

State and Local* Planners Playbook For Medical Response to a Nuclear Detonation



* "State and local" includes state, regional, local, tribal, and territorial medical and public health planners.

About this Playbook

This Playbook is a prototype and is a living document that must be updated periodically to reflect evolving processes and policy decisions including changes resulting from interagency plans or policies. ASPR is responsible for managing this process of bringing the playbooks up to date. It is not a “must follow” structured road-map. It is offered as a guide to assist State, regional, local, tribal, and territorial medical and public health planners and other subject matter experts preparing their venues for a nuclear detonation. However, is not designed to account for all local variables or planning considerations. The content of this playbook must be tailored to specific local organizations, requirements, and capabilities.

The organization of this playbook is similar to playbooks created and used by the Department of Health and Human Services to guide the Federal medical and public health response. Its content, however, is different, and is offered expressly for state, regional, local, tribal, and territorial medical and public health planners.

To provide background, HHS/ASPR strongly recommends that planners consult key detailed supporting material listed below and the Additional Resources section of this document which begins on page 40 of this document.

--[Planning Guidance for a Nuclear Detonation](#)¹

--[Radiation Emergency Medical Management](#)² (REMM)

The REMM web portal be downloaded to personal computers or mobile devices.

This State and Local planners Playbook is a resource developed by non-government and government subject matter experts from the Nuclear Detonation Scarce Resources Working Group. Multiple manuscripts were published in the March, 2011 issue of *Disaster Medicine and Public Health Preparedness*. A complete manuscript list is on page 43 of this document.

Feedback is welcomed by the Division of Preparedness and Planning, Office of Preparedness and Emergency Operations, ASPR, HHS. Users are encouraged to submit comments through the website and to join the REMM ListServ to receive notice of important changes to the Playbook and the REMM website ([Join REMM Listserv](#)). Periodic updates will be found on this website.

¹<http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf>

²<http://www.remm.nlm.gov>

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This Playbook is designed with modular sections that may be used as needed. It is time-oriented with actions described within various focus areas.

The “Additional Information Sources” section, designated “**IS**” in the table, begins on page 40 in this document.

Background Information

Casualties from a nuclear detonation result from blast, heat (thermal energy), and ionizing radiation. The distribution and severity injuries seen depends on device yield (kilotons), height of burst (air versus ground burst), atmospheric conditions (weather, wind pattern), protection afforded by shelter/topography of the terrain (e.g., urban landscape vs. rural open spaces, robustness of buildings construction)

Rescue efforts after a nuclear detonation will be complex due to potentially high radiation levels, severe infrastructural damage, the number and severity of casualties, and the inaccessibility of many victims at least initially. A summary of the key principles of the medical and public health response of the nuclear detonation is found below.

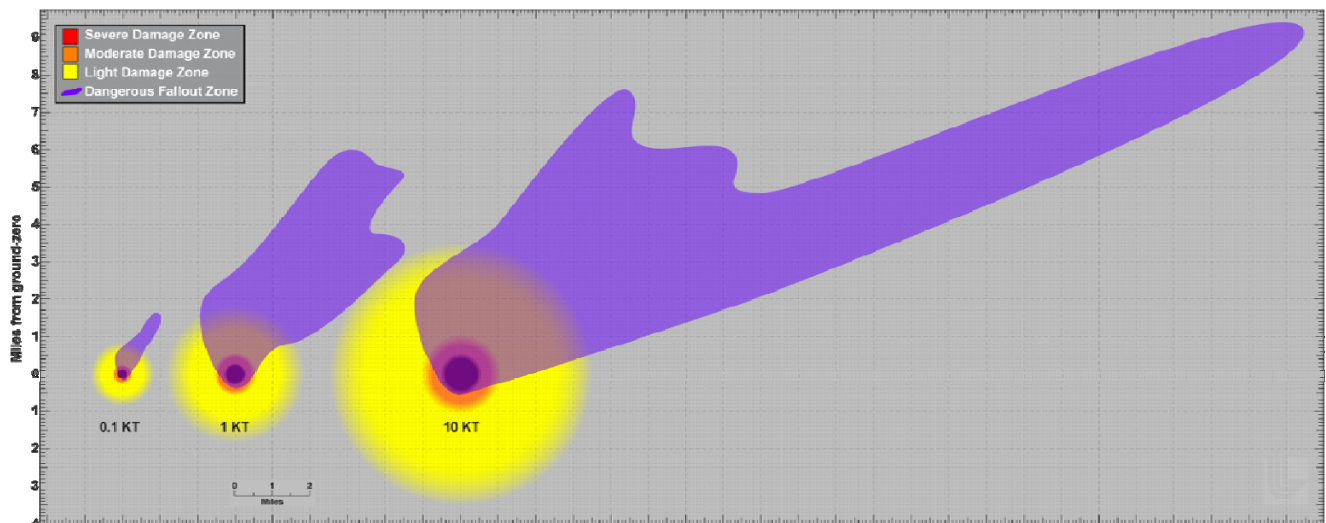
Concept of operations: using Damage Zones to organize response activities*

[*The Concept of Operations, or CONOPS, describes how the response will be organized and how the various components and sectors will relate to one another.]

Response tasks (including search and rescue) that are likely to be safe and effective are organized by four concentric physical damage zones around ground zero, some of which also include radiation. Starting from ground zero and working outward the four damage zones, for 3 sized detonations, 0.1, 1 and 10 kilotons (kT) [equivalent size of TNT] are:

- Severe Damage (SD) Zone
- Moderate Damage (MD) Zone
- Light Damage (LD) Zone
- Dangerous (DF) Fallout

Figure 1: Representative Damage and Dangerous Fallout Zones for 0.1 kT, 1.0 kT and 10 kT. A radiation exposure rate of 10 roentgens/hour (R/h) is used to delimit the DF zone. Zone shapes are idealized for illustration only; actual zones are likely to be less circular in shape and boundaries between zones are less distinct. DF zone will depend on weather conditions and height of burst. The scenario used for this playbook focuses on the 10KT detonation. (Courtesy Lawrence Livermore National Laboratory).



The following description of zone sizes is for a 10kT ground burst detonation:

Severe Damage (SD, previously called No-go) Zone

- Description: very few buildings structurally sound or standing; radius on the order of 0.6 miles (1.0 km) from ground zero
- Access by rescuers will be limited by massive physical damage and high radiation levels
- There will be few survivors in this zone.

Moderate Damage (MD) Zone

- Description: at the inner boundary (entry into Severe Damage/No-go zone) all buildings are fallen or structurally unstable; at the *outer* transition from the MD to the LD zone, there will be significant structural damage ~1 mile (1.6 km) from ground zero. Sturdier buildings (e.g., reinforced concrete) are likely to be standing; lighter commercial and multi-unit residential buildings will be unstable; houses are likely to be destroyed.
- Limited rescue activities will be possible here.

Light Damage (LD) Zone

- Description: *inner* boundary with MD zone will have more substantial building damage; *outer* boundary with the DF zone will have damage defined by the prevalence of broken windows (~25%) out to 3 miles (4.8 km) from ground zero; window damage tapering out to 5 miles (8 km). As responders move inward toward ground zero, windows and doors will be blown in, and gutters, roofs, and lighter construction will have increasing damage, litter and rubble will increase, and more automobiles will be stalled and crashed, making emergency vehicle passage difficult.
- Many will self evacuate; some response efforts will be useful but difficult and dangerous, due to high radiation levels.

Dangerous Fallout (DF, some refer to as Hot) Zone

- Description: The DF zone is distinguished not by structural damage, but by radiation levels from fallout. A radiation exposure rate of 10 roentgens/hour (R/hour) delimits the ‘hot zone’ exterior boundary. Inside the boundary, responder operations are severely limited by need to limit responder exposure time. The hot zone will shrink rapidly in size as the fallout decays though the boundaries of the original DF zone are important for predicting initial radiation exposure. The radioactive decay rule of thumb: exposure rate from fallout declines 90% every 7 hours. {At 14 hours it is approximately 1% of what it was at 1 hour}
- Fallout particles may be visible as fine sandy material, either actively falling out as the plume passes, or visible on clean surfaces. Visible fallout provides strong evidence of dangerous levels of radioactivity, but, fallout may not be noticeable on rough or dirty surfaces, and no method is available to reliably estimate radiation dose rates based on the quantity of visible fallout. Therefore, visible fallout may possibly be used as an indicator of a direct radiation hazard, but the lack of apparent fallout should not replace appropriate radiation measurements.
- Responders should refrain from undertaking missions in areas where radioactivity may be present until radiation levels can be accurately determined and readily monitored. Any response operations within the hazardous DF zone must be justified, brief, and well-planned.
- Prior to an incident, local protocols should be created that define operations in radiation-contaminated areas and optimize exposure risk versus the benefits of the potential missions.

A fifth zone, circumscribed by a “line” reflecting an environmental exposure rate of 0.01 R/h, is also useful in managing the response. It is in Figure 2, below. It has also been called “a Radiation Caution Zone”. This “line” and the zone within it will enlarge initially as fallout is deposited but will then

contract quickly, as radiation levels decrease due to rapid radioactive decay in the hours and days after a blast. This is not a damage zone per se, but it is area outside the DF zone where response activities can be conducted. However, responder time will be limited by federal Protective Action Guides or recommendations adopted by the local Incident Commander. The ALARA (As Low As Reasonably Achievable) principle will also apply (keeping radiation levels for responders as low as reasonably achievable (http://www.fema.gov/good_guidance/download/10260)).

Number and spectrum of injuries

There will be hundreds of thousands of casualties. Injuries will vary by type and severity. Many people will have trauma only (especially in and beyond LD zones), others will have radiation exposure only (especially in DF zone), and some will have both. The list below reflects the major kinds of injuries expected.

- **Blast:** from pressure wave, tumbling and crush injuries; puncture injuries from flying debris, rather than pressure-related injuries dominate because those who would have sustained classical blast injuries are likely due to have been killed by the exceptional radiation doses or burns levels in the zone where classical blast injuries would be sustained.
- **Burns:** thermal energy from the detonation and burns from secondary fires and contact with hot materials during the failure of a building (Note: It may be difficult to distinguish superficial thermal from radiation burns without patient history).
- **Radiation:** prompt radiation (instantaneous and high dose rate from detonation) and fallout (lower dose rate with most of dose being given in first few hours)- depends on location and duration of exposure. Sheltering-in-place in the hours following the detonation is important to reduce radiation dose.
- **Combined injury:** defined as radiation plus blast and/or burn. This has a worse prognosis than either alone.
- **Multiple blunt trauma and lacerations** resulting from motor vehicle accidents that are a consequence of “flash-blindness” from detonation (the blindness lasts a few minutes, worse at night when pupils dilated). This may occur miles away, especially at night when pupils are dilated so that flash may have greater impact..
- **Punctures and lacerations:** from glass breakage may be at distances up to miles from the detonation point.

Decontamination

- Prompt radiation from the detonation will produce very high instantaneous doses but will not contaminate people.
- Contamination comes from radioactive fallout alighting on the individual. People inside shelters will not have superficial contamination unless they go outside. Individuals evacuating from shelters later may contaminate their shoes and clothing in transit through the DF zone.
- Life-saving interventions by responders take precedence over decontamination, as long as they occur in areas that are considered safe for responders.
- Decontamination is a responsibility of the state and local responders and also of individuals. The need for decontamination as soon as possible after the incident and the time it takes federal assets

to arrive makes it crucial for state and local entities to manage this function, although guidance may be available from federal authorities.

- Removing outer garments and shaking out hair removes 90% or more of external contamination. Thus control of removed clothing is a priority for containment of radiation.
- Managing internal contamination from inhalation or ingestion is not considered a significant part of the *initial* response. Therefore, there is no initial role for KI (potassium iodide), Prussian Blue or chelating agents (e.g., DTPA).

Response Worker Safety

Search and rescue operations will be markedly impeded by the relatively high levels of radiation in and around the MD zone. Protective Action Guides (PAGs) and the As Low As Reasonably Achievable (ALARA) principle will guide actions (http://www.fema.gov/good_guidance/download/10260).

Safeguards for responders include but are not limited to the following:

- Personal Protective Equipment (PPE)- will protect emergency workers from contaminants but will not protect against external radiation doses
- Respirator or Self-Contained Breathing Apparatus- will protect workers from breathing in radioactive particulates.
- Real time personal electronic dosimeters- will provide readings to alert emergency workers as to when exposure levels are about to exceed worker safety limits (PAGs) or other locally determined guidelines.
- “Turn around times”- by knowing radiation levels in the work area, turn around times can be calculated to account for worker entry, time on task, worker exit from the radiation zone.

Triage

- When working in areas approved for search and rescue, emergency Medical Services (EMS) workers will use their customary field triage system which is based initially on the *physical injury* (e.g., *START, jumpSTART, SALT, DIME*. Referenced on REMM web portal)
- If resource adequacy is limited, the standard order for triage and transportation (sickest first) may need to change, as noted in the next section.
- Given the magnitude of the incident and the limited size of the EMS response assets available, most people will reach medical care without having been screened in the field.
- Radiation dose can be estimated very roughly by the physical location of the individual at the time of detonation and after. When available, blood counts or the clear presence of cutaneous radiation burns can be used to better determine dose estimates. Many casualties will not have been exposed to any radiation.
- Time to vomiting after exposure is one simple way to estimate dose. However, because vomiting can result from many causes besides radiation, it is not considered particularly accurate.
- Diagnosis of Acute Radiation Syndrome (ARS) and its organ sub-syndromes
 - *Hematological Syndrome*: clinically relevant acute injury occurs typically at doses above 2-3 Gy, although lower doses may be detectable with CBCs and other tests. For victims with doses > 2 Gy, immediate treatment with myeloid cytokines is indicated (e.g., G-CSF). Best effects occur when administered within 24 hours of exposure. Hematologic injury may become detectable 1-3 weeks after exposure, after a latent phase without signs or symptoms.

- *Gastrointestinal Syndrome*: usually results after doses above 5-6 Gy; occurs within a few days of exposure; can be managed with aggressive treatment.
- *Neurovascular Syndrome*: typically results from doses above 10 Gy; almost always fatal, but will benefit from palliative/compassionate care.
- Triage and management by dose of whole body exposure: general principles, with the understanding that precise dose estimation *initially* may be difficult
 - <2 Gy: follow-up only (possibly for biodosimetry assessment later)
 - 2-4 Gy: evaluation and expert monitoring within 1-3 weeks of exposure, with myeloid cytokines if supplies are adequate
 - >4 Gy: immediate medical attention, including myeloid cytokine treatment as soon as possible
 - >10 Gy: palliative/compassionate care
- Combined injury: defined as significant physical trauma (and burns > 20% of the total body surface area) in conjunction with radiation dose of >2 Gy; has much worse prognosis than either injury alone. People with only minor trauma plus radiation will be triaged and managed the same as those with radiation only using radiation dose as outlined above.

Scarcity of Resources affects Triage Priority and Standards of Care

- Scarcity of medical resources (e.g., staff, space, equipment, medicines) will vary greatly by location of the medical care facility and time after the incident; this will affect how victims are triaged and cared for.
- Conventional triage attends to the “sickest first”. Resource scarcity after a nuclear detonation will result in a change of triage priority in order to provide the greatest good to the greatest number which includes providing palliative/comfort care. With severe scarcity, the sickest victims who require intensive rescue resources may no longer be assigned first priority.
- “Standards of Care” available to victims will be affected by resources scarcity. It is expected that at least initially in near-by locations provision of care may need to change from conventional to contingency (functionally equivalent) and then to crisis for some period of time.
- Each institution should have a plan to determine when and how it plans to change from normal or conventional triage guidelines and standards of care. It is crucial that these decisions be made by senior managers and the reasons be communicated promptly and effectively to staff and the public. This will help to minimize chaos, inconsistency, excessive stress in decision-making, and ensure adequate liability protections for practitioners.
- It is essential the victim be *reassessed* and re-triaged iteratively because resource adequacy may change rapidly over time. It is expected that close-in facilities will experience marked resource limits initially followed by improvement subsequently, as assets begin to arrive after 24-48 hours.

Organization of medical response

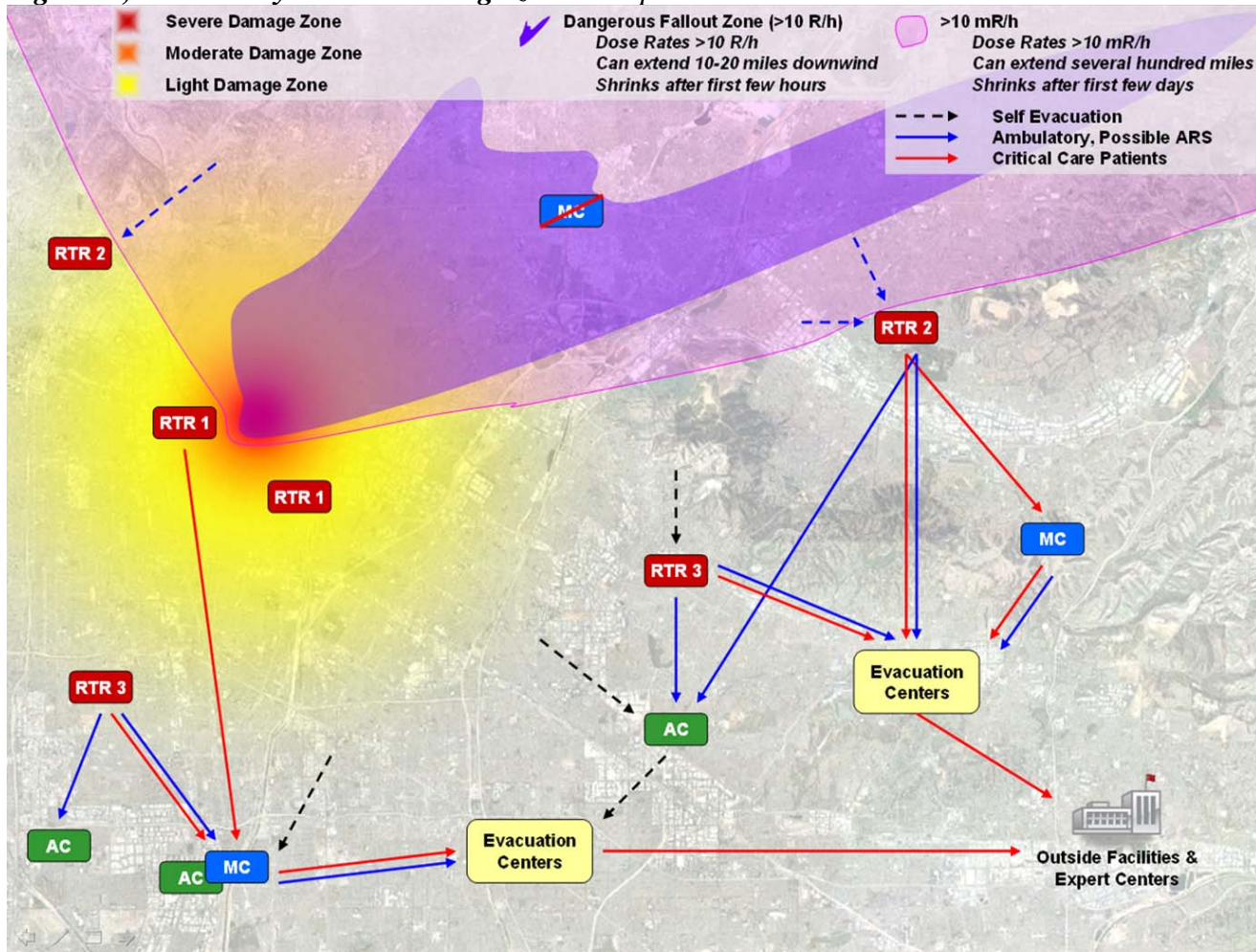
Venues for the medical response

The Radiation Treatment, Triage and Transport System (RTR System) presents a functional approach to the various activities of the medical response. The figure below illustrates the various kinds of activities and where they would likely be located in relation to the zones of response noted above and regional assets. There will likely be multiple RTR 1, 2 and 3 sites each with different types of activities. Using this terminology allows responders to have common language for situational awareness, deployment of resources, and planning.

The medical response following a nuclear detonation requires identification of Assembly Centers (AC) and Medical Care (MC) centers equipped to handle medical surge and the ability to assess where the damage zones are located relative to the AC and MC sites. The medical response is organized following the RTR system and MedMap. The MedMap is an HHS system that contains GIS-based information on many aspects of the response. It can be accessed on an as-needed basis in coordination with HHS.

RTR system and MedMap

Figure 2., *The RTR system and damage zones. Explanations and abbreviations described in text.*



RTR Response Organization System (Radiation Treatment, Triage and Transport). The RTR is a functional approach, with a focus on **TR**iage, **TR**eatment, and **TR**ansport. There will likely be multiple RTR 1, 2 and 3 sites. The designation of three subtypes is to help organize the response that allows a common understanding and language for situational awareness, deployment or resources, and planning.

- RTR 1, 2, and 3 sites are *formed spontaneously and are designated/determined in real-time* during an incident by the Incident Commander and responders. Sites are designated based on the previously described physical damage zones which will inform assumptions regarding the availability of access and transportation and the potential casualty population.
- There will be multiple RTR 1, 2, and 3 sites, many of which will form as victims aggregate.
- Medical Care (MC), Assembly Centers (AC), Evacuation centers and points of distribution can largely be preplanned at predetermined sites.
- MedMap is a GIS based mapping system used by HHS for response planning and situational awareness. It will be shared among response organizations when needed.
- MedMap uses a mapping base with a variety of data overlays (e.g. number of available beds, locations of deployed personnel, caches, roads, schools, weather, etc), and key geographically modeled or actually sampled radiation level data, updated over time, from IMAAC (Interagency Modeling Atmospheric Advisory Center).

RTR 1 sites will be near the SD zone and within the MD zone. Physical infrastructure damage and radiation will limit the ability both to reach the victims and to help evacuate and administer medical support. Over time, the radiation dose will decrease and victims who had adequate shelter may conceivably survive.

- Many or most affected persons are non-ambulatory, or soon will be; victims will have physical trauma, burns, acute radiation syndrome, and combined injuries, making evacuation very difficult.
- Based both on their proximity to the blast and on time to onset of symptoms, it will be clear that many of the victims will have lethal traumatic and/or radiation injuries and will require primarily comfort care, if available.
- Because of ambient radiation levels and limited supplies, individual emergency medical responders will have very limited periods of time to work safely in this environment. It may be possible to extract some victims, provide instructions to ambulatory people and provide some palliation.
- Transportation will be extremely limited and delayed after such a large incident and response assets will be difficult to deploy. As the fallout decays, these sites will be safer for responders to enter.

RTR2 sites will have radiation that will limit the time for responders and victims to be present with acceptable risk. Most of these will be within the LD zone and DF zone.

- Most victims will be ambulatory, and many fewer victims will have combined injuries. Many victims may have significant radiation exposure from fallout.
- The time constraints for responders must be carefully monitored due to ambient radiation within the DF zone.
- Self-decontamination will be possible once people are outside of the area, at least the removal of surface contamination of individuals through control of clothing.
- Transportation may still be delayed reaching these sites in the LD zone due to broken glass and debris.

RTR3 sites will be away from the LD and DF zones and will not have radiation that appreciably limits the victims' and responders' time there. Glass and blast damage may be present miles from the epicenter where the conditions are not complicated by radiation so structural damage to buildings does not necessarily mean radiation is present.

- Almost all victims will be ambulatory and many people may have minor to no injuries and no significant radiation exposure. Some will be displaced persons whose homes will be uninhabitable and/or unreachable for some period of time.
- The time constraints for responders' presence at these sites will reflect regular disaster shift schedules and will not be limited by ambient radiation. Local physical dose monitors and radiation safety officers will alert the Incident Commander and/or Safety Officer if an RTR3 site becomes contaminated. Contamination of an RTR3 site may result in its movement to a clean location or in moving the people to an AC site.
- For those who arrive from the DF zone, self-decontamination will be possible- at least the removal of surface contamination of individuals.
- Symptomatic treatment including basic wound care can be administered if appropriate, prior to transportation.
- Following triage and initiation of minor treatments where applicable, available transportation assets will evacuate victims to MC or AC sites as appropriate, some of which may be at a substantial distance.
- Radiation monitoring devices and people who know how to calibrate and use them may be available at RTR3 sites. Transportation will be available here, and it is important to minimize contamination of health and shelter facilities and transport vehicles.
- RTR3-related infrastructure will be relatively intact, so roads and logistics should not impose serious limitations to the capabilities at these sites. Control of the evacuation and transport routes will be vital, and will be greatly facilitated by civilians abiding by public messages.

Medical Care (MC) sites may include

- Hospitals, medical centers, and other health care facilities such as nursing homes and medical clinics, alternate care facilities such as Federal Medical Stations, and
- Distant, even nationwide medical facilities (such as Radiation Injury Treatment Network sites, cancer centers, burn centers, trauma centers)
- Some of the facilities nearest to the blast will not be operational due to loss of infrastructure and others may not be useable, at least for a period of time, due to their location within or near the fallout.
- If response caches have been mobilized to the appropriate areas, or are available locally, it may be possible to initiate some treatment for mitigation of acute radiation syndrome (e.g. cytokines) and to provide symptomatic treatment to affected people who are being prepared for evacuation

Assembly Centers (AC) will be

- Evacuee-receiving registry centers and temporary shelters where people may receive food and shelter and/or will check in with authorities so that they can be accounted for after the incident.
- Screening forms or assessment of radiation exposure may also occur at these sites, but the purpose is not generally medical care, though they may be co-located with a medical care (MC) site.

- People may arrive directly or may have been directed from RTR and MC sites.
- AC sites differ from RTR3 sites in that they will have been pre-designated but RTR3 sites may serve as ACs.

Evacuation centers and drop zones

- Hubs for major victim and evacuee transport by land, rail, air, and water
- May be for incoming supplies and personnel and/or for outgoing exposed/displaced persons

Summary of Anticipated Operations

Intent of Operations

All response and recovery planning and operational activities should be initiated and executed in compliance with the National Response Framework (NRF), National Incident Management System (NIMS), and the HHS ESF #8 Concept of Operations Plan for Public Health and Medical Emergencies. Nuclear detonation response and recovery planning should focus on developing and coordinating collaborative, interagency and multi-jurisdictional operational activities and capabilities to provide for:

1. Patient and At-Risk Population Evacuations
2. Life-Saving Operations
3. Life-Sustaining Operations
4. Restoration of Public Health and Medical Infrastructure
5. Human Services and At-Risk Population Needs
6. Patient Return to Location of Origin
7. Veterinary Assistance (service animals)
8. Fatality Management
9. Worker Safety and Health

Response and initial recovery planning and operational activities will consider medical evacuation and shelter-in-place (SIP) options and resources for individuals with medical needs in hospitals, nursing homes, assisted living facilities, and persons living at home. Individuals with functional needs, including individuals with disabilities and individuals with limited English proficiency, that do not require medical support/intervention but do require other means of support such as the assistance of an interpreter, the assistance of a personal caregiver to accomplish activities of daily living or the assistance of a caregiver to provide guidance in daily decision-making, or other auxiliary aid or service is a shared responsibility between Mass Care and Medical And Public Health responsibilities.

Response Considerations

- **Initial response** will be local and regional. While some Federal resources may start arriving by 12-24 hours, they are not likely to arrive in significant numbers until 24-48 hours.
- **Early Federal Response.** Initial federal resources will include weather information and modeling (from Interagency Modeling and Atmospheric Advisory Center (IMAAC), some supplies from Strategic National Stockpile, emergency declarations and subject matter experts on scene or available.

- **Early Triage and Transport.** The local emergency response and EMS systems will be overwhelmed and mutual aid will be required. Most people will likely reach medical care by self-evacuation.
- **Communication.** Directing people to shelter-in-place and where to go for medical care and for assembly centers will have major impact on survivability, and must be done in the first minutes to hours after an incident – requiring pre-incident scripting.
- **Responder Safety and Health.** Adequate provisions and training for protecting safety and health of responders is a strategic objective. Exposure limits should be predetermined by the locality in an effort to optimize exposure risk versus mission necessity and requirements. General rules should be established in advance by Incident Commanders (guidance information available in Planning Guidance).
- **Limiting Effects of Electromagnetic Pulse (EMP).** EMP and physical damage to electric grid and communications equipment will impact response up to a few miles but much of surrounding infrastructure will be intact. EMP is instantaneous. It will not impact any equipment brought into the area which will work, but is likely to limit availability of directly impacted medical equipment and vehicles.

ORGANIZATION OF PLAYBOOK

This playbook contains actions steps which outline the medical and public health response to a nuclear detonation while allocating scarce resources. In essence, it presents the response by a complex system. The action steps stages are outlined below:

The medical response unfolds in stages

1. Phase 0: Pre-incident Preparation (and possibly some ramp-up may be possible if there is intelligence indicating heightened risk)
2. Phase I: Early phase- 0-24 hours
3. Phase II: Intermediate phase- 24-96 hours (in addition to ongoing 24 hours)
4. Phase III: Later phase- >96 hours

Sectors

1. Emergency medical services (EMS)
2. Healthcare facility
3. Public health
4. Medical system coordination (ESF-8)
5. Evacuee medical care and fallout-related radiation illness
6. Recovery / Resilience (not a focus of this document and thus limited guidance provided)

Also contained in this playbook are additional resources. These resources serve as informative references with definitions, discussion points, and recommendations about topics related to medical response to a nuclear detonation. The information contained in the resource section is to be used in concert with the Action Steps.

ACTION STEPS

KEY POINTS

Objective-

Action Steps provide sequential guidance required to coordinate the medical response to a nuclear detonation.

The Action Steps complement the Concept of Operations (CONOPS), a model for procedures for coordinating Federal public health and medical assets necessary to support response efforts.

Organization of Phases and Sectors

- Phase 0** - **Pre-incident Phase** - All exercises, procedures, and resources needed to be prepared for a nuclear detonation.
- Phase I** - Activities and resources needed 0-24 hrs after detonation.
- Phase II** - Activities and resources needed 24- 96 hours after detonation.
- Phase III** - Activities and resources needed 96 hours after detonation leading into recovery.

Sectors, within each Phase

- General Readiness Planning and Emergency Management,
- Emergency Medical Services (EMS),
- Health and Facility Response, Public Health,
- Medical System Response,
- Evacuee Medical Care and Fallout-related Illness,
- Recovery.

Information Sources (IS) numbered 1 through 17 in the following matrix are additional sources of useful information. There is a Supplemental Information Table that indicates where this information can be located. Some of it will be included in a Supplemental Appendix folder on line; other sources will be web sites.

ACTION STEPS

Note that this playbook addresses acute health and medical aspects (ESF-8) of a nuclear detonation. It is comprehensive or cross-disciplinary guidance

Table of Actions/Issues

Phase 0: Pre-incident planning: Preparedness activities for a Nuclear Detonation		
Line number	Actions/Issues	Information Source
General Readiness Planning and Emergency Management		
0-1	Access pre-incident general education - for responders, medical personnel, general public, and responsible officials. Prepare list of where to find information when a disaster strikes.	IS #1
0-2	Educate public safety agencies on the impact of a nuclear detonation and operational zones (SD, MD, LD and DF zones). Work with medical care and public health entities to define possible Medical Care and Assembly center sites per Planning Guidance for Nuclear Detonation including Radiation Treatment, Triage and Transport (RTR) system	IS #2 IS #3
0-3	Educate public - Duck and cover if you witness a bright flash of light. Seek shelter as you would for a tornado following any catastrophic explosion in the community until further advised. Information about the advantage of time, distance, and shelter to increase survival likelihood.	
0-4	Develop checklist for possible nuclear detonation specific to community that incorporates initial actions and notifications.	
0-5	Establish plan to immediately activate Emergency Alert System (EAS) in wake of detonation for those areas immediately adjacent the blast.	
0-6	Establish plan to liaison with National Weather Service and visual sources of information about plume	
0-7	Ensure Continuity of Operations plans for emergency management that include consideration of electromagnetic pulse effects around likely target zones	
0-8	Establish Emergency Operations Centers (EOC) planning including law enforcement, fire, transportation, communication, medical care networks, medical distribution (pharmacies), debris removal, public information, utilities, private sector	

**Phase 0: Pre-incident planning:
Preparedness activities for a Nuclear Detonation**

Line number	Actions/Issues	Information Source
0-9	Educate non-federal planners how to access Federal information including DHS and HHS via state and local means. Radiation and plume modeling expertise will assist in situational awareness, even within the first few hours.	
0-10	Ensure that general and medical planners should work with HHS (ASPR) for familiarization with MedMap GIS mapping of medical infrastructure in surrounding region	IS #4
0-11	Utilize NIMS terminology and ICS structure for consistency among responders.	IS #5
0-12	Consider transportation issues including: creating immediate access along roads clogged by disabled vehicles and broken glass especially, transporting injured out of area by non-ambulance means, transporting response personnel and supplies; transporting non-injured. Identify key transportation routes and modes that will need law enforcement to open and safeguard.	
0-13	Designate regional staging areas for incoming personnel and supplies (e.g. ambulances) and plan allocation and orientation (maps, etc) mechanisms	
0-14	Designate forward movement points (rail, air, ground) for evacuees / patient evacuation via NDMS and other means	IS #18
0-15	Assess fragility of 911 and other key communications systems relative to likely locations for a nuclear detonation and the impact (out to 2 miles) of electromagnetic pulse (EMP)	
0-16	Validate public communication plan for settings where many usual technologies may be unavailable or not work to reach displaced persons or those within the range of EMP effects. See Planning Guidance for information on communication.	IS #7
0-17	Gain familiarity with concepts behind planning for Scarce Resource situations.	IS #8
Emergency Medical Services (EMS)		
0-18	Understand resources available under local MOUs, the Emergency Medical Assistance Compacts (EMAC) and the Federal Ambulance Contract and their timeframe for arrival	
0-19	Define aero-medical resources available within the region and neighboring regions and establish MOU and/or coordination mechanism for catastrophic circumstances	

**Phase 0: Pre-incident planning:
Preparedness activities for a Nuclear Detonation**

Line number	Actions/Issues	Information Source
0-20	Establish plan with regional partners to automatically report to designated staging areas within the region following an nuclear detonation for briefing and assignment	
0-21	Educate providers on zones of operation following a nuclear detonation (as above) as well as sheltering actions should they be in the Dangerous Fallout zone at the time of attack. Providers should be aware that immediate response may not be possible due to requirements for sheltering from fallout.	
0-22	Educate providers on variation of a nuclear detonation from usual incident response plan, basic triage after a nuclear detonation, principles of mass casualty care and triage, appropriate PPE, and focus on patient care rather than decontamination	
0-23	Plan with public health and medical system for EMS support for and transport to Medical Care and Assembly Center sites as well as evacuation hubs	
0-24	Obtain radiation detectors and dosimeters for response vehicles, facilities and individuals- plan for distribution and use according to community planning and risk profile	
0-25	Assure coordination mechanism and communication plan for the multiple EMS agencies that will be involved with the response	
0-26	Review and update Continuity of Operations plan including for situations where 911 system may be non-functional in certain areas (i.e. what instructions are conveyed to public and how does EMS provide coverage)	
0-26	Assure crisis operations plans for agency/system are accomplished including triage of calls at Public Safety Answering Point (PSAP), medical dispatch centers, and on-scene, and also including staffing configurations, transport destinations (e.g. delivering patients to non-hospital locations such as RTR3 / Medical Care locations)	
Healthcare Facility Response		
0-27	Understand the implications of the Declaration of a Public Health Emergency on facility and provider liability	
0-28	Assure internal and external communication redundancy in case of EMP or other effects	
0-29	Understand and practice coordination mechanisms with the area hospitals (Health and Medical Coordination Center – HMCC)	

**Phase 0: Pre-incident planning:
Preparedness activities for a Nuclear Detonation**

Line number	Actions/Issues	Information Source
0-30	Define surge capacity assets and develop plan for maximal expansion of facility capacity	
0-31	Identify sites close to the facility that may serve as appropriate referral area for minor injuries (Medical Care center)	
0-32	Assure facility infrastructure damage assessment and evacuation planning completion	
0-33	Assure adequate Continuity of Operations (COOP) planning for utilities failure, other logistical and service interruptions	
0-34	Develop a strategy for crisis medical care including management of critical medical supplies. Consider what to potentially stockpile and contingencies for vendor delivery interruption	IS #8
0-35	Consider resource sharing arrangements within locale and region. Include medical care facilities and suppliers.	
0-36	Based on threat assessment, stockpile 'dry decon' kits allowing patients to control clothing or plan to accommodate large numbers of these patients.	
0-37	Establish plan for victim flow, decontamination / clothing control, control of hospital environment in regard to radiation contamination. (Note that after a nuclear detonation, priority is on patient care with <i>containment of contamination</i> rather than full decontamination which would be emphasized in RDD or other limited exposure events.)	
0-38	Assure personal dosimeters and Geiger-Muller counters available to the ED and assure radiation safety/nuclear medicine personnel who can assist with radiation monitoring are involved in planning process Establish radiation exposure guidance, possibly in collaboration with other facilities in the region for consistency. Protective Action Guidelines available..	IS #19
0-39	Consider radiation portal-monitor system for emergency department EMS entrance to identify individuals requiring further decontamination.	
0-40	Understand the Radiation Treatment, TRIage, and TRansport system (RTR).	IS #3
0-41	Work with local/state/regional/tribal planners to define Medical Care (MC) facilities, including alternate care facilities, and Assembly Centers (AC)	IS #3

**Phase 0: Pre-incident planning:
Preparedness activities for a Nuclear Detonation**

Line number	Actions/Issues	Information Source
0-42	Define plans for receipt and distribution of supplies from Strategic National Stockpile. (including basic medical supplies and cytokines, etc)	IS #9 IS #11
0-43	Define plans for requesting resources from air and ground EMS services. Understand the physical limitations of facility helipad and anticipate excessive demands on external EMS services.	
0-44	Establish tools and/or methods for patient and victim tracking which integrate into community plan. Disaster plan to include how documentation may be simplified during mass casualty incident.	IS #6
0-45	Establish plans for missing persons / patient hotline at facility	IS #10
0-46	Download REMM and join REMM ListServ http://www.remm.nlm.gov	IS #11
Public Health (PH)		
0-47	Educate staff on impact of a nuclear detonation, likely effects, priorities, and the terminology of the RTR system	IS #7
0-48	Understand process to request any emergency health declarations / powers and their implications	
0-49	Exercise with EOC and HMCC coordination between PH and hospitals/EM/EMS which will be critical to the successful response	
0-51	Assure coordinated Medical Reserve Corps planning with neighboring jurisdictions and a mechanism to request assistance from these and other jurisdiction and state-based assets	
0-52	SNS plans must include ability to staff reception point in conjunction with other demands on PH personnel – consider MOA with adjacent region – vendor managed inventory (VMI) of cytokines and push-packs among other supplies will likely be enroute shortly after the incident	
0-53	Plan to provide guidance for Sheltering-in-Place and for evacuation. Initial decisions on sheltering based on plume must be made immediately by emergency management/public safety. PH must be prepared to liaison rapidly with EM and, based on initial models define additional shelter and evacuation instructions	IS #7
0-54	Identify mass emergency shelters for evacuees of Dangerous Fallout and other impacted zones	

**Phase 0: Pre-incident planning:
Preparedness activities for a Nuclear Detonation**

Line number	Actions/Issues	Information Source
0-55	Identify sites for Assembly (screening) and Medical Care centers	IS #3
0-56	Coordinate Medical Care site planning with assistance from medical system and EMS	
0-57	Develop registration / screening form to include demographic information and symptom / epidemiologic assessment of radiation exposure for use at AC, shelters, MC areas	
0-58	Plan to coordinate messaging about who should NOT go to a medical facility, in order to allow resources to be used for seriously injured as well as provide instructions for self-care	IS #7
0-59	Gain familiarity with issues regarding Scarce Resources and facilitate public discussions regarding what a Scarce Resources setting will mean.	IS #8
0-60	Education for public for in-home and in-office emergency supplies and initial actions (see also first section of table EM)	
0-61	Education for public regarding decontamination and how to self-decon (pre-incident and just-in-time) – this may not need to be specific for radiation but could address a broader range of exposures	
0-62	Assure mass fatality management plan incorporates aspects of victim contamination and catastrophic casualty numbers	IS #12
0-63	Establish plans for psychological support including risk communication, psychological first aid, and targeted interventions by local and regional/national means (hotlines, designated referral locations) – offer training in psychological first aid	IS #13
Medical System Response		
0-64	Assure Health and Medical Coordination Centers (HMCC) that include the hospitals in the area are region are practiced and that there is redundancy in case select facilities/personnel are rendered inoperative	
0-65	Determine the actions that adjacent regions and HMCC will take automatically following a nuclear detonation – is there also a plan in place for succession if the local HMCC is rendered non-functional due to the scope of the incident?	
0-66	Assure the HMCC is integrated into a multi-agency coordination center (such as an EOC) so that requests and issues may be sent via proper channels and to improve situational awareness	

**Phase 0: Pre-incident planning:
Preparedness activities for a Nuclear Detonation**

Line number	Actions/Issues	Information Source
0-67	Assess regional medical capacity (surge capacity) including planning for alternate care sites (Medical Care centers)	
0-68	Communications system compatibility and redundancy planning between agencies and facilities	
0-69	Prepare list of potential critical medical supplies and develop local strategy for obtaining them	
0-70	Resource sharing plans and mechanisms for request of necessary resources	
0-71	Understand and practice mechanisms for healthcare facilities to move requests to appropriate EM partners at the local/regional/state level	
0-72	Prepare to provide consistent information on medical triage to assure fairness. Consider using information from the Scarce Resources Project	IS #14
0-73	Download REMM and join REMM listserv.	IS #11
0-74	Be aware of National Disaster Medical System (NDMS) and other HHS assets, and how these are requested during an incident	
0-75	Be aware of local / regional resources for blood supplies.	
0-76	Be aware of the Radiation Injury Treatment Network (RITN).	IS #16
0-77	Work with local Veterans Affairs hospitals and military facilities to assure Federal facility integration	
Evacuee Medical Care and Fallout-related Radiation Illness		
0-78	Educate population regarding importance of --“duck and cover” after a brilliant flash is seen, --sheltering-in-place immediately after the incident, --avoiding fallout by sheltering, evacuating based on official advice.	
0-79	Provide educational material regarding radiation injury and that small amounts of radiation are not as harmful as many people assume.	
0-80	Provide educational material regarding decontamination including self-decontamination.	IS #16
0-81	Provide education to public that Potassium Iodide is not a part of a nuclear detonation response.	
0-82	Emphasize family resilience planning (food, water, other supplies for 96 hours)	

**Phase 0: Pre-incident planning:
Preparedness activities for a Nuclear Detonation**

Line number	Actions/Issues	Information Source
0-83	Emphasize for any major disaster the effects on the 911, EMS, and medical care system and to avoid all non-emergent use of the medical care system	
Recovery		
0-84	Provide reassurance that there will be many, many survivors despite the disastrous nature of the incident.	
0-85	Educate community of the importance of community resilience.	
0-86	Educate community on normal responses to stress and mitigating actions that can be taken	
0-87	Discuss guidelines for people returning to their homes and offices.	
0-88	Plan for long-term registry and who should be followed for long-term cancer risk	
0-89	Establish plans for long-term psychological support for responders and citizens.	IS #13

Phase I: 0-24 hours post-detonation

Line number	Actions/Issues	Information Source
General Readiness Planning and Emergency Management		
I-1	Response for nuclear detonation begins following reports by public safety that incident magnitude suggests nuclear detonation.	
I-2	Assure immediate assessments for radiation by public safety personnel / first responders	
I-3	Upon confirmation of radiation presence, coupled with catastrophic explosion, immediately activate EAS for areas potentially within dangerous fallout zone and blast zones and instruct persons to immediately take shelter inside the largest available building	
I-4	Contact or deploy airborne assets (helicopters – law enforcement, media, others) for visual report on debris cloud drift	
I-5	Contact National Weather Service for Doppler radar information on cloud drift/movement or work through IMAAC (Department of Energy) or DHS.	
I-6	Issue further EAS activations as needed for the anticipated fallout zone. Contact other jurisdictions as needed	
I-7	Notify state and request disaster declaration (state and Federal), request ‘no-fly’ zone over fallout locations and 2 miles in all directions from apparent epicenter aside from medical flights	
I-8	Institute incident command, open jurisdictional EOC and initiate callbacks/notifications including obtaining state or Federal radiologic consultation (Radiation Assistance Program – RAP) and public health consultation	IS# 20
I-9	Begin to obtain situational awareness from public safety – impact, status of 911 and other communications systems and inform state EM of the magnitude of the situation and on the physical location. Developing and maintaining situational awareness will be a continued struggle over the next several days in the dynamic response environment and will require significant resource commitment.	IS #4
I-10	Assign a mapping/modeling unit and begin to assemble known data, readings, and wind/weather information to begin assembling data to predict response zones (SD, MD, LD and DF zones). Work with HHS for MedMap access.	
I-11	Implement Continuity of Operations Plans as needed based on incident impact	

I-12	Appoint PIO and initiate JPIC, issue initial messages to media and schedule press conference	
I-13	Deploy additional field radiologic monitoring	
I-14	Obtain situational awareness support from DHS and HHS. Radiation and plume modeling to guide response. Initial data will be supplemented by on-site measurements of where radioactivity is and is not. Begin to define evacuation guidance for dangerous fallout zone based on mapping	
I-15	With public health, define shelter locations, Assembly Centers and possible Medical Care centers – assure logistical support for these locations and publicize these locations to community and responders	
I-16	Determine key transportation routes identified by law enforcement and fire/EMS and need for debris clearance. Identify and deploy public/private assets to clear glass and vehicles supporting access to light and moderate damage zones.	
I-17	Assure regional staging locations identified. Designate staging areas for both incoming and outgoing personnel and supplies.	
I-18	Communicate with the public in a coordinated manner to minimize confusion. Coordinate with Federal information centers. Be prepared if “talking heads” provide contradictory opinions and monitor media outlets.	

I-19	<p>Through state, request:</p> <ul style="list-style-type: none"> • SNS push-pack deployment and myeloid cytokines VMI deployment • HHS activation of National Disaster Medical System (NDMS) and other HHS assets (DMATs and burn teams). HHS to activate AABB TF for blood supports through Assistant Secretary for Health (ASH) activate RITN; Veterans Administration activated • FEMA EMS contract activation for initial 100 EMS units • FEMA Urban Search and Rescue Teams • State National Guard assets for transportation, debris removal, security, logistic support • Heavy lift equipment and debris clearing equipment, supplemental lighting and portable generators, fuel, etc. • Cellular on wheels and other communications support for areas damaged by EMP including amateur radio • EMAC requests as needed to meet EMS and logistic needs 	IS #9 IS #11
I-20	Assure activation of reception site for Strategic National Stockpile (SNS) assets.	
I-21	Anticipate logistical needs for inbound resources (road and air) and begin to plan for outbound evacuation of patients and evacuees	
Emergency Medical Services		
I-22	Recognize incident. Implement incident management and response plans, initiate callbacks and augment personnel.	
I-23	Assess status of 911 system and implement call triage at PSAP and medical dispatch – recommend self-transport in all cases when possible	
I-24	Create accountability system to determine which crews are unable to be contacted or are sheltering in dangerous fallout areas. May be unable to contact many crews within a few miles of blast initially due to cell tower damage.	
I-25	Request regional EMS resources to staging location and request mutual aid to support briefing and assignment at that location	
I-26	Establish position in EOC / HMCC to coordinate EMS response	
I-27	Emphasize with crews coordination with fire department, definition of response zones, direction of walking wounded out of area, focus on hemorrhage control and herding.	

I-28	Triage, treatment, transportation of acutely wounded- Triage based on usual trauma criteria including considerations of limitations on critical care and transportation in the early aftermath Utilize the RTR system for designating sites. RTR-1, -2 and -3	IS #3
I-29	Based on evolving response and situational awareness, begin to assign crews to establishing areas of treatment (RTR1,2,3) and assign divisional supervisors to these sites under NIMS – every effort should be made to create unified divisional command with fire and law enforcement	IS #3
I-30	Determine access problems to affected LD and MD areas and pass needs/requests to EOC	
I-31	Provide support / care at assembly centers / shelters / medical care sites including directing mutual aid resources to these locations	
I-32	Identify depleted and needed resources and regional sources to back-fill, plus request re-supply from state / federal sources	
I-33	EOC liaison should begin to work with EM and PH on plans for staffing evacuation hubs and assembly / medical care sites over subsequent days. Request regional assistance for staffing and resourcing these locations as needed.	
Healthcare Facility Response		
I-34	Recognize incident. Implement incident management and response plans, initiate callbacks and augment personnel.	
I-35	Activate radiation response teams and deploy radiation assessment equipment	
I-36	Assess facility for damage and impact on operations; Assess staffing and capacity. Implement surge capacity plans. Move pre-designated supplies to ED and other triage/treatment areas	
I-37	Triage, treatment of victims of trauma / combined injury Continually reassess survivors as scarce resource setting changes. Priority in scarce resource setting is on hemorrhage control and other rapid stabilizing measures. Complex surgeries and definitive management should NOT be undertaken at this time. Focus on moderately injured with single-system injuries amenable to rapid correction to prevent life/limb threat.	IS #14
I-38	Establish minor triage/treatment areas on site (lobbies, classrooms, garages) and off-site (nearby school, church, lobby of large building, etc)	
I-39	Assess critical medical supplies. Contact suppliers, sharing partners and HMCC / EOC with needs and issues	IS #8

I-40	Assess current in-patient population to see who could be discharged and/or transferred to free up beds and resources for the expected influx of victims.	
I-41	Liaison with EMS or contact HMCC to determine options for patient movement to other sites via bus, ambulance, air depending on situation and ability to access facility	
I-42	Establish decontamination site and activate victim flow plans. Deploy 'dry decon kits'. For hospitals experiencing demand resources focus is on patient care, with containment of radiation by clothing control	IS #16
I-43	Understand the Radiation Treatment, Triage, and Transport system- RTR and use this terminology when communicating with EMS.	IS #3
I-44	Work with ICS to determine status of MC facilities, including alternate care facilities, and AC, to where people without immediate medical needs will be directed.	
I-45	Use REMM for assessment of radiation injury	IS #11
I-46	Work with EOC for receipt of supplies from SNS.	
I-47	Begin treatment of obvious radiation casualties 2-6Gy with bone marrow growth factors based on supply, demand and triage plans.	
I-48	Determine need to transfer patients and available transportation means with EMS – facilities closer to the blast may need medical helicopters to ferry supplies and staff in and evacuate limited numbers of moderate/critical patients already stabilized	
Public Health		
I-49	Implement orders for Sheltering-in-Place initially as determined in discussion with EM, DHS, HHS and other radiological response teams.	IS #7
I-50	Request any emergency health powers declarations as needed under local/state law	
I-51	Based on field reports and in conjunction with EM and Federal advice, begin to define Dangerous Fallout areas, rates of decay, and develop recommendations for evacuation timeframe for those sheltering in place. Define evacuation points and assess evacuation routes.	
I-52	Provide public messaging about self protection and who should NOT go to a medical facility, in order to allow resources to be used for seriously injured.	IS# 11
I-53	With EM, plan and open AC for minor care / shelter and communicate these resources to public. Provide support for shelters and alternative Medical Care locations.	IS #3

I-54	Participate / liaison with HMCC to assess medical system condition and needs	
I-55	Notify MRC volunteers including adjacent jurisdictions/regions and begin assignment to AC, MC, and shelter sites	
I-56	Assure reception site for SNS materials activated and determine incident impact on usual distribution plans to healthcare facilities, determine delivery to AC and MC sites depending on plans for myeloid cytokines administration	
I-57	Based on identified areas of radiation, develop / modify a screening form for use at shelters, AC, and MC sites that collects basic demographic data, epidemiologic data, and symptom/timeframe information.	
I-58	Develop identification plan / tracking plan for those receiving myeloid cytokines (e.g. wristbands)	
I-59	Activate victim tracking system	IS #6
I-60	Activate family reunification hotline and other resources – request national American Red Cross information line activation	IS #10
I-61	Provide instructions for public on self-decontamination - who needs it and how to do it (include instructions for pets)	IS #16
I-62	Recommend personal protective measures and equipment for citizens and responders.	
I-63	Activate mass fatality plan. Inform public that saving lives and providing care to living are first priorities.	IS #7 IS #11
Medical System Response		
I-64	Notify area facilities of incident and provide updated information as needed	
I-65	Activate Health and Medical Coordination Center plans including liaison to multi-agency coordination center or EOC	
I-66	Obtain situation status information including healthcare facilities with structural damage, functional status of those facilities, access issues to those facilities, and patient loads at area facilities. Create hospital situation report for public health.	
I-67	Activate resource sharing plans as needed	
I-68	Determine, with public health, location of Medical Care and Assembly sites and organize staff and materials for these sites including use of regional resources and MRC	
I-69	Assist overwhelmed hospitals by obtaining buses or other transport as possible from EOC and by ferrying in staff and supplies (may need to be done via helicopter)	

I-70	Receive resource requests and identify policy issues requiring guidance	
I-71	Prepare inventory of requested medical supplies and activate local strategy for obtaining them	IS #11 IS #9
I-72	Anticipate delivery of SNS and other resources on 24h timeframe and work with public health to deliver to facilities in greatest need first	
I-73	Assist PH with public message development about when/where to seek care	
I-74	Coordinate resource requests with EOC critical to minimize duration of time spent in Scarce Resource situations.	
I-75	Use REMM as a resource for patient care	IS #11
I-76	Develop provisional information for hospitals on dangerous fallout locations and circulate triage criteria for myeloid cytokines and medical treatment toward end of operational period. Be prepared to update this information to reflect situation.	
I-77	Assure National Disaster Medical System (NDMS) activated and instruct overwhelmed hospitals to begin to prepare lists of patients for evacuation.	
I-78	Provide basic information on 'dry decon' to clinics and other healthcare facilities and request personnel as needed to support acute care needs at hospitals and Medical Care sites	
I-79	Consider need for Federal Medical Station or other alternate location for hospital overflow	
I-80	Consider need for Disaster Medical Assistance, Burn, and other specialized teams and personnel – communicate needs to EOC	
I-81	Provide basic information on 'dry decon' to clinics and other healthcare facilities and request personnel as needed to support acute care needs at hospitals and Medical Care sites	
Evacuee Medical Care and Fallout-related Radiation Illness		
I-82	Shelter-in-place initially, evacuate based on official advice.	
I-83	Provide instruction on decontamination. Self-decontamination is only necessary for those with fallout contamination on them. Listen for information of where fallout is and IS NOT.	IS #16
I-83	Remind victims via public messaging to remember physical location and time spent there. This is critical for dose estimation and triage.	
I-84	Instruct and/or move evacuees to Assembly Centers (AC) set up by PH with support from other agencies. Utilize portal or other screening at "clean" ACs for contamination, provide at least dry decon for those contaminated if possible.	

I-85	Evaluate for injuries and symptoms related to exposure	
I-86	Refer injuries to hospital or Medical Care location (may be co-located with Assembly Center) as necessary, accounting for local hospital ability to provide care	
I-87	Register those at assembly center – complete screening sheets if available toward end of operational period	
I-88	Refer asymptomatic individuals to area shelters	
I-89	Treat symptoms (mainly vomiting) of Acute Radiation Syndrome (ARS), provide cytokines (myeloid cytokines) to those with vomiting if available from local stores	
Recovery		
I-90	Define areas that will have NO radiation and remain useable. Emphasize that there is no need to evacuate these areas.	
I-91	Emphasize community resilience and individual actions to assure personal safety and health	
I-92	Define requirements for victim registry personnel in conjunction with Federal officials (DHS, HHS)	
I-93	Activate psychological support teams for responders.	IS #13
I-94	Begin to identify priorities for utility service restoration in Light Damage Zone	

Phase II: 24-96 hours post-detonation
IN ADDITION to what has been started on Day 1

Line number	Actions/Issues	Information Source
General Readiness Planning and Emergency Management		
II-1	Maintain situational awareness and define the damage and fallout zones in collaboration with USG and other Federal partners	IS #2
II-2	Obtain situational awareness support from DHS and HHS. On-site measurements of radioactivity and prediction of levels for every 6 hours. Provide assessment of low level radiation in the down-wind fallout zones (not likely to require radiation injury treatment).	
II-3	Utilize MedMap in coordination with HHS and DHS to assess medical assets	IS #4
II-4	Assign available law enforcement (and National Guard) to assist at transportation routes, staging areas, assembly centers and within damage zones for property protection.	
II-5	Have JPIC provide frequent communication with the public in a coordinated manner with Federal messages	
II-6	Prepare for air-based transfer of victims to other jurisdictions, NDMS hospitals, RITN and Veterans Administration hospitals. This will include those in the latent phase of radiation illness who can fly via commercial charter. Assist Federal and state counterparts in arranging logistics to airport.	
II-7	Define acceptable level of superficial contamination on vehicle and individuals for transportation outside affected area with Federal partners.	
II-8	Other jurisdictions in region open assessment centers and shelters for evacuees to include medical screening and assessment for radiation illness and contamination	
II-9	Prepare to support arriving military and civilian assets and assure common operating picture / communications plan and define operating periods and briefings	
II-10	Track requested and unrequested arriving assets, emphasize staging area use and request logistical support for assets as needed	
II-11	Define priorities for utilities, street clearing, and essential service restoration to Light Damage zone	

Emergency Medical Services (EMS)		
II-12	Anticipate that victim mixture to begin to change- more radiation victims reaching medical care and trauma victims with radiation from Moderate Damage and Severe Damage zone search and rescue and trauma/burn victims without radiation from Light Damage zones and vehicle collisions.	IS #2
II-13	Anticipate that triage, treatment, transportation of acutely wounded - RTR-1, -2 largely no longer needed, and RTR - 3 transported to Medical Care (MC) center or AC.	IS #3
II-14	Support Urban Search and Rescue and fire crews as they define / grid search zones and begin more systematic searches of moderate damage areas.	
II-15	Support care at assembly centers / shelters, support continued emergency response demand. Mutual aid resources support patient evacuation. Assist in administration of palliative care.	
II-16	Receive and disseminate to crews any triage criteria for myeloid cytokines treatment or medical referral and the locations of the AC and MC sites.	
II-17	Continue to utilize non-traditional transport, batched transport of patients, and other contingency mechanisms	
II-18	Request supplemental staff and resources via EOC including supplies	
II-19	PSAPs continue to triage calls/responses – update criteria as needed in conjunction with PH and healthcare system	
Healthcare Facility Response		
II-20	Reassess survivors as scarce resource setting changes. Anticipate many “concerned citizens” reaching facility requiring ongoing assessment and triage – many symptoms of anxiety overlap with early ARS.	IS #8
II-21	Assess critical medical supplies and work to balance supply and demand. Work with ICS to receive supplies from SNS including myeloid cytokines.	
II-22	Obtain ALCs and track symptoms of patients over time to obtain more specific prognosis – provide myeloid cytokines to those who will receive aggressive care (see priority table IS #3)	IS #15
II-23	Work with HMCC to determine status of system, including alternate care facilities, and AC, to where people without immediate medical needs will be directed.	IS #3

II-24	Discharge and/or transfer appropriate in-patient population to free up beds and resources for the influx of victims in conjunction with EMS. Provide patient lists for transfer to HMCC	
II-25	Contain radiologic contamination within facility if present and provide more screening of individuals presenting to facility with at least dry and perhaps wet decontamination	
II-26	Use REMM for assessment and treatment guidelines for ARS	IS #11
II-27	Request additional personnel/staff as needed from HMCC	
Public Health		
II-28	Continue evacuation of Dangerous Fallout areas. With EM, develop and publicize maps illustrating contaminated areas and the level of risk within those areas in the hours after the blast.	IS #2
II-29	Provide messaging about who should NOT go to a medical facility, in order to allow resources to be used for seriously injured and who should go to an Assembly Center or Medical Care center for assessment of radiation illness symptoms.	IS #7
II-30	Augment patient and victim tracking. Identify by card, wristband, temporary tattoo or other means those that are high priority for myeloid cytokines treatment	IS #6
II-31	Identify persons with mild/moderate ARS for evacuation over next 10 days to other jurisdictions/networks for ongoing assessment / care and provide lists of these persons by shelter/location to EOC for evacuation planning.	
II-32	Receive SNS assets including cytokines, distribute, and begin administration (daily) to those with at-risk symptoms.	
II-33	Augment reunification hotline as needed (ideally a national number via ARC or Federal at this point)	IS #10
II-34	Provide instructions for public on self-decontamination-who needs it and how to do it.	IS #16
II-35	Mass fatality unit assures obvious bodies collected and transported to processing area Inform public that saving lives and providing care to living are first priorities.	IS #12
II-36	Support transfer and tracking of victims and potential victims of acute radiation syndrome to regional, NDMS, and RITN centers for management in conjunction with EMS, EM, and medical.	IS #15

II-37	Reinforce PPE use by responders in areas of heavy structural damage. With OSHA and environmental health assistance initiate air monitoring for particulate debris and other hazards	
II-38	With Federal and environmental health partners continue to map and monitor radiation levels	
II-39	Assess safety of tap water	
Medical System Response		
II-40	Maintain situational awareness, including for AC, MC sites	
II-41	Pass resource requests to appropriate EOC / other channels and provide feedback about expected timeframe of arrival	
II-42	Work with hospitals to identify patients for transfer to regional facilities, NDMS, RITN centers or burn facilities. Develop lists for PH/EOC planning of evacuation	IS #15
II-43	Assure adequate supplies of medications, blood products, etc.	
II-44	Activate resource-sharing plans throughout health system-including distant locations including bringing in supplemental.	
II-45	Activate resource-sharing plans throughout health system-including distant locations including bringing in supplemental staff	
II-46	Maintain fairness across the region and medical systems by attempting to distribute resources and patients and providing consistent guidance on triage in conjunction with PH	IS #14
II-47	Provide support for patient evacuation	
II-48	Match arriving Federal, MRC, and other personnel with facilities / sites in need	
II-49	Contribute status report to jurisdictional incident action plan via PH / HMCC	
II-50	Emphasize need for timely treatment with myeloid cytokines of early ARS victims	
II-51	Facilitate evacuation of damaged hospitals	
Evacuee Medical Care and Fallout-related Radiation Illness		
II-52	Continue mass evacuation and self-evacuation based on official guidance	
II-53	Follow recommendations on self decontamination	IS #16
II-54	Remember physical location of shelter, time spent there, and onset/duration of any symptoms- for triage purposes.	

II-55	Screen persons in MD or DF zone at AC or MC for ARS symptoms – initiate treatment with myeloid cytokines as soon as possible if mild/moderate symptoms	
II-56	Move people out of shelters to other facilities/communities as soon as possible	
Recovery		
II-57	Assess radiation and plume modeling and data to guide response and plans for recovery including access to certain areas for damage assessment. (what) Can define areas that will have NO radiation and remain useable without evacuation and radiation clean-up.	
II-58	Improve situational awareness for damaged areas, utilities and affected infrastructure	
II-59	Continue debris removal to facilitate traffic flow and restore services	
II-60	Implement ‘cellular on wheels’ (COW) and public safety portable repeaters as needed in areas where EMP has damaged equipment to restore basic communications (in addition to amateur radio)	
II-61	Emphasize community resilience and neighbor helping neighbor	
II-62	Begin to resume retail and other functions, especially in unaffected places.	
II-63	Assure that registry process is consistent with Federal expectations and shared with state(s) to allow follow-up care as well as for long-term cancer risk	
II-64	Activate psychological support teams for public at large and continue support for responders and healthcare providers.	IS #13
II-65	Provide hotlines (located at national level), shelter-based support, and psychological triage / initial treatment to degree possible	
II-66	Continue to work with utilities and private sector to prioritize service restoration	

Phase III: Beyond 96 hours post-detonation
IN ADDITION to what has been started on Day 1-4

Line number	Actions/Issues	Information Source
General Readiness Planning and Emergency Management		
III-1	Local, state, and federal officials continue to assess the situation and define the damage and fallout zones and prioritize access and service restoration	IS #2
III-2	Law enforcement defines perimeters and continues to manage traffic flow Increased number of people will return to area. Security required.	
III-3	Donations management and management of unsolicited volunteers and ‘disaster tourists’ as well as media becomes a focus	
III-4	Resupply, clean-up, and restoration of utilities anticipating major return of population.	
III-5	Frequent communication with the public in a coordinated manner via the JPIC continues, including communication of risks of residual contamination and hazards of clean-up	
III-6	Continue transfer of victims who may need delayed medical care to National Disaster Medical System (NDMS), RITN and other jurisdictions.	IS #15
III-7	Prioritize service restoration for major hospitals and healthcare facilities as possible	
III-8	Begin disposition planning for special needs shelter patients and the medically fragile, slow demobilization of shelters over time	
III-9	Debris removal with heavy equipment continues in support of rescue operations in the Moderate Damage zone for the first 7-10 days	
III-10	As perimeters become better established, create screening and decontamination corridors for vehicles	
III-11	Create guidance for transport and disposal of contaminated items (including contaminated medical waste) in conjunction with Federal experts	
Emergency Medical Services		
III-12	Reallocate resources as last of the victims from Moderate Damage zone rescued, recovery operations commence in Severe Damage zone. Pressure on EMS systems continues due to ongoing patients with complications of ARS and difficulty responding in timely manner due to service area disruptions/access issues	

III-13	RTR sites demobilized. Some RTR-3 sites may function as assembly centers.	
III-14	Support care at assembly centers / shelters. Continue transporting victims to evacuation locations, which will decrease after first 10 days. Transport displaced persons with chronic illnesses to appropriate medical or special needs shelter facilities.	
Healthcare Facility Response		
III-15	Continually reassess survivors as scarce resource situation improves. Most will have ended crisis standards of care. Anticipate many “concerned citizens” reaching facility requiring proper sorting from continued large numbers with ARS symptoms	IS #8
III-16	Continu to screen and help monitor victims with ALC as well as obtaining laboratory results for clinical/epidemiologic data	
III-17	Continue to request necessary supplies / staff from HMCC or EOC as directed	
III-18	Provide support as possible to MC-Medical Care facilities, including alternate care facilities, and AC- Assembly Centers, to where people without immediate medical needs will be directed. Slow demobilization of these facilities over time	IS #3
III-19	Finish transfer of victims to NDMS, RITN, burn and other specialty care facilities	IS #15
III-20	Continue to modify services provided to focus on ability to provide emergency and acute care, slow resumption of usual hospital services. Daily planning cycles and incident action planning continue	
Public Health		
III-21	Consider returning people to habitable zone in conjunction with Federal and state guidance	IS #2
III-22	Continue patient and victim tracking	IS #6
III-23	Continue reunification hotline.	IS #10
III-24	Provide instructions for public as to where to resume care for pre-incident illnesses including provision of dialysis	
III-25	Continue to implement and expand operations of mass fatality plan including integration of Federal DMORT teams as recovery becomes focus after rescue phase concludes (when moderate zone searched)	IS #12
III-26	Scale up transfer of victims and potential victims of acute radiation syndrome to RITN centers and their communities for observation and management over next few weeks.	IS #15

Medical System Response		
III-27	HMCC must maintain situational awareness, including daily incident action plans and communication with member hospitals and liaison with key stakeholders at EOC	
III-28	Monitor healthcare system demand and balance loads across local and regional hospitals as possible by allocating available staff and resources to those areas with greatest need and prioritizing evacuation of patients from most-stressed facilities	
III-29	Facilitate evacuation of facilities that have structural damage but were unable to evacuate earlier	
III-30	Facilitate request and delivery of resources including personnel, SNS assets	
III-31	Determine, with public health, transition of myeloid cytokines administration from AC/MC sites to clinics and other locations to continue daily treatment and contact with at-risk group 2-6Gy that was not able to be evacuated	
III-32	Continually reassess standards of care in area and provide talking points to JPIC about when/where to seek care. Slow transition to normalization of medical care provision	IS #6
Evacuee Medical Care and Fallout-related Radiation Illness		
III-33	Provide information as to who should and should not participate in long-term registry	
III-34	Evacuate persons with likely 2-6Gy exposure to other jurisdictions for ongoing monitoring and myeloid cytokines treatment	
III-35	Provide instructions and daily myeloid cytokines to the 2-6Gy exposure group that remains in the area and assure that similar clinics/centers are set up in neighboring jurisdictions (may start at AC and MC and transition to monitoring clinics set up according to jurisdictional plan with PH/EM)	
III-36	Continue to triage patients for evacuation based on epidemiologic information and symptoms with addition of ALC as blood tests become more widely available	
Recovery		
III-37	Use ever-improving radiation and plume modeling and data to guide plans for recovery. Convene local groups along with outside radiation experts. Can define areas that will have NO radiation and remain useable and those with minimal risk.	
III-38	Provide more detailed information about decontamination of property and vehicles to population	

III-39	Provide easily understood information about relative risk for future malignancies and impact on property to those in fallout areas	
III-40	Emphasize community resilience and neighbor helping neighbor.	
III-41	Resume community functions, especially in unaffected areas	
III-42	Increase staff and logistical support for long-term registry and for those to be followed for long-term cancer risk	
III-43	Facilitate creation (with Federal agencies / VA system, others) of a network of integrated clinics that will follow and provide ongoing treatment for victims of the incident	
III-44	Establish teams, timeline, and goals for medium- and long-term psychological support to help resilience.	IS #13

ADDITIONAL INFORMATION SOURCES

Objective: These materials are informative references with definitions, discussion points, and recommendations about topics related to nuclear detonation medical response. These resources are to be used in concert with the Action Steps.

Information Source (IS)	Topic	Where to locate information
IS #1	Key Principles for Medical Responders	Medical management guidelines available at REMM http://www.remm.nlm.gov/index.html
IS #2	Structural, Radiation and Medical Response	Planning Guidance 2 nd Ed., page 41 available at http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf Also in Appendix Folder
IS #3	RTR description	Planning Guidance 2 nd Ed., page 84 available at http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf Also in Appendix Folder
IS #4	MedMap	Access will be available when needed through HHS Secretary's Operations Center
IS #5	National Incident Management System (NIMS)	http://www.fema.gov/emergency/nims/
IS #6	Patient Registration and Tracking	Planning Guidance 2 nd Ed., page 113 also available at http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf Also in Appendix Folder
IS #7	Public Health Announcements	Planning Guidance 2 nd Ed., pages 121-124 also available at http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf Also in Appendix Folder

IS #8	Scarce Resources environment	Scarce resources paper Scarce resources Figure #4 and AHRQ Medical Mass Care Guide http://www.ahrq.gov/research/mce/mceguide.pdf
IS #9	Strategic National Stockpile (SNS)	SNS- http://www.bt.cdc.gov/Stockpile/
IS #10	Establishment/Activation Of a Missing Persons Hotline/Internet Site	Planning Guidance 2 nd Ed., pg 113 available at http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf Also in Appendix Folder
IS #11	Radiation Emergency Medical Management (REMM)	General REMM information: http://www.remm.nlm.gov/index.html Injury related information: http://www.remm.nlm.gov/radtrauma.htm ; http://www.remm.nlm.gov/burns.htm
IS #12	Mass fatality planning	Planning Guidance 2 nd Ed., pages 96-97 available at http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf Also in Appendix Folder
IS #13	Psychological issues	Planning Guidance 2 nd Ed., pages 93-96 available at http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf
IS #14	Scarce Resources Triage Guidelines	Scarce Resources Manuscript for triage (#9 and #10); Scarce Resource Ethics Manuscript # 4; http://www.ahrq.gov/research/mce/mceguide.pdf Scarce Resources
IS #15	Radiation Injury Treatment (RITN)	http://www.nmdp.org/RITN/

IS #16	Decontamination Operations-Persons	Planning Guidance 2 nd Ed., page 110-112 also available http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf
IS #17	Scarce Resources for a Nuclear Detonation	Series published in Disaster Medicine and Public Health Preparedness. Titles listed below
IS #18	National Disaster Medical System (NDMS)	http://www.phe.gov/Preparedness/responders/ndms/Pages/default.aspx
IS #19	Protective Action Guidelines	http://www.fema.gov/good_guidance/download/10260
IS #20	National Nuclear Security Administration (NNSA)-Radiological Assistance Program	http://nnsa.energy.gov/aboutus/ourprograms/emergencyoperationscounterterrorism/respondingtoemergencies/firstresponders/radi

Nuclear Detonation Scarce Resources Working Group Manuscript List
Disaster Medicine and Public Health Preparedness, March 2011 issue

#1 - Coleman CN, Knebel AR, Hick JL, Weinstock DM, Casagrande R, Caro JJ, DeRenzo EG, Dodgen D, Norwood AE, Sherman SE, Cliffer KD, McNally R, Bader JL, Murrain-Hill P. Scarce Resources for Nuclear Detonation: Project Overview and Challenges. *Disaster Med Public Health Prep.* 2011

#2 - Knebel AR, Coleman CN, Cliffer KD, Murrain-Hill P, McNally R, Oancea V, Jacobs J, Buddemeier B, Hick J, Weinstock D, Hrdina CM, Taylor T, Matzo M, Bader JL, Livinski A, Parker G, Yeskey K. Allocation of Scarce Resources Following a Nuclear Detonation: Setting the Context. *Disaster Med Public Health Prep.* 2011

#3 – DiCarlo AL, Maher C, Hick JL, Hanfling D, Dainiak N, Carr Z, Chao N, Bader JL, Coleman CN, Weinstock DM. Radiation Injury after a Nuclear Detonation: Medical Consequences and the Need for Scarce Resources Allocation. *Disaster Med Public Health Prep.* 2011.

#4 - Caro JJ, DeRenzo EG, Coleman CN, Weinstock DM, Knebel AR. Resource Allocation Following a Nuclear Detonation Incident: Unaltered Standards of Ethical Decision Making. *Disaster Med Public Health Prep.* 2011.

#5 – Dodgen D, Norwood AE, Becker SM, Perez J, Hansen CK. Social, Psychological and Behavioral Responses to a Nuclear Detonation in a US City: Implications for Healthcare Planning and Delivery. *Disaster Med Pub Health Pre.p* 2011.

#6 – Sherman, SE. Legal Considerations in a Nuclear Detonation. *Disaster Med Pub Health Prep.* 2011.

#7 - Hick JL, Weinstock DM, Coleman CN, Hanfling D, Cantrill S, Redlener I, Bader JL, Murrain-Hill P, Knebel AR. Healthcare System Planning and Response for a Nuclear Detonation. *Disaster Med Pub Health Prep.* 2011.

#8 - Murrain-Hill P, Coleman CN, Hick JL, Redlener I, Weinstock DM, Koerner JF, Black D, Sanders M, Bader JL, Forsha J, Knebel AR. Medical Response to a Nuclear Detonation: Creating a Playbook for State and Local* Planners and Responders. *Disaster Med Pub Health Prep.* 2011.

#9 - Casagrande R, Wills N, Kramer E, Sumner L, Mussante M, Kurinsky R, McGhee P, Katz L, Weinstock DM, Coleman CN. Using the Model Of Resource and Time-based Triage (MORTT) to Guide Scarce Resource Allocation in the Aftermath of a Nuclear Detonation. *Disaster Med Pub Health Prep.* 2011.

#10 - Coleman CN, Casagrande R, Hick JL, Weinstock DM, Bader JL, Chang F, Nemhauser JB, Knebel AR. Triage and Treatment Tools for Use in a Scarce Resources – Crisis Standards of Care Setting following a Nuclear Detonation. *Disaster Med Pub Health Prep.* 2011.

Acronyms

AC	Assembly Centers
ARS	Acute Radiation Syndrome
ASH	Assistant Secretary of Health
ASPR	Assistant Secretary for Preparedness and Response
ATSDR	Agency for Toxic Substances and Disease Registry
IS	Information Sources
CBC	Complete Blood Count
CONOPS	Concept of Operations
DF zone	Dangerous Fallout
DHHS	Department of Health and Human Services
DHS	Department of Homeland Security
DOD	Department of Defense
DOE	Department of Energy
EAS	Emergency Alert System
EMACS	Emergency Medical Assistance Compacts
EMP	Electromagnetic Pulse
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
EOC	Emergency Operations Centers
ESAR-VHP	Emergency System for Advanced Registration of Volunteer Health Professionals
ESF# 8	Emergency Support Function # 8
FEMA	Federal Emergency Management Agency
HHS	US Department of Health and Human Services
HMCC	Health and Medical Coordination Centers
IC	Incident Commander
ICS	Incident Command System
IMAAC	Interagency Modeling and Atmospheric Assessment Center
IND	Improvised Nuclear Device or Investigational New Drug (FDA)
LD Zone	Light Damage Zone
MC	Medical Care facilities
MD Zone	Moderate Damage zone
NCRP	National Council on Radiation Protection and Measurements
NDMS	National Disaster Medical System
NIMS	National Incident Management System
PAG	Protective Action Guide
PAR	Protective Action Recommendation
POC	Point of Contact
POD	Point of Distribution
REAC/TS	Radiation Emergency Assistance Center/Training Site
REMM	Radiation Emergency Medical Management
RITN	Radiation Injury Treatment Network
RTR system	Radiation Treatment, TRIage, TRansport system
REMM	Radiation Emergency Medical Management
SD Zone	Severe Damage zone
SNS	Strategic National Stockpile
USG	United States Government
VA	Department of Veterans Affairs