barriers.
- The general conclusion is that these special populations would not be treated any differently than other populations. The one exception would be pregnant women and small children because:
  - There are no special pharmaceutical treatments for a pregnant woman, but they will require considerable reassurance and communication.
  - If radioactive iodine exposure has occurred, children should receive KI.

- Hospitals should also consider giving KI to special populations that cannot evacuate, including prisoners, nursing home residents, hospital staff, and nuclear power plant employees who may potentially be exposed to radioactive iodine.

Laboratory Issues

- In initial management of mass casualties, basic precepts of medicine should take hold with regard to testing: minimize the amount of testing, only do testing that can affect the immediate care of the patient.
- In a mass casualty incident, hundreds to thousands of patients may attempt to come to a hospital, putting the hospital in the position where it cannot possibly take a blood count on every one of them. Anyone who has or might exhibit prodromal effects would need to be considered for a CBC with differential. This is probably best repeated every 6 hours for about 72 hours.
- Other laboratory tests to consider if warranted by the patient interview include:
  - Sperm counts, which are tremendously sensitive to radiation. Initially, a normal count can rule out a significant exposure. Conduct a baseline test and then recheck in 6 weeks to find out if sperm count falls.
  - Cytogenetic analysis - collect blood for dosimetry.
  - Lung x-ray, if patient is believed to have a large dose of radiation to the lungs.
- Steps that hospitals can take to address laboratory capacity include:
  - Ensuring that mutual aid agreements are in place.
  - Seeing if it is possible to transfer non-critical patients to other facilities.
  - Keeping a stockpile of CBC tubes (use purple and green tube tops for CBCs).
  - Knowing the local, national (Federal Radiological Monitoring and Assessment Center [FRMAC]) and international laboratory resources.
  - Considering random sampling of patients for laboratory analysis to reduce stress on labs. However, there could be political and legal consequences of this decision.
  - Having a plan for back-up hospital personnel and a process to communicate with them.
- Emergent laboratory procedures and equipment (not yet available or practical for hospitals) that could be considered include:
  - Commercial centrifuge-based blood counters for portable radiation dose assessment.
  - Hand-held blood counting devices, including lymphocyte counting technologies.
  - A hand-held appliance to test protein biomarkers.

- To determine the necessary laboratory tests, there should be an accurate assessment of the incident site including confirmatory tests for the presence of radionuclides.
- Hospitals should keep in mind that while they are dealing with the casualties, other local, state, and federal organizations are dealing with the scene. Hospitals need to know how to connect with these responding organizations to get needed information, such as isotope data and dose assessment.
- A lesson learned from the anthrax incidents is that healthcare providers should have heightened awareness of significant political pressure to use most the accurate tests available and avoid random testing.

Patient Mental Health Concerns

- Based on past mass casualty incidents, a vast majority of casualties are going to be psychological casualties.
  - The majority of these will not be severe psychiatric conditions that result from the incident. Most people will exhibit higher levels of anxiety rather than psychotic behavior; some will also experience Post Traumatic Stress Disorder (PTSD). Concern and anxiety are natural reactions to the uncertainty associated with a radiological incident. Also, many people will come to the hospital for fear of loss of access to mental health medications. (These points are from research conducted by the National Institutes of Mental Health.)
  - Contrary to popular belief, there is a large body of literature that suggests that rather than people becoming dysfunctional in disasters, they tend to rise to the occasion.
  - Research also indicates that mass hysteria does not occur in mass casualty incidents.
  - It is probable that family members will attempt to gather information about other family members who are experiencing heightened anxiety and have sought medical attention. Hospitals should dedicate space in the facility and a phone number (if possible) to keep family members informed.
- Long-term psychological effects, which could arise from 48 to 72 hours after the incident and from then on for several months, include anxiety disorders, PTSD, depression, traumatic neurosis, insomnia, and acute stress disorder.
- It is very important to distinguish between the worried well and people who have a non-incident-based psychological dysfunction.
- Since the situation is frightening to all people, hospitals should be proactive in reassurance and communication to reduce psychological issues. Hospitals should:
  - Dispense timely and accurate information, including an accurate description of the incident and its location to the public. This will allow them to take appropriate actions before they come to the hospital.
  - Turn off the sound on the Geiger counter so people are not alarmed.

- Counsel patients on both acute and potential long-term physical and psychological effects. Include this information in patient discharge sheets.

- Hospitals also should ensure that trained counselors are on site, and initially screen persons who may be at higher risk for PTSD (i.e., people who have been previously traumatized or have been in other disasters). These individuals will require follow-up.
  - Dedicate a lead person responsible for the counselors.
  - Provide radiological education/training for the staff performing the psychological evaluations and counseling. Staff who cannot function in times of high stress should not be assigned to these duties.

Breakout Session 3: Provider Protection and Resources

Employee Protection (Physical)

- Initially obtaining as much information as possible is proactive protection. Obtain as much patient and site information as feasible from first responders.
- The first step in protecting employees is to establish a secondary assessment site (hospitals should also consider developing a separate assessment center on the hospital campus) and control zones (hotlines) within the hospital. Hospitals should ensure that they have someone in charge of access to/from the control zones, and that they have a law enforcement representative present.
- Suggested personnel protection equipment that also facilitates the ease of clean-up includes:
  - Universal precautions clothing (facemask, goggles, gowns, double-gloves with inner one taped and outer glove removed after each contact).
  - Saran Wrap™ to cover and protect equipment.
  - Disposable shoe coverings.
  - Butcher paper on floor.
  - If possible, dosimeters for staff members who might have frequent contact with contaminated patients.
- Hospitals should purchase and maintain survey meters for detection procedures.
  - Each hospital should have three survey meters, one each at points of egress and ingress and the third in circulation.
  - Large hospitals might consider a portal monitor for 24/7 monitoring and protection. Portal monitors cost about $5000 and “pancake” meters are $500-$1000.
  - Hospitals should ensure that designated personnel are properly trained on the use of the meters, and that the meters are maintained and calibrated according to the manufacturer.

- Remember that protective clothing does not always reduce risk of exposure; it just limits the spread of contamination. Its purpose is to make it easier to clean up when leaving the facility.
- Hospitals should take special precautions to protect special populations, especially pregnant employees.
  - Historical industry data indicates that it is extraordinary that anyone with significant contamination would come to hospital.
- Hospitals should provide employees with immediate and honest external communication, such as public announcements, media packets, information packets for the Emergency Department waiting area, and web site updates.
- Hospitals should provide copies of the North American Emergency Response Guide for staff.
- Issues to consider in funding or obtaining needed equipment include:
  - Considering a billable patient surcharge for disaster preparedness. DOE or other government grants may be available for PPE and radiation detection devices.
  - Considering other resources in the community that also have meters and equipment.
- Employees are best protected when hospitals activate the radiation component of their emergency response plan when there is any probability of a radiological mass casualty event.
- Employees should remember to apply time, distance, and shielding principles (i.e., limit time spent near contamination; keep as much distance from the contaminated area; and shield with any available material, including protective clothing).

Training of Hospital Staff

- Every employee at the hospital needs simple, competency-based training that is preferably conducted on-site and includes:
  - The basic principles of radiation and the realties of treating contaminated patients.
  - A clear definition of the roles and responsibilities of all staff members involved in a response to a mass casualty incident.
- Hospitals should incorporate this training into employee orientation and differentiate radiation training from other HazMat trainings. The use of video or internet-based training should be explored.
- Basic radiation training for staff will help to reduce stress and increase quality of care in a radiological mass casualty incident.
- Specific skill-based training includes:
  - Survey meter use and reading for those who will test individuals for contamination.

- Decontamination training for those who will most likely decontaminate patients.
- Setting up control zones and a global perspective for head nurses in the Emergency Department.
- How to plan for a radiological emergency for members of the disaster planning committee.
- Equipment decontamination for janitorial staff.

- Hospitals can emphasize CMEs to convince physicians to participate in training, especially training on patient treatment for the first 48 hours after a radiological mass casualty incident.
- Ensure that hospital staff who will most likely respond to a radiological incident or those at highest risk for radiation exposure receive the most training.
- Since the hospital will not be able to train the entire staff in all scenarios, it should create easy access to radiological experts.
- Training should extend beyond hospital staff; the hospital's training plan and Emergency Response Plan should be coordinated with the first responders, the American Red Cross and civil authorities. Because of the constant interaction of hospital and non-hospital staff during any disaster, it should conduct joint interactive training if at all possible.
- A standard, community-wide "All Hazards" training curriculum integrated for all types of responders needs to be developed at the national level.

Practitioner Mental Health Concerns

- There is a basic assumption that health care providers operating outside of their areas of expertise will share many of the same concerns as the public and probably some of the same mental health effects.
- The most likely psychological consequences for medical staff as a result of treating patients in mass casualty incident are:
  - Fear, primarily because people know a little about the effects of radiation and assume that radiation is more dangerous than it actually might be. There is also the lingering concern about unknown long-term side effects, such as the increased risk of cancer.
  - Suspicion of being contaminated by radiation and carrying that radiation home to one's family. This preoccupation may distract health care providers from their work.
  - The decisions made regarding who to save and who not to save. Providers are likely to have a real sense of guilt when they cannot treat everyone and are not able to do as much as possible for each patient. This concern could result in anger, feelings of helplessness, depression (potentially long-term), and even sleep disturbances. All of these will be aggravated by fatigue and exhaustion from response demands.

  - Apprehensions, when the state or federal government personnel arrive, that their decisions will be second-guessed. This could lead to guilt and anxiety.

- Possible physical signs that staff may be experiencing psychological effects include vomiting, diarrhea, nausea, and headaches. Coincidentally, these are also physical signs associated with acute radiation exposure.
- Psychological effects are most likely to occur among staff who have the greatest amount of contact with the deceased and/or dying, and those dealing with children or pregnant women. These effects are more likely to occur with staff who are severely fatigued by being on duty for a long period of time.
- Prevention is the best treatment and, because prevention and treatment for provider mental heath concerns are so intertwined, it is important to educate health care providers now to provide the best care for all when it is needed.
  - The first lesson in treatment is to have a critical incident stress management team that includes credentialed mental health providers on board and in place at each facility before a critical incident.
  - Hospitals should have mental health providers dedicated to staff support.
  - Hospitals should screen for those who are at higher risk of psychological complications.
  - Provider education and training are key components. Do not assume that practitioners know more about radiation than the general public.
  - Staff will be concerned about their own families, so hospitals should establish a communication liaison for them.
- Hospitals should conduct tiered levels of debriefing after a mass casualty event to gather data and to address mental health concerns. The debriefing groups should not be cross-discipline (physicians with nurses, etc.).

Surveillance

- There are two purposes for surveillance: a registry for longitudinal study and a short-term disaster medical intervention resource.
- Surveillance is needed to treat and track patients and learn from the incident. Surveillance in the first 48 hours gathers information used to determine action and treatment. Hospitals should keep in mind that patient care comes first, so they should focus on decision-making data, especially for patient treatment. Records also should be user-friendly to practitioners.
- Key data to collect include patient demographics, patient location at the time of the incident, and contact information for later follow-up.
  - Consider including the patient's description of what happened, details about the conditions at the location at the time of exposure, and the patient's chief complaints.

  - Record therapeutic data, including patient treatment data, body location where there was radioactive contamination and isotope identification.

- It would be valuable to gather data for an hour-by-hour summary of some basic information that includes a count of people affected by the immediate incident (the number could grow markedly over time) and key patient complaints.
- Attempt to use modern technology/electronic storage to implement and integrate surveillance information.
- Radiation has long-term consequences; therefore, there is an additional complex and expensive long-term issue of registry tracking. This should not be a concern of the hospital. The hospital can easily define the population up front for future tracking.
  - When there is a disaster of any national importance, CDC performs surveillance for response and general health considerations.
  - Radiation experts will use the hospital's initial information to reconstruct the incident.
- The Health Insurance Portability and Accountability Act (HIPPA) rules limit access to this information; therefore it is not clear now how this will play out in an incident involving mass casualties. Some states have flexibility in creating a list of reportable conditions to track and report, consistent with HIPPA. Additionally, some states require reporting of suspected bioterrorism incidents. Hospitals should check with their state on these issues.

Breakout Session 4: Community Planning

External Hospital Communications

- A mass casualty incident is a poor time to learn how to communicate; therefore hospitals should prepare their communications and communication training in advance.
- External stakeholders are the key audiences, the people you want to address, and include:
  - First Responders, EMS, Fire, and Police who are key to protecting the hospital's resources and are priority stakeholders.
  - Media who can play a key role in providing accurate information and therefore possibly reducing the number of worried well who come to the hospital.
  - Members of the community
  - Other medical facilities
  - Health departments
  - Local elected officials
  - Volunteers
- Hospitals need to develop a media relations plan that:

  - Builds relationships with reporters to ensure positive press experiences. Hospitals should invite media to participate in pre-planning activities and drills. This is a two-way learning opportunity: media learns about strategic factors in a disaster and medical personnel learn how to work with the media.
  - Includes media in the community planning process so they understand contingencies.
  - Designates a spokesperson and spokes-hospital if multiple hospitals are involved. Any spokesperson should have prior training in media relations.
  - Requires that staff never talk to a reporter without public relations personnel present to help them stay on message.
  - Focuses on what the hospital is doing rather than the disaster. The media business is highly competitive. Hospital personnel should not contribute to the misinformation by talking about topics outside their areas of expertise. The hospital needs to know who is coordinating and integrating information going out to the public.
  - Ensures back-up communication equipment.
  - Informs the media of local and national experts and contacts.
- Hospitals should ensure all messages are consistent, immediate, accurate, and open. Key messages include:
  - If you think you are exposed …
  - If you are injured …
  - To find people …
  - Things to empower …
  - Likely effects …
  - To avoid contamination …
  - Available resources, experts/contacts …
- Hospitals should develop prepared information packets.
- Unique messages are called for in an incident involving radiation. The people who have already had doses are at a predetermined risk. Others may become exposed, and there is a need to reduce or eliminate future exposure by letting the general public know places to avoid or leave. These messages should include information on evacuation, weather effects, shelter, KI, and what people can eat or drink.
- Hospitals can practice rumor control by following the local media reports and addressing and correcting "misinformation" immediately. Rumors will arise to fill gaps in information, so if the hospital does not speak about an issue, someone else will.
- Each hospital should make sure it is linked to the community's emergency alert system (stations are required to have equipment to broadcast emergency alerts). The system has fallen into disuse, but it is available for this type of communication. Hospitals should consider proposing that the community develop a Reverse 911 program that allows the

911 center to categorize a geographic area and broadcast a specific recorded message to that area.

- A Press Plan is an essential component of any community disaster plan. People should be accountable for comments in the planning stage. Therefore, hospitals should remember that professionals, even when speaking outside their discipline, still sound credible to the general public.

Community Planning

- A hospital's responsibility in community planning and in responding to a mass casualty incident includes:
  - First and foremost, receiving and treating patients. Treatment in a radiation incident includes the resources required to decontaminate one patient. To be successful, a hospital needs to develop strategies to treat a large number of patients during a mass casualty incident, including having easy access to medications. (Hospitals should consider entering into agreements with local hospitals and pharmacies.)
  - Being the party that convenes the community partners if the health department has not already assumed this role.
  - Conducting a community risk assessment as required by JCAHO.
  - Establishing adequate and redundant two-way communication with staff and partners; two-way radios can be used for this purpose.
  - Knowing what to do to avoid becoming a second-hand casualty (close air ducts, emergency power, etc).
  - Planning for a move if the hospital becomes dangerously contaminated.
  - Coordinating human resources including staff members, individual and organizational volunteers, and Good Samaritan health care professionals. The hospital should have liability and malpractice coverage that automatically covers this additional help. Furthermore, hospitals should address emergency credentialing policy in advance (reference: May 2002 issue of the *National Association of Medical Staff Services).*
  - Controlling access to the facility.
  - Instituting a process to accurately record costs/expenses related to any mass casualty incident.
- Helpful steps in developing an evidence-based Community Plan include:
  - Checking to see if a Community Plan already exists. If so, it should be revised it to include radiological incident-specific information.
  - Exploring evidence-based research and literature on radiation emergency response to stay abreast of new findings.

  - Determining who should be responsible for convening a community planning process; if there is none in place, the hospital should be the leader/convener.
  - Knowing the key community partners. Initial players will be EMS, Police, Fire, emergency management agencies, and the health department. This group will expand quickly once the key organizations begin working together (additional partners might include public and private transportation companies, refrigerated shippers, and expanding to other public and private ventures). Hospitals should include local businesses and non-profit volunteer organizations (rescue missions, churches, and food banks) as partners.
  - Having each partner conduct its own internal assessment and then share its findings with the partners.
  - Ensuring that all partners agree on and are familiar with the roles and responsibilities of each partner.
  - Conducting a community-wide risk assessment.
  - Developing an integrated training program and conducting at least one training exercise per year, as required by JCAHO.
  - Evaluating and reassessing the plan periodically.
- Relationships are just as important as what is in the plan when it comes to ensuring successful implementation of the plan in response to a mass casualty incident.
- Hospitals should make sure in the pre-planning process that there is a method in place for finding out which hospitals are still functioning, which ones need help, and which ones should not be receiving additional patients.
- It is important to conduct post-incident debriefing and share these discoveries with other communities. There is a need for a national institutionalized process to maximize what we learn from the history of disasters and to serve as a national clearinghouse of published and non-published research. However, hospitals may be reluctant to share information for fear of lawsuits; therefore, the research should be rendered anonymous prior to sharing.
- The benefits of community planning go beyond joint planning to include other collaborative opportunities such as joint purchasing that will reduce costs.
- An important reference material is the *Community Medical Disaster Planning and Evaluation Guide,* American College of Emergency Physicians, 1995.

Response Plan Activation and Notification Procedure

- "A hospital is not an island." It is a crucial part of the response system to an emergency in the community.
- Hospitals should use existing internal resources, and:
  - Not recreate the wheel, but rather revise their existing plan for radiological incidents.

  - Ensure they are familiar with the community's Incident Command Center (ICC) and, specifically, who is responsible for what and how it will be accomplished. Hospitals should try to ensure that the fire or police chief will not attempt to run the Emergency Department. Is there any benefit to your hospital having it's own ICC? In general, smaller hospitals do not benefit as an ICC, which can create many layers of bureaucracy.

- Hospitals also should understand external plans and resources, and:
  - Ask their state or community if there is an existing plan. If so, the hospital can plan for their specific situation. States with nuclear power plants have well-defined plans and an established hierarchy for notification and plan activation. Hospitals should include poison control centers as a resource.
  - Be aware that the Nuclear Regulatory Commission (NRC) and some states have created incident assessment centers that pull together a handful of people to assess the site, and then communicate with appropriate organizations.
  - Know that the radiological community has many recognized experts and hierarchies who can assist in response plan activation.
  - If the hospital decides an ICC is needed, then it should examine the Hospital Emergency Incident Command Structure (HEICS) system, out of California, which is very well organized and would be an excellent model.
- Hospitals should assign and prepare staff in advance by:
  - Ensuring roles and responsibilities are clearly defined in advance.
  - Assigning someone the responsibility for making the proper notifications (externally and internally) and ensuring they have an accurate and updated list of experts that the staff can contact for guidance.
  - Having back-ups for key officers, in case they are not available.
- Hospitals should use a confirmed incident, suspicious incident, or expected incident as a trigger for the plan; however, they should be cautious about the notification and consider the source (Is it reliable?). There is a danger of putting unneeded "All Hazards" contingencies in place that may result in actually slowing down delivery of the needed care.
  - Hospitals should be cautious about when to trigger emergency response plans. There may be graded responses, not just an all or none response, based upon suspicious incident, suspected incident, confirmed incident.
  - Hospitals should consider adopting the concept of modular activation, so that they may activate parts of the disaster plan without activating the entire plan and causing major disruption, especially early on when no one is certain how much of a disaster exists.
  - Hospitals need to establish a strong link with the Incident Command Center during the disaster so to determine exactly what is taking place.

- The existence and scope of disaster may not be clear; thus, the hospital should consider modular incident command system implementation.

- In the planning stage, the hospital should ensure that data recorded by meters is meaningful to clinical practitioners.

Patient Discharge and Follow-up

- Patient discharge sheets should include basic information about radiation exposure and accurate information about the long-term health effects of radiation exposure. Hospitals can customize and relate these possible effects to the specific situation. If the incident is thought to be of criminal intent, the discharge staff should explain the need for reporting and cooperation with law enforcement.

- Along with discharge sheets hospitals could provide Q&A sheets, fact sheets, etc. Hospital fact sheets should not be in conflict with external organizations/experts. Fact sheets should include expert contacts and phone numbers and reliable sources of information.

- There is the risk of information overload to the patient. The challenge is how to design printed materials and how to keep them short and simple and still effective.

- Hospitals should avoid generic discussions about radiation - it will just worry people. The more information is customized to an individual's circumstances, the more helpful it will be.

- Hospitals should consider having CDC distribute approved discharge sheets on the internet or via fax real-time to apply specifically to the incident.

- It is not recommended that *hospitals* provide follow-up screening for cancer.

Strategic Issues

In concluding the roundtable, the participants explored strategic issues associated with successfully addressing a radiological mass casualty incident for each breakout topic. The top strategic issues that should be addressed include:

- Inadequate funding for emergency response funneled to hospitals – the majority of funding goes to the first responders (hospitals need to be redefined as first responders or included in the funding for first responders).
  - Who will pay the bill for mass casualty patient treatment? Consider grants for local communities or a disaster surcharge. Also, ensure that Medicare, Medicaid and third-party payers will cover patient treatment in a mass casualty situation.
  - There is insufficient funding for employee training and equipment for radiation incidents. Almost all of the increased funding is directed to preparation for bioterrorism.

  - Currently there is pending legislation to provide funding for emergency equipment for Fire and Police personnel. The medical community should consider obtaining similar funding.

- Lack of secondary assessment center(s) in communities, and lack of authority for a hospital to create center(s) within their communities.
  - It is unclear who is ultimately responsible for developing a secondary assessment center.
  - CDC should recommend that these centers be a component of community plans for mass casualty incidents.
- Shortage of qualified human resources for radiation emergencies.
  - In general, there is a scarcity of trained staff locally, regionally, and nationally. This situation will worsen in the future because of the retirement of roughly 40% of the active health physicists over the next 3 to 5 years and is exacerbated by the lack of health physics trainees or students.
  - Declining human resource support for the radiological field from the Federal government means there may not be sufficient support for a response to a mass casualty.
  - CDC should explore how to best train first responders on preparation for radiological incidents.
- Lack of clear policies and procedures
  - When is it safe enough to continue using the facility? There is an absence of defined rules and regulations pertaining to the decontamination of medical facilities.
  - There are insufficient standardized education, training, and best practices. (CDC should explore developing a Center of Excellence for an "All Hazards" mass casualty incident.)
  - There is a need for clear CDC guidelines on KI usage.
- Scarcity of sufficient laboratory testing facilities throughout the nation
  - There are not enough laboratory resources to conduct all of the tests that people will want conducted.
  - There is a need to develop a formal protocol and guidelines for necessary laboratory testing to reduce the number of excessive laboratory requests.
- Legal issues related to HIPPA and EMTALA immunity and indemnification for all health care workers.
- Inadequate research on mass casualty events.

Appendix: Acronym Listing

- AFRRI = Armed Forces Radiobiology Research Institute
- CBC = Complete Blood Count
- COBRA = Consolidated Omnibus Budget Reconciliation Act
- EMTALA = Emergency Medical Treatment and Labor Act
- FEMA = Federal Emergency Management Agency
- FRMAC = Federal Radiological Monitoring and Assessment Center
- FRPCC = Federal Radiological Preparedness Coordinating Committee
- HEICS = Hospital Emergency Incident Command Structure
- HIPPA = Health Insurance Portability and Accountability Act
- IAEA = International Atomic Energy Agency
- ICC = Incident Command Center
- NCRP = National Council on Radiation Protection and Measurements
- NRC = Nuclear Regulatory Commission
- REAC/TS = Radiation Emergency Assistance Center/Training Site