CENTERS FOR DISEASE CONTROL AND PREVENTION
National Center for Environmental Health

Record of the Roundtable Meeting on
Partnering with EMS for Radiological/Nuclear Emergency Preparedness

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The Radiation Studies Branch (RSB) of the Centers for Disease Control and Prevention's (CDC) National Center for Environmental Health (NCEH) convened a meeting August 19–20, 2010, in Atlanta, Georgia. The meeting, a roundtable of Emergency Management Services (EMS) experts, was held at the Westin Atlanta Perimeter North Hotel. Attachment 1 lists those attending.

The meeting's goals, described by RSB Chief Dr. Charles Miller, were 1) to discuss the extent of the EMS community's preparedness for a mass casualty radiation incident, what it may need, and how CDC could help, and 2) to explore other questions that should be posed and addressed. The input from this and other similar meetings will contribute to the development of new or updated training aids and educational materials.

Dr. Miller commented that, after the events of September 11, 2001, CDC examined the role of public health agencies in a radiological event and found that most public health officials had no idea that their departments would even be involved. EMS is an important response partner, along with public health, public safety, emergency management, and others. Because EMS personnel will have a critical role as those first on the scene, their decisions will be critical in saving lives. Therefore, CDC began partnering with emergency response professionals to develop information and training to prepare them for such a scenario. Although a nuclear attack would certainly be a major disaster, people can survive and recover, as they did in Hiroshima and Nagasaki. Educational and training products developed through input from this meeting will contribute significantly to the public health community's ability to save lives in such an event.

RSB's Dr. Armin Ansari, a health physicist, made a presentation on the basic aspects of radiation, and Medical Officer Dr. Jeffrey B. Nemhauser presented on pre-hospital medical response in radiological or nuclear emergencies. These presentations are summarized in detail in Attachment 2.

Facilitated Discussion: Current Capabilities and Gaps

Mr. Ron Edmond, meeting facilitator, Oak Ridge Institute for Science and Education (ORISE), led the group in a discussion of the EMS system's current state of preparedness for radiological events, potential partners, and the guidance and resources needed to improve EMS response.

General comments from the discussion:

Response-related

- Inconsistencies exist in ambulance equipment standards nationally, as well as throughout the EMS community; in capacity for early detection of a large-scale radiation event; in provider knowledge—education is needed across the board to counter the fear factor.

- During a mass casualty event, a set percentage of resources must still be allocated to normal daily response needs, such as accidents and births.

- A gap that must be addressed with EMS providers is the lack of education and training in psychosocial behavior.

Surge capacity, needed scale(s) of response

- The sudden influx of patients during a large-scale emergency event will present a significant challenge. Across the country, hospitals have downsized, their capacity is reduced, and their ability to respond is a matter of degree. Even with advance planning, resources will not be adequate during a massive event affecting tens or hundreds of thousands of people. Policies and other guidance are needed to address the scope of potential events, ranging from local to statewide or regional, in an incremental manner. States and local municipalities must think about partners they can engage in planning and executing a surge response (e.g., identifying hospitals with surge plans and implementing agreements for external support staff). For example, well-trained and equipped HazMat personnel and hospitals' Nuclear Medicine departments are potential deep resources for helping plan and execute radiation response efforts.

- Potential gaps in Improvised Nuclear Detonation (IND) event response must be identified and a plan to deal with them developed (e.g., how to improve inadequate hospital capacity or increase the number of first responders; how to deal with loss of electronic communications.)

- A national standard for first responder radiological training is needed. Some younger responders who did not personally experience Cold War era nuclear fears cannot completely relate to the potential of a major incident. Emergency Medical Technician (EMT) training in general differs between locales but is unlikely to include specific training on radiological incident response. For realism, particularly for young responders, a radiation element could be added to more familiar training scenarios, such as the Oklahoma City bombing or 9/11, to illustrate the different needs and responses required in a radiological event.

Potential Partners to Give CDC Input were listed by the participants in no particular order: dispatchers, Department of Defense (DOD) personnel, law enforcement officials, public utility workers—use an all-systems approach; American College of Emergency Physicians (representing emergency medicine at the national level) for disseminating training and guidance; Emergency Management Association; Emergency Nurses Association; Radiation Safety Officers; American Red Cross (ARC); public transportation agencies; mental health professionals representing diverse disciplines and various training levels; National EMS Labor Alliance; International Association of Fire Chiefs; National Association of EMS Educators; National Ambulance Association; Department of Transportation (DOT); EMS Chiefs Association; American Medical Association (AMA), which publishes national life-support training that includes radiation and nuclear (rad/nuc) elements; Department of Homeland Security (DHS) training, often done locally; National Disaster Medical System (NDMS); Veterans' Administration (VA); and the Radiation Emergency Assistance Center/Training Site (REAC/TS) in Oak Ridge, which works with local entities.

What assistance or guidance is desirable from CDC/RSB?

- Development of national education and training standards like those for Advanced Cardio Life Support (ACLS) and Basic Disaster Life Support (BDLS) to ensure national consistency.

- Funding.

- Help in bridging intrastate communication gaps. The Council of Radiation Control and Protection Directors (CRCPD) could provide a list of every state's radiation contact; EMS agencies should reach out to their radiation control programs for technical assistance. CRCPD is working with CDC and the Radiation Alliance to address such communication gaps. To raise awareness about the availability of radiation expertise, each State Radiation Control Bureau's telephone number should be promoted at every level of government. Increased communication between EMS agencies and radiation control programs also can ensure awareness of smaller radiation emergencies, even if an incident involves only 1–2 people.

- CDC's Crisis Emergency Risk Communication (CERC) training modules, rolled out in 2004, are online and can be used locally to develop messages and conduct training.

- Perhaps CDC could help develop an information network based on the Poison Control Center (PCC) model. PCCs illustrate the best model for a rad/nuc training initiative; they started with public education, and awareness about them is now high throughout the U.S. population. These new information centers could supply the greater radiation support capacity needed to advise on specific rad/nuc challenges when the state's Radiation Office is overwhelmed (e.g., on surge capacity and location of or access to equipment stashes). Like the PCCs, these centers could do community outreach such as distributing magnets with telephone numbers that people can call anytime, day or night, to get current information. REAC/TS and many Radiation Safety Officers also offer this kind of service. CRCPD identified this as an issue and is working with officials in local areas to connect local radiation experts with the Medical Reserve Corps.

- Raising awareness of the evidence-based national standardized emergency messages to state and local agencies. EPA has also developed radiation messages and has issued a small informational booklet on the topic. A good strategy is to widely distribute risk communications messages in pre-developed packets to help alleviate fears and control public behavior (e.g., help avoid swamping hospitals with people seeking unnecessary care).

Communications to Alleviate Responders' Fear

Research indicates that mass casualty events involving radiation are the occasions to which people are least willing to respond. To address this issue, the discussion group recommends the following:

- Work with the National Association of State EMS Officials (NASEMSO) to share information with state EMS officers for dissemination in their state. CDC's Web site also should link to the NASEMSO Web site to reach its members.

- Institute training for EMTs, which is currently lacking. As was demonstrated with HIV/AIDS, education and training supported by solid scientific evidence will reduce the fear factor among emergency responders. CDC should develop national training standards and accompanying curricula.

    - CDC could be the repository and filter for all this training information. The following resources could be included:

        - Archived resources and contact points.

        - Relevant literature.

        - Links to organizations that can provide contact lists and other relevant information to the repository.

        - Standardized procedures that specify, from the first responder up to federal involvement, who and what level responds, and how. This will provide the consistency factor.

- Another option is to assemble the leaders of national organizations already setting training standards and to disseminate more information through their organizations (e.g., at national conferences). Another dissemination vehicle mentioned is state EMS training staff that can provide a "one-stop shop" for statewide access to information.

- To correct currently inconsistent information on first responder safety, provide standard education about the minimal risk of contamination to the responder, and especially emphasize proper Personal Protective Equipment (PPE) use to avoid any hesitation to perform life-saving activities.

BREAKOUT GROUP REPORTS

The meeting participants convened in topic-focused workgroups and then reported back.

Local Response/Gaps, Medical Field Management

The group's conclusion was that response to a rad/nuc event may differ from EMS response to other kinds of events. The latter are unlikely to have an epicenter, and there are different issues related to scene assessment, patients, and the responders themselves. The current concern is that a radiological response is a low priority for EMS agencies. Either an incident is perceived as presenting a far-future risk, or the lack of education has caused a sense of fatalism about what can be done about it. To address such perceptions, the group suggested several strategies:

- Focus on making it a priority to educate EMS personnel on the potential risk for such an attack, the potential for victim survival, and related problems. Responder education priorities include how to assess the scene, best ways to safely treat patients who need care, and a realistic examination of their ability to rescue victims.

- Educate policy makers and others who provide funding for response planning about the probability of a rad/nuc event and that it can be survivable, although mass casualties are possible. An important element of such education is changing people's mental image of, or how to think about, a nuclear event; a wide range of events are possible. Survival will largely depend on the ability of EMS to operate safely within the response zone.

Hazards Response

The workgroup agreed that CDC should avoid "reinventing the wheel" in terms of revising standard operating procedures for dealing with hazardous materials and events. The basic approach platform is the same across the nation: isolate, deny entry/exclude, identify, plan, and act. The group recommended that

- Didactic training should be to the lowest common denominator—keep it simple.

- Any available, accessible specialized information should be used, for example, a PDA download to a radiation expert in the field.

- The jurisdictional differences in training needed (e.g., an urban versus rural response) and differences in training for specific responder types (e.g., the first responder versus incident command staff) should be addressed.

- National standards should be inserted into existing curricula for multiple platforms (national educational standards for EMT certification). Much of EMT/paramedic continuing education is now done online; plug a curriculum on radiation emergencies into that. Once the education infrastructure is in place, develop a degree of compulsion to make the curriculum a requirement.

Medical Response

- There are no standard protocols for either response or treatment in a rad/nuc event. CDC should engage, and perhaps coordinate, partners (e.g., fire chiefs and firefighter associations, EMS systems, medical directors) in the development of standardized responder PPE recommendations.

- Radiation training and education are lacking. CDC should engage key partners to develop an initial preparedness certification in EMT school and subsequent continuing education curricula, and then identify key partners to unite the field behind one standard, such as done for CPR.

Regarding gaps in training and education, three areas demand attention. First, there are no standardized objectives for a realistic training scenario. To address this, discussion centered on engaging all stakeholders (e.g., as mentioned above) in developing multi-agency training so that all hospitals (urban as well as rural) share the training objectives. Second, training availability should be ensured for any provider through multiple platforms (Web-based, live, etc.). And finally, the lack of funding for this very important work could be addressed by tapping into the hospital preparedness program or CDC's local-level preparedness funding. This group noted that, if funding is not targeted, it vanishes. Specific funding for this work is needed.

Discussion/Core Competencies

What would core training competencies be? Which would tie into the objectives above?

- Core training topics would include triage, decontamination, PPE, and the overall response process specific to rad/nuc. The latter would include training on psychosocial behavioral responses, in terms of a knowledge base as well as specific response skills (e.g., a realistic presentation of how a scenario would unfold; education about sheltering in place, likely response issues, etc.).

- To dispel preconceived radiation fears, modification of primary assessment procedures is needed for rad/nuc response scene survey (e.g., ensuring responders know the difference between radiation exposure and contamination) and the ensuing steps. The core competencies will change according to the responses. One core competency would be the ability to assess the nature of the event on the scene and to determine the radiation hazard, its source, and whether the responder is exposed. Another would be the ability to assess the patient: irradiated or contaminated, emitting an ongoing exposure or not? Then, the ability to assess personal risk to determine when the responder can or cannot act safely. Factors beyond that enter the realm of routine responder activity. Once the nature of the challenge is known, responders know how to address it.

- Given the similar response to a radiological event as to those normally performed by EMS, a tie-in to resolve the disconnect between the two responses is needed that builds on the responders' existing knowledge, education, and experience.

How to integrate or align those core competencies with what EMS systems already have?

- CDC has clout; its lead in setting "safe operating level" parameters nationally would be a milestone.

- To apply this response to hands-on experience, apply the Cold War concept to what is familiar now. For example, add a radiation element to training based on the Oklahoma City bombing or 9/11 scenarios. The young responders may not have a deep historical knowledge base, but they do have it in GIS mapping capacities. For example, potential plumes could be superimposed on the Oklahoma City bombing or 9/11-like scenarios to make the training more realistic.

AUGUST 19, 2010

Mr. Edmond briefly summarized the previous day's discussions of EMS core competencies needed for effective response to a rad/nuc event. These included knowledge of the difference between contamination and exposure; types of nuclear and radiological incidents; decontamination procedures; PPE; scene assessment; transport of contaminated patients; medical field management protocols; and the command and control structure. Two more were added to that list: management of psychosocial and behavioral issues and recognition of effects to the responder post-exposure.

Training and education should include the short- and long-term goals relevant to treatment of common injuries in radiation emergencies and recovery issues.

Other than risk communications for the public (e.g., messages urging vaccination of the whole family against pandemic influenza), targeted messages are needed for the EMS workforce to prepare and reassure them about going into the damage zones. The first responders may see symptoms of acute radiation exposure. Another consideration is the ethics of the decision to go in or not—to try to save those lives or not because of high readings or extensive damage that could endanger the responders' lives.

- Part of the risk assessment is to triage survivors outside of the half-mile area around ground zero; address them first. By the time the responders get to the half-mile area, the situation probably will have self-mitigated and the ethical decisions will have been made for them.

- The ethics of this type of response differ in terms of psychosocial elements; responders may experience guilt feelings because of their caregiver perspective. Specific training could be given on the ethics of this decision, or it could be added to triage training. EMS already has good methods of managing psychosocial effects, including conducting debriefings.

- Current guidance for first responders' risk evaluation varies. The military will send people into areas of exposure up to 100 rem to save a life, and that is a significant lifetime dose. The general occupational limit specified in other federal guidance is 25 rem. Anything above 5 rem requires consent; with consent, there is no upper limit.

Attendees generally agreed that no core competency training is needed on burn and blast injuries; new training should be kept specific to rad/nuc. The types of injuries that might be expected in blast zones could be a training topic, but not necessarily how to triage and treat them.

Functional response roles relevant to a rad/nuc event were listed by the group in no particular order: dispatcher, EMT/paramedic, supervisor/manager, medical director, trainers/educators, hospitals, state and national agencies/organizations, firefighters, and others. It was suggested that state and national agencies could be dropped from the list because they would be incorporated under the other categories. But an alternate view held that outreach should start at the regulatory agencies to make people aware of the threat and to support the need for appropriate training.

Partners and getting their buy-in

Participants shared their perspectives of who should be involved in increasing awareness of radiological and nuclear incidents.

- *Emphasize the threat.* Make sure that potential partners understand the consequences of inaction—that's where it becomes political.

- *Involve whoever governs EMT activity*: state or local Emergency Medical Services Agency, the providers themselves, or city officials. CDC isn't a regulatory agency, but its recommendations carry weight. A CDC recommendation stating that x, y, or z requires attention and training would draw attention and spur funding for making the needed changes.

- *Lead by example*. To meet local budgets and conserve training and equipment dollars, the focus is always on what is mandated or necessary rather than on preparedness planning. Educate partners about this gap and give evidence of why supplemental funding is needed. Priorities come from the state level, which in turn come from the federal level. Associations like the EMSA get guidance from the state and can lobby at that level for work that should be done.

- *Complement federal planning and training incentives with bottom-up advocacy*. Information regarding the likelihood of the threat must be documented to engage the support of local EMS agencies and national EMS leaders.

    - *Partnering with funding agencies with similar missions* can help make the case that radiation or nuclear events are viable threats. Unless planning is mandated *and* a systems and training program is funded, half the support will vanish. The H1N1 response proved that federal funding can trickle down to the local level, but it is possible that neither public nor private sectors will be funded to develop EMS resp*onse* protocols. The EMS community has been trying unsuccessfully to get dedicated funding since the initial response grants were issued. Getting that funding will require involvement by national organizations and their advocates.

        - Currently, half of EMS funding is governmental. The Fire Administration oversees the Fire Service, and the Department of Transportation (DOT) provides a small amount of funding to EMS. The other half of EMS funding comes from the private sector. The only area where a mandate might be useful would be to tie for federal funding to requirements that ensure that certain detection equipment and PPE are on hand.

        - The problem is that no one agency is specifically charged to fund EMS. So, the first need is to properly specify EMS funding channels, as is done for firefighter and police activities. Without a driving force, someone to report to and fund us, we're lost."

    - Having or providing something tangible encourages funding. EMS agencies interested in increasing their level of preparedness for radiation emergencies should have plans for education and training, identifying funding sources, establishing an implementation timeline, providing continuing education, developing outcome measures and ongoing training programs, etc.

- *Funding options* were suggested.

    - Insert radiation emergency preparedness planning as a mandated activity in grant applications, or tap into what's already mandated.

    - Tap into present funding for hospital training, such as that provided by Medicare, The Joint Commission, or the Hospital Preparedness Program.

    - Look to the American Heart Association for a model for implementing and disseminating national guidance to the EMS community. The American Heart Association's guidelines are followed by the American Red Cross, which uses the American Burn Association's training. This training is an example of something that is simple and low cost.

- *Essential education.* The pandemic influenza response is a classic example of how education and "showing the need" can work. A mandate to provide rad/nuc education and equipment is needed at the federal and local levels to reinforce that this issue is important and necessary.

- Top-down action is driven by perceived need. A lot of bioterrorism training was done with HRSA funding. The point is, unless funded, work will not be done.

- However, the participants also advised caution about mandates. Another giant bureaucracy is not needed and would be a waste of funding.

Other strategies to gain buy-in and to circumvent the roadblocks

- Build bridges to agencies with credibility about the rad/nuc threat, the same way CDC is credible in leading action against disease. CDC should develop a tool kit for EMTs that includes an easy-to-understand video using basic terms that they are familiar with.

- There is no single entity to ensure a mandate in all states. DOT can issue requirements for paramedics, and the National EMS Association can issue standards, but each state determines what will be done within its borders (e.g., what drug can or cannot be given by EMS).

Training incentives. 1) As corny as it sounds, awarding a token like a certificate or a pin on completion of specialized training provides an incentive for training. 2) The Cobra training delivered at Anniston is an example of how prestige maximizes buy-in; it is exclusive, and entrants must apply to train there. And 3) the training outcome must be clear. Enabling medics to protect themselves and operate safely allows them to be more effective and save lives.

On the other hand, CDC must decide the goal: train the masses or train the trainers. If the idea is to give EMS responders the basic information they need to protect themselves and work in hazard zones, the training should not be exclusive.

Mr. Edmond explained that each state has its own perception of what its EMS personnel need. Therefore, whatever this group recommends must be flexible enough for the state to implement according to its population demographics and specific needs. Some trainees might want the pin or T-shirt, whereas others need only self-satisfaction. Any recommendation should provide a core set of instruction curricula and resources then leave it up to the state to implement according to its needs. Although desirable, there seems to be no one-size-fits-all way of proceeding.

How can a set of self-help tools be disseminated to community leaders to provide them with core knowledge and the ability to determine what they need in the area of radiation emergency preparedness? Mandating the dissemination of such a product is unlikely anytime soon; how can this advisory group push this out and encourage its use? Besides having CDC or other influential organizations endorse it, how can we use our talents and resources to get the EMS community trained and armed with the tools and resources they need?

- Have evidence modules to help convince local and state decision makers that the rad/nuc threat is real. The question is, how do we convince local agencies of the need for action?

- *Leaders.* The common reliance on community opinion leaders may not apply at the state level, although it may count in certain departments or in terms of trendsetters. It depends on the field.

    - Current best practices can be used as examples to ensure success.

    - Local areas will be involved if a larger neighboring city experiences a nuclear blast. The big city will need its smaller neighbors' help. That makes optional modules risky; the nearby local areas may not be fully prepared.

    - Perhaps a module on risk assessment and other essential core competencies could be developed and identified as critical. Or, the training could be delineated by job description, with models given for each type of job.

The group generally agreed that the core competencies necessary should be delineated under each job description. The national associations will help determine what these core competencies should be for each job.

Equipment now in hand and needed for the future was discussed.

- Fire departments are well equipped, but personal dosimeters should be included.

- PPE – at least respiratory protection, since that's a route of entry.

- Considerations:

    - Who is the initial responder?

    - What should be done with expired equipment, such as escape hoods whose purchase has also expired; how to get more for an emergency.

    - The cost of annual recalibration must be included in the equipment budget.

    - As with chem/bio event equipment, education and training on rad/nuc response equipment is needed.

Credible scenarios, other than IND response, and training scenarios for EMS

Scenarios could be developed that would help to measure or demonstrate that the competencies and objectives need for the response to the scenario can be met by those doing the exercise. Examples of possible scenarios are listed here:

- A nuclear power event such as a release of radiation from a nuclear power plant: EMS personnel generally know nothing about related issues (e.g., dissemination of iodine tablets in schools). They also may not be aware that people who are able to walk away from the scene could get sick later and causing a surge in the number of people requiring care at local hospitals. Emphasize the latter. Where will these people get care in a system already saturated?

- Explosion at an imaging center separate from a hospital, where radiation, chemo therapies, etc., are done; this is a smaller-scale event but still requires isotope identification, etc.

- Needs of survivors in the first 12 and 48 hours; hospitals' decontamination capacities vary between cities.

- Current and former military bases and aerospace or other industrial facilities that may have radioactive material or sources (e.g., fire in the plant).

- Accidents involving transport of radioactive isotopes: traffic congested or halted by accidents after a blast; inoperable car computers; effects on water supply, food sources, and agriculture; and how far do those effects reach from the blast?

Training considerations:

- A training exercise to hours 1, 6, 12, 48, etc., could go indefinitely, similar to one for response to a catastrophic earthquake. Use credible scenarios, but keep it simple and manageable to avoid overwhelming people. For example, a realistic scenario would be an EMT responding to someone sick and learning they have a radiological implant. Or, focus response to a rad/nuc event on the first hour or first day. EMTs need to know the initial action to take; once they know the challenges and correct actions to take in the first hour, they will carry through. Anything after 24 hours falls under long-term progression handled by the command and control (C&C) structure. Focus on the initial day.

- However, a long-term scenario could be useful for leadership. For example, a training scenario for a nuclear incident with fallout would include time-framed considerations for shelter when people should not go outside. In this case, EMS response would be extended beyond 3 days. This scenario can lay out how the Incident Command (IC) will operate, but "the feet on the ground" won't need to practice command center management.

- A good training model is CONTOMS, a tactical medical course that includes both administrative and medical aspects, so each side know the other's role.

- Existing training sources that could be used as models were listed by the participants and left with CDC. These best practices could be an excellent education model.

Paths Forward

CDC and its credible partner agencies must convince the EMS community about the need for realistic training for a rad/nuc incident. Because CDC can't do it all, a champion is needed to make initial contacts, follow up, and conduct other important activities. This person could be recruited from among other radiological experts. Mr. Edmond asked that meeting participants forward names of possible candidates to Ms. Leeanna Allen at ORISE, who coordinated this meeting. Group discussion also included the following;

- The EMS community should work with the CDC-CRCPD Alliance. The Alliance's small staff would be challenged to do training, but it is working with the Radiation Alliance to advance increased awareness of the field.

- The discussion group generally agreed that it is too early to even consider using the word "mandate". Use of the words like "approach," "guidelines," and "endorsement" is preferred. However, putting mandates in place may be a valid long-term objective, with active state-level participation to support rad/nuc preparedness.

- Endorsement from national associations should be sought and would be helpful.

Closing Discussion

Meeting feedback. The participants expressed appreciation for the meeting format, which fostered active participation in the discussion; Mr. Edmond's excellent facilitation; and the variety of disciplines represented. They were able to educate each other as well as CDC staff members on what is needed. They also stated that many EMS providers in the field are unaware of the great resources available, such as CRCPD and National Council on Radiation Protection (NCRP) and funneling such information to others will be very helpful. They expressed their belief that having the CDC brand for support in implementing rad/nuc preparedness is valuable.

Participants also suggested that more input is needed from the non-medical management provider level: EMS administrators and the "feet on the ground" personnel. They found the scientific presentations to be helpful. They suggested that future roundtable meetings could include an agenda item to discuss an event's ramifications (e.g., problems associated with injury, fire, etc.), then develop a scenario to highlight needs related to response and organizational structures (e.g., C&C/IC, etc.). Then, infrastructure gaps could be identified and plans discussed to deal with those problems.

Participants suggested that having regional roundtable meetings could help foster attendance by those whose input was wanted but could not attend this meeting. However, another stated perspective was that it depends on CDC's objectives for the meeting—whether to talk to those people who are experts in the subject matter, or to gather a lot of input from those who would attend a conveniently located meeting. A suggestion was made that people like those in attendance at this meeting could best identify future participants, involving people locally and emphasizing the importance of the topic.

Mr. Edmond and Dr. Miller thanked the participants for taking the time to come and for their excellent input. CDC representatives stated their intention to work on involving the other partners suggested. They also announced that these meeting minutes will be circulated for feedback, and a summary will be posted on the Internet.

Attachment #1: Attendance

Facilitator:
Mr. Ron Edmonds, Oak Ridge Institute for Science and Education

Panel:
John Bilotas, REMT-P, City of Boston Emergency Medical Services

Sam Cooke, Office of EMS Region 3 Training Specialist,
Georgia Department of Community Health

Terry Crammer, RN, BSN, MICN, Disaster Training Specialist,
Los Angeles Country EMS Agency

Theodore Delbridge, MD, MPH, President, National Association of EMS Physicians

Rick Ellis, Treasurer, National Association of Emergency Medical Technicians

Ernie Foster, EMT-P, Paramedic Field Supervisor, Priority One Medical Transport

Michelle Hanley, RN, Program Director, Paramedic Training Institute

Richard King, PhD, Director of Education and Research, Section on EMS, Disaster Medicine and Homeland Security, University of Texas

Marinea Mahrhoff, Section Supervisor, Radiation Chemistry, University of Iowa

Michael Metro, Deputy Fire Chief, Los Angeles County Fire Department

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Jacqueline Rifenburg, RN, MICH, Disaster Resource Center Program Manager,
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Joseph Ring, PhD, CHP, Radiation Safety Officer, Harvard University

Leslee Stein-Spencer, RN, Chicago Fire Department, and Program Manager,
National Association of State EMS Officials

Courtney Terwilliger, Chairman, Georgia Association of Emergency Medical Services

Lars Thestrup, MD, Assistant Medical Director, City of Houston Fire and EMS

Donald Turley, Senior Captain, City of Houston Fire and EMS

Millicent Wilson, MD, Disaster Training Specialist, Los Angeles Country EMS Agency

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Art Chang, Lynn Evans, Maire Holcomb, Ziad Kaazi, Carol McCurley, Charles Miller, Robert Whitcomb

ORISE:
Leeanna Allen, Kevin Caspary, Scott Hale, Florie Tucker, Rachel Vasconez

Others:
Marie Murray, SoWrite, Inc.; Sara Browning, TKCIS

Radiation Basics for EMS Providers
Presenter: Armin Ansari, PhD, CHP, CDC/NCEH/RSB

Dr. Armin Ansari offered a refresher presentation on the basic concepts of radiation and related terminology. Among the components of chemical, biological, radiological, nuclear, and explosive **(**CBRNE) incidents, only the "N" involves a nuclear detonation. Everything else falls under the category of a radiological incident. That distinction is necessary because the effects of the two are vastly different.

Nuclear events involve weapons in the megaton range, not considered a likely threat today. An improvised nuclear device (IND) is a much smaller bomb, about 1000 times less powerful than the Hiroshima "Little Boy" bomb. Although it would not destroy a city, it still could be very destructive. A wide range of possible radiological incidents requiring a response includes transportation events (HazMat response), a nuclear power plant event, a space vehicle crash, a gas explosion or fire at a radiation-licensed facility, or the explosion of a radiological dispersion device (RDD). The latter would be similar to the Oklahoma City bombing, but with radiation added; this is part of the National Planning Scenario #11.

Current response guidance to such events includes the handbook by the Council of Radiation Control Program Directors (CRCPD) for responding to an RDD, a resource that could be used to develop training materials. The National Council on Radiation Protection and Measurements' (NCRP) Commentary #19 provides key planning elements for radiological incident response, and the National Security Agency (NSA) has planning guidance for response to a nuclear detonation.

Decontamination will be an issue when responding to any radiological or nuclear event. The policies of the Department of Defense and the American Red Cross both require people to be decontaminated before transport or entry to a shelter, respectively. The default thinking about decontamination is the human equivalent of a "car wash," but severely injured people could not endure that, nor is it the best way to remove radioactive material. Decontamination is possible by simply removing contaminated clothing or wiping skin down. This is important because lessons learned from radiation response exercises show that medical response to victims is typically too slow to save lives.

Of the three forms of radiation (alpha, beta, gamma), alpha particles have a short range and lose energy; these are the easiest to stop. Gamma rays can penetrate the body enough to ionize and damage its cells. People generally fear radiation because of their knowledge of the World War Two bombings in Hiroshima and Nagasaki and later threats associated with the Cold War. To counter these fears, two important factors must be emphasized.

The first is that humans are irradiated daily from natural background radiation (e.g., radon, uranium) at levels too low to cause any concern. In fact, our bodies themselves normally radiate, something that increases with exposure (e.g., having a medical procedure involving nuclear radiation, or going through an airport security scanner). The most significant factor to health is the type and extent of the radiation exposure. Radioactive material is measured by the amount of energy (disintegrations) emitted per second, most of which has no effect (e.g., the average banana has 12 disintegrations per second).

The second is the difference between radioactive material, which contaminates when it comes in contact with a person's body or clothing (externally or internally), and radiation, which irradiates and actually exposes the body (e.g., by having an X-ray or CT scan). Fallout is the most likely contaminant, mostly affecting the head and shoulder regions and bottoms of the feet. When measuring to detect contamination, it is important to know the starting point, or background level, of the radiation.

The important message to convey is that radiation contamination is not immediately life threatening. It can be compared with changing a soiled diaper—if radioactive material is touched, soap and water will wash it away. The best decontamination of radioactive material is to remove contaminated clothing (carefully, to avoid dust), which probably carries 95% of the contamination. If there are many people to process [and some must be moved to other locations prior to decontamination they can be safely moved by simply covering them (e.g., with a sheet).

Internal contamination from radioactive material, inhaled or rubbed from hands into the eyes, involves different responses. The important point about radiation is that health effects will vary depending on the dose; this is why personal protective equipment (PPE) and monitoring dose levels is important. To illustrate this, Dr. Ansari offered an effective and simple comparison using a pinto bean to represent one millirem (mrem) of exposure. A chest X-ray would involve approximately 10 mrem. Every year, we receive about 300 mrem from natural background sources (cosmic rays, bananas, etc.).

That can be doubled for the average person who receives medical exposures (e.g., radiation exposure from a CT scan is equal to three years of background exposure) and still be no cause for worry. Thousands of mrem of exposure are required (e.g., a 5-gallon water dispenser bottle filled with approximately 40,000 beans) to *perhaps* cause a measurable effect, but it would still not deliver a lethal dose. It would take 10 such containers, a dose of 400,000 mrem, to produce an "LD 50"—a dose so lethal that half of those exposed would die no matter what is done.

Such facts are vitally important to communicate to the responder community.

Pre-Hospital Medical Response in Rad/Nuc Emergencies
Jeffrey B. Nemhauser, MD, CDC/NCEH/RSB

Dr. Nemhauser defined "first responders" as all the people responsible in the early stages of an incident for protecting life, property, evidence, and the environment. People often do not realize that "first responders" other than EMS personnel are also at incident scenes; these could include, for example, utility workers who are sent to work in the incident area (e.g., to turn off gas supplies) and then leave. There is a huge knowledge gap among many responders.

Many EMS personnel now carry radiation detectors. Some EMS personnel have refused to transport people who have had medical radiation treatments, let alone treat them, when a detector alarmed during a call. In some cases, even hospitals have refused to accept such patients.

In a radiation emergency, EMS personnel need to know two things: how to protect themselves and how deal with the victims during triage, transport, and field medical management.

Personal protection. The three keys to personal protection in radiation emergencies are knowledge, personal protective equipment (PPE), and personal dosimeters.

1. Knowledge: Responders must know the difference between exposure and contamination and between an RDD and an IND; they must also know about the EPA Protective Action Guides, precautionary guidance for state and local authorities to keep people from receiving a radiation dose potentially dangerous to their health. (These were summarized).

2. PPE is protective clothing worn in emergencies to protect against internal and external contamination. . Decisions about their use can be based on the identification of contaminants and their levels and on the anticipated role of responders (e.g., in a contaminated area, on its outskirts, etc.).

3. Personal dosimeters help protect first responders from exposure to high-energy, highly penetrating ionizing radiation by measuring the level of risk so they know when to leave the area. Many dosimeters have alarms to indicate dangerous radiation levels.

Dealing with victims. Some guidance on triage and transport of IND explosion victims was issued by the Council of Radiation Control and Protection Directors and others. However, there are no federal or international medical triage systems specifically for mass casualty incidents involving radiation. Given that, each community will have to decide their approach. One approach is to use the National Response Plan's planning guidance for response to a nuclear detonation, which describes a zoned approach to prioritizing work. In this approach, damage is mapped according to severity: light damage (LD), moderate damage (MD), severe damage (SD), and dangerous fallout (DF) zones. Mapped by color, these zones are designed to direct work to save lives and limit the danger to emergency response workers. The focus of each zone is as follows:

- LD Zone. Here, most injuries are not expected to be life-threatening. Responder medical triage should focus only on severe injury.

- MD Zone. This zone is where the response impact is highest. Here, life-threatening injuries can be triaged and the patient transported to receive additional medical care. This zone may have high radiation levels and environmental and structural hazards.

- SD Zone. This was formerly known as the "No Go" zone. Responders do not enter until radiation dose rates have dropped to safe levels. The damage here is expected to be so great that people in this zone have either died or been so exposed that they are unlikely to survive. All responder missions must be justified to minimize their risks based on risk/benefit considerations.

- DF Zone. This zone can overlap the LD or MD zones. Here, response activities are guided by the potentially lethal radiation hazard. The primary mission is to communicate protective action orders to the public (e.g., shelter in place, evacuate, etc.) until the radiation levels drop.

Triage/transport considerations. Threats to life and limb take precedence over radiation exposure and decontamination. Patients needing immediate intervention (ABC: protect and stabilize the airway, stop bleeding, restore circulation) or surgical stabilization have the highest priority. Critically ill patients must be sent to the hospital; delay risks their death.

Field Medical Management. In this area, it is imperative that first responders understand that those who are contaminated pose low or minimal threat to the responder, similar to someone receiving radiation treatment in a hospital. Victim decontamination and management of radiation sickness are secondary considerations to life- or limb-threatening injuries. As Dr. Ansari demonstrated, simple disrobing typically eliminates 75% to 90% of external contamination. However, all foreign objects should be handled with care (or not at all) until they are proven non-radioactive. There is no field medical management prescribed for those with Acute Radiation Syndrome (ARS). Alternative diagnoses should be considered, but if ARS is truly present, it cannot be addressed in the field. These patients should be sent to an advanced care facility, but their survival is not likely.