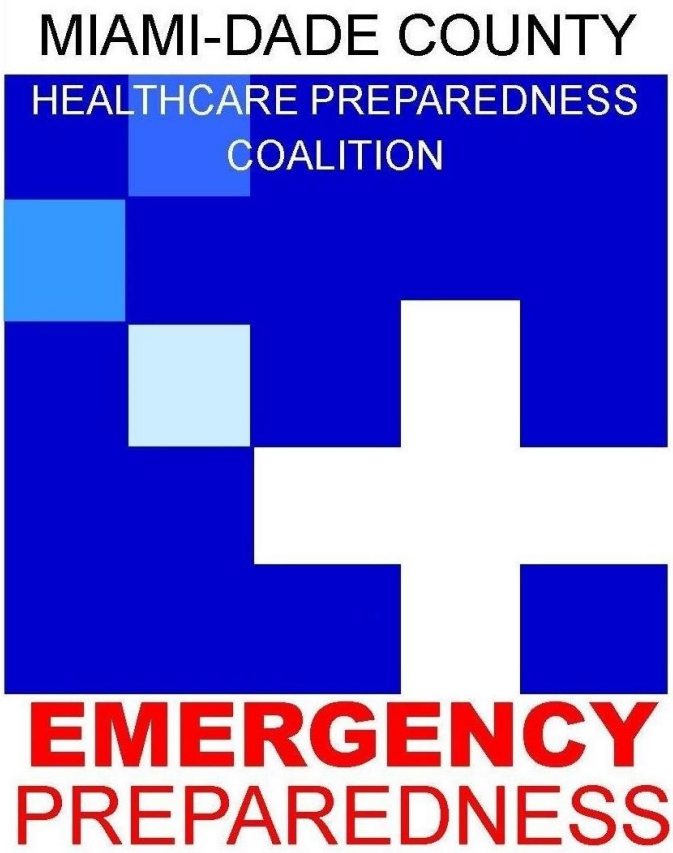

Miami-Dade County Healthcare Coalition
Radiation Emergency Surge Annex

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1. Introduction

1.1 Purpose

The annex provides guidance to support a coordinated healthcare response to a radiation emergency in which the number and severity of exposed and/or contaminated or possibly exposed and/or contaminated patients challenges the capacity and/or capability of The Miami-Dade County Healthcare Preparedness Coalition (MDCHPC) member facilities. The annex will outline specific incident response and treatment, protocols necessary to properly plan for, manage, and care for patients during a radiation emergency. This Annex does not replace other county or local emergency operations plans or procedures, but rather builds upon the existing plans and their annex.

1.2 Scope

This plan will be reviewed and updated as necessary by the MDCHPC. Lessons learned as they emerge from After Action Report/ Improvement Plans following real events or planned training exercises will be incorporated into the annex. This plan is not intended to supersede the authorities of the participating entities.

For the purpose of this annex, a radiation emergency is defined as **any unplanned urgent or emergent event resulting in release of radioactive material leading to exposure and/or contamination of the staff and other population either from a nuclear power plant or other radiation producing devices including radiological dispersion device ("Dirty Bomb") or Nuclear Bomb**. A Mass Casualty Incident (MCI) is an incident that generates a sufficiently large number of casualties whereby the available healthcare resources, or their management systems, are severely challenged or unable to meet the healthcare needs of the affected population.

This annex was collaborated on by MDCHPC leadership & staff, Miami-Dade County trauma and acute care centers, radiation treatment facilities, local emergency management, ESF-8, and local power plant emergency management personnel.

1.3 Overview/Background of HCC and Situation

1.3.1 Overview/Background of HCC and Situation

Radiological/nuclear emergencies can be postulated as ranging from a minor emergency with no incident site effects to a major emergency that may result in an incident site release of radioactive materials. This may include terrorism acts associated with nuclear power plants, nuclear weapons detonations, radiological dispersal devices (RDD), radiation exposure devices (RED), various radiological accidents including those associated with transportation of radioactive materials, and incidents associated with industries using radioactive materials including hospitals, commercial food irradiators, and similar operations.

An annex with a specific preparedness and response model would not be feasible because each emergency could have different consequences, both in nature and degree. The most likely radiological incident in Miami Dade county would involve relatively small amounts of radioactive material as a result of highway or industrial accidents.

For such fixed facilities and materials in transit incidents, the responses generally would not depend on the initiating events. The coordinated response to contain or mitigate a threat or actual release of radioactive material would be essentially the same whether it resulted from an accidental or deliberate act. For malevolent acts involving improvised nuclear or radiation dispersal devices, the response would be further complicated by the magnitude of the threat and the need for specialized technical expertise/actions. Therefore, sabotage and terrorism would not be treated as separate types of emergencies rather, they would be considered a complicated dimension.

Nuclear weapons on the other hand would certainly generate more casualties than local medical resources would be able to handle. Logistical plans would have to provide not only for medical supplies and equipment but also general supplies, food, clothing, water purification equipment, radiation detection and survey instruments, communication equipment and alternative modes of transportation. Certain types of medical supplies such as whole blood, blood expanders, burn kits, dressings, individual protective clothing, and gloves will be needed. Consolidated staging, treatment, and evacuation sites in areas of relative safety from residual radiation, secondary explosions and fires would need to be established between medical, rescue, evacuation and damage control groups. The effectiveness and adequacy of the rescue, evacuation, and treatment effort during the first 24 hours after such an attack will be critical.

A few basic definitions are provided below to better understand this annex.

1.3.2 Definitions

Acute radiation syndrome (ARS): ARS is an acute illness caused by irradiation of most/all of the body by a high dose of penetrating radiation in a very short period of time (usually a matter of minutes). Patients in the first stage of ARS exhibit the classic symptoms of nausea, vomiting, and possibly diarrhea (depending on dose), which can occur from minutes to days following exposure. Symptomatic episodes last for minutes up to several days.

Contamination (radioactive): The deposit of unwanted radioactive material on the surfaces of external or internal structures, areas, objects, or people. External contamination occurs when radioactive material is outside of the body, such as on a person's skin. Internal contamination occurs when radioactive material is inhaled, ingested, or absorbed through a cut or abrasion.

Community reception center (CRC): A dedicated site to assess people for exposure and/or contamination, conduct external decontamination (if necessary), obtain information for an exposure registry, and refer individuals for medical/mental health follow-up, as appropriate.

Decontamination: The process of removing radioactive contamination. For external contamination, this may involve removing the outer layer of clothing and washing all exposed parts of the body with soap and water. For internal contamination, medical countermeasures are necessary.

Exposure (irradiation): Exposure occurs when radiation energy penetrates the body. Exposure to very large doses of radiation may cause death within a few days or months, and exposure to lower doses of radiation may lead to an increased risk of developing cancer or other adverse health effects later in life.

Host Counties: Are those counties adjacent to risk counties that would be used to assist if a radiological emergency occurred in that risk county.

Population monitoring: The process of immediate monitoring of potentially affected individuals after a radiation incident (which involves screening for exposure) and the use of exposure registries to perform long-term monitoring of health effects from an event.

Radiation dispersal device (RDD): An RDD is a device (or process) that disperses radioactive material, exposing people and the environment to radiation. An RDD may be noticeable—such as an explosion or dirty bomb, or it may be silent and go unnoticed (e.g., case with contamination of the food or water supply). Responders and officials will know an RDD has been used when detection equipment registers an elevated radiation level or through notification by intelligence or law enforcement.

Radiation emission/exposure device (RED): An RED is also called a "hidden sealed source," a device intended to expose people to significant doses of ionizing radiation without their knowledge. Constructed from partially or fully unshielded radioactive material, an RED could be hidden discreetly in a public place exposing those who pass close by. Prolonged exposure to a

high-intensity source may lead to ARS or to radiation burns. If the seal around the source is broken and the radioactive contents are released from the container, the device could become an RDD, capable of causing radiological contamination.

Radiation Injury Treatment Network (RITN): is a national network of medical centers with expertise in the management of bone marrow failure and works with partners from other medical specialties to assist with managing acute radiation syndrome (ARS) and its health-related consequences.

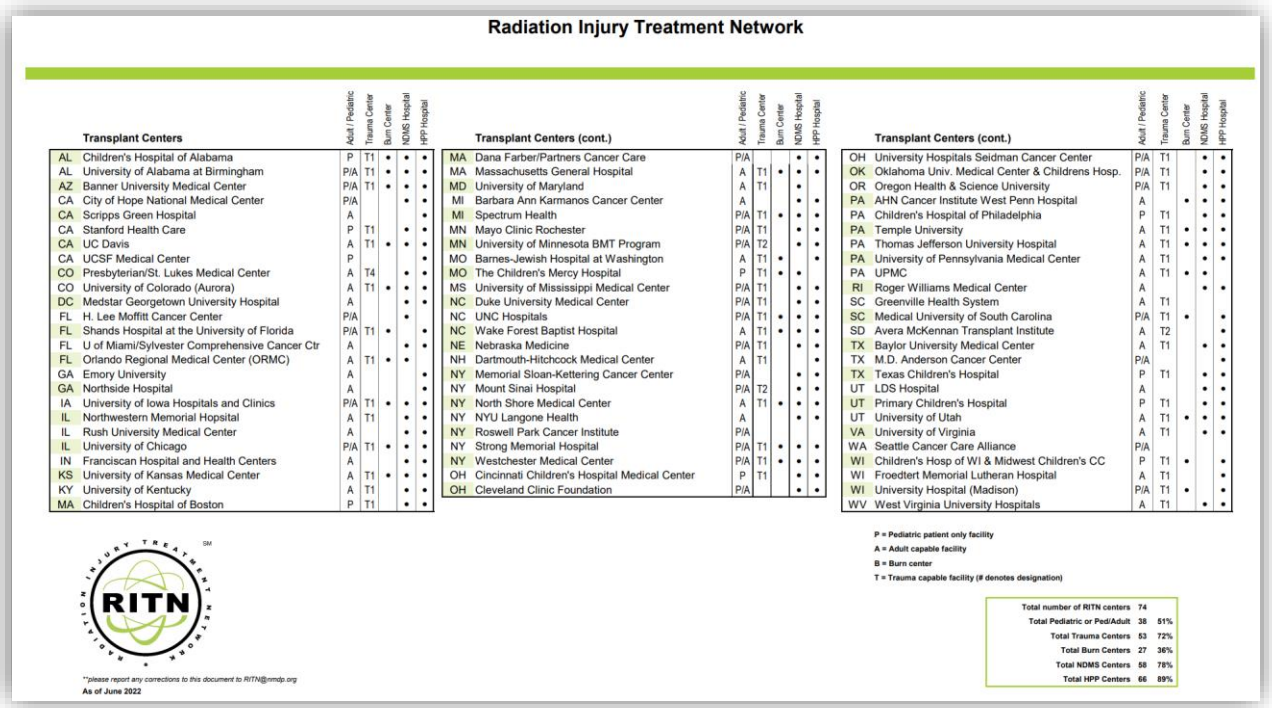
Risk Counties: are those counties with nuclear facilities such as nuclear power plants but also include counties with significant placements of radioactive materials.

1.3.3 Coalition Overview

The Miami-Dade County Healthcare Preparedness Coalition membership includes hospitals and health systems, emergency management, public health, EMS providers, long-term care providers, behavioral and mental health providers, specialty service providers (dialysis, pediatrics, urgent care, district Medical Examiners, funeral directors, etc.), support service providers (laboratories, pharmacies, blood banks, poison control, etc.), primary care providers, community health providers, and other healthcare and response stakeholders. There are 32 acute care hospitals and 7 freestanding emergency departments in Miami-Dade County.

Miami -Dade County has 2 hospitals that have standing agreements with the local nuclear powerplant (Turkey Point) to treat its staff in case of a radiological injury or emergency. There are also 4 hospitals in Florida with 1 in Miami-Dade County that are part of The Radiation Injury Treatment Network (RITN) (See Image 1) which may not be sufficient regarding resources to manage an influx of patients in a radiation emergency surge incident.
Capacity and capability can be enhanced through:

a) The provision of pharmaceuticals, medical supplies, and equipment required to evaluate, decontaminate, and treat radiation exposed and/or contaminated patients.
b) The provision of training and resource materials on the management of radiation exposed and/or contaminated patients.



Radiation Injury Treatment Network

	Transplant Centers	Adult / Pediatric	Trauma Center	Burn Center	NDMS Hospital	HPP Hospital
AL	Children's Hospital of Alabama	P	T1	•	•	•
AL	University of Alabama at Birmingham	P/A	T1	•	•	•
AZ	Banner University Medical Center	P/A	T1	•	•	•
CA	City of Hope National Medical Center	P/A			•	•
CA	Scripps Green Hospital	A				•
CA	Stanford Health Care	P	T1		•	•
CA	UC Davis	A	T1	•	•	•
CA	UCSF Medical Center	P				•
CO	Presbyterian/St. Lukes Medical Center	A	T4		•	•
CO	University of Colorado (Aurora)	A	T1	•	•	•
DC	Medstar Georgetown University Hospital	A			•	•
FL	H. Lee Moffitt Cancer Center	P/A			•	
FL	Shands Hospital at the University of Florida	P/A	T1	•		•
FL	U of Miami/Sylvester Comprehensive Cancer Ctr	A			•	•
FL	Orlando Regional Medical Center (ORMC)	A	T1	•	•	
GA	Emory University	A				•
GA	Northside Hospital	A				•
IA	University of Iowa Hospitals and Clinics	P/A	T1	•	•	•
IL	Northwestern Memorial Hopsital	A	T1		•	•
IL	Rush University Medical Center	A			•	•
IL	University of Chicago	P/A	T1	•	•	•
IN	Franciscan Hospital and Health Centers	A			•	•
KS	University of Kansas Medical Center	A	T1	•	•	•
KY	University of Kentucky	A	T1		•	•
MA	Children's Hospital of Boston	P	T1		•	•

	Transplant Centers (cont.)	Adult / Pediatric	Trauma Center	Burn Center	NDMS Hospital	HPP Hospital
MA	Dana Farber/Partners Cancer Care	P/A			•	•
MA	Massachusetts General Hospital	A	T1	•	•	•
MD	University of Maryland	A	T1		•	
MI	Barbara Ann Karmanos Cancer Center	A			•	•
MI	Spectrum Health	P/A	T1	•	•	•
MN	Mayo Clinic Rochester	P/A	T1		•	•
MN	University of Minnesota BMT Program	P/A	T2		•	•
MO	Barnes-Jewish Hospital at Washington	A	T1	•		•
MO	The Children's Mercy Hospital	P	T1	•	•	
MS	University of Mississippi Medical Center	P/A	T1		•	•
NC	Duke University Medical Center	P/A	T1		•	•
NC	UNC Hospitals	P/A	T1	•	•	•
NC	Wake Forest Baptist Hospital	A	T1	•	•	•
NE	Nebraska Medicine	P/A	T1		•	•
NH	Dartmouth-Hitchcock Medical Center	A	T1			•
NY	Memorial Sloan-Kettering Cancer Center	P/A			•	•
NY	Mount Sinai Hospital	P/A	T2		•	•
NY	North Shore Medical Center	A	T1	•	•	•
NY	NYU Langone Health	A			•	•
NY	Roswell Park Cancer Institute	P/A				•
NY	Strong Memorial Hospital	P/A	T1	•	•	•
NY	Westchester Medical Center	P/A	T1	•	•	•
OH	Cincinnati Children's Hospital Medical Center	P	T1		•	•
OH	Cleveland Clinic Foundation	P/A			•	•

	Transplant Centers (cont.)	Adult / Pediatric	Trauma Center	Burn Center	NDMS Hospital	HPP Hospital
OH	University Hospitals Seidman Cancer Center	P/A	T1		•	•
OK	Oklahoma Univ. Medical Center & Childrens Hosp.	P/A	T1		•	•
OR	Oregon Health & Science University	P/A	T1		•	•
PA	AHN Cancer Institute West Penn Hospital	A		•	•	•
PA	Children's Hospital of Philadelphia	P	T1		•	•
PA	Temple University	A	T1	•	•	•
PA	Thomas Jefferson University Hospital	A	T1	•	•	•
PA	University of Pennsylvania Medical Center	A	T1		•	•
PA	UPMC	A	T1	•	•	
RI	Roger Williams Medical Center	A			•	•
SC	Greenville Health System	A	T1			
SC	Medical University of South Carolina	P/A	T1	•		•
SD	Avera McKennan Transplant Institute	A	T2			•
TX	Baylor University Medical Center	A	T1		•	•
TX	M.D. Anderson Cancer Center	P/A				•
TX	Texas Children's Hospital	P	T1		•	•
UT	LDS Hospital	A			•	•
UT	Primary Children's Hospital	P	T1		•	•
UT	University of Utah	A	T1	•	•	•
VA	University of Virginia	A	T1		•	•
WA	Seattle Cancer Care Alliance	P/A				
WI	Children's Hosp of WI & Midwest Children's CC	P	T1	•		•
WI	Froedtert Memorial Lutheran Hospital	A	T1			•
WI	University Hospital (Madison)	P/A	T1	•		•
WV	West Virginia University Hospitals	A	T1		•	•

RITN

**please report any corrections to this document to RITN@nmdp.org

As of June 2022

P = Pediatric patient only facility
A = Adult capable facility
B = Burn center
T = Trauma capable facility (# denotes designation)

Total number of RITN centers	74	
Total Pediatric or Ped/Adult	38	51%
Total Trauma Centers	53	72%
Total Burn Centers	27	36%
Total NDMS Centers	58	78%
Total HPP Centers	66	89%

Image 1: Radiation Injury Treatment Network Locations

The MDCHPC Radiation Emergency Surge Annex was developed using its members and subject matter expert support. This multi-disciplinary group included several radiation safety officers from our radiation injury treatment facilities and acute care hospitals, Miami-Dade Fire Rescue, The County Department of health, The County's office of Emergency Management, and the coalition staff.

This plan will be reviewed and updated as needed by the MDCHPC. Lessons learned as they emerge from After Action Report/ Improvement Plans following real events or planned training exercises will be incorporated into the annex. Please see Appendix 3.6 for the Radiation Emergency Surge Tabletop Exercise After-Action Report and Improvement Plan. The After-Action report and Improvement plan was created after The MDCHPC and its members participated in a virtual tabletop exercise facilitated by The State of Florida Healthcare Coalitions Taskforce. The exercise had a radiation surge scenario and the MDCHPC had the opportunity to participate as a player along with several other coalitions and their members across Florida. The After-Action report addresses strengths, weaknesses, lessons learned, and identified gaps for the improvement plan.

Miami-Dade County Radiation Emergency Subject Matter Experts:

Radiation/Radiation Injury SME	Contact Information	Associated Agency	Role
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Jorge Munoz	Jorge.munoz@va.gov	Miami VA	Radiation Safety Officer

MDCHPC Radiation Surge Annex Taskforce Members:

Annex Taskforce Member	Contact Information	Associated Agency	Specialty
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Vincent Torres	Vjt3@med.miami.edu	UM Health System	Emergency Management Director
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Abdul Memon	amemon@jhsmiami.org	Jackson Health System	Chief Medical Officer/Disaster &Emergency Preparedness

1.3.4 Demographics

According to the Threat Hazard Identification Risk Assessment Plan (THIRA) 2015 that is routinely updated by Miami-Dade County Office of Emergency Management, the County identifies three main types of hazards in the following order: Natural, Technological, and Human-Caused. Natural hazards may include disease outbreak, drought, hurricanes, flooding, storm/storm surge,

lightning, wildfire, and more. Technological hazards may include coastal oil spills, hazardous material release, nuclear power plant release, structural fire, transportation incident, and water/wastewater incident. Human-caused incidents may include active shooter, civil unrest, food borne illness incident, terrorism (chemical, cyber, explosive, and radiological), and mass migration.

According to the aforementioned information presented in the THIRA, there are several hazards that can cause radiological emergency events in Miami-Dade County. Such hazards may include, but are not limited to, hazardous material release, nuclear power plant release, transportation incidents, and terrorism. Planning for a radiological event is crucial. Miami-Dade County's potential vulnerability would impact a large population. It is the most populous county in Florida as well as a major tourist destination for local and international travelers. Planning for a radiological emergency event will prove useful to Miami-Dade County's radiation treatment facilities, and Trauma Centers. General, at-risk groups include power plant workers, EMS/first responders, and vulnerable populations (e.g., elderly, pediatric community).

1.3.5 Geography

Areas at higher risk of a radiological event in Miami-Dade County include Turkey Point power plant, heavily populated destinations that could potentially be prime targets for terrorists, The Port of Miami, Miami International Airport, Homestead Airforce Base, industrial/research facilities, locations close to railroads carrying highly radiological material, and any facilities that may host highly populated events (conventions, concerts, sporting events, etc.).

1.3.6 Radiation Treatment Facilities

Facilities specific for radiation emergency response including healthcare facilities, trauma centers, specialized treatment centers, urgent care facilities, and community health centers. Miami-Dade County has one RITN (Radiation Injury Treatment Network) facility. The Radiation Injury Treatment Network® (RITN) is a national network of medical centers with expertise in the management of bone marrow failure and works with partners from other medical specialties to assist with managing acute radiation syndrome (ARS) and its health-related consequences. The mission of the RITN is to maximize health-related outcomes among casualties with ARS following a mass casualty disaster involving radiological, nuclear, or chemical agents with marrow toxicity.

All hospitals in Miami-Dade County have agreed to accept radiation injury patients if an MCI occurs. Currently, Miami-Dade County has 7,526 Acute Care Beds. However, this number does not account for unstaffed beds, therefore the actual number may be lower. Below is information on the RITN hospital in Miami-Dade County.

University of Miami/Sylvester Cancer Center
1800 NW 10th Ave
Miami, Florida 33136
Disaster Contact Emergency Phone: (305) 243-9921
RITN Facility: Yes
Trauma Center: No

1.3.7 Key Partners & External Resources

Key partners and external resources with the necessary radiological expertise needed to temporarily provide treatment, support, and recovery skills:

Jackson Memorial
Mercy Hospital
University of Miami Health System
Baptist Hospital of Miami
Miami-Dade Fire Rescue/HAZMAT
The Radiation Emergency Assistance Center/Training Site (REAC/TS): 865-576-3131/865-576-1005
Bureau of Radiation Control: 24 Hr. Emergency: 407-297-2095
Turkey Point Nuclear Powerplant | FP&L

1.4 Assumptions

- Radiation incidents may be accidental in nature (e.g., industrial or transportation accident) or purposeful, require prolonged response and extensive resource management challenges.
- Substantial differences in response protocols and priorities exist between power plant / industrial, terrorist (e.g., RDD/dirty bomb) and nuclear bomb detonation.
- The coalition annex does not replace the need for protocols at each hospital and EMS agency.
- Different agencies may have authority over management of power plant, transportation, and terrorist incidents, including the authority to implement shelter-in-place and evacuation orders.
- The roles and responsibilities of agencies and organizations will change depending on the severity and scale of the incident and the respective level of activation by impacted jurisdictions and should be outlined ahead of an incident.
- Federal, state, and local emergency resources will all be needed during a large-scale event.
- Contamination assessments, proper PPE utilization, and decontamination efforts will be essential in protecting coalition partners, staff, and the public
- Staff at coalition facilities may be impacted by exposure, fear of exposure, or family obligations (e.g., child/family care if schools are closed, acute care facilities are affected).
- Fear from the incident will cause a worried well surge to the emergency departments and pharmacies.

- Public safety (e.g., police, fire, EMS) and other first responder personnel are considered a high-risk population; the implementation of protocols for monitoring control zones and effective contamination control measures will be essential for workforce protection.
- Federal resources (e.g., ambulance contracts, National Disaster Medical System [NDMS] teams) cannot be relied upon to mobilize and deploy for the first 72 hours.
- Management of contaminated waste from decontamination efforts should be managed in consultation with SMEs, EPA, and local water authorities.

Each facility or healthcare organization should understand expectations specific to them as part of the coalition. For example:

- Implementation of surge protocol specific to a radiation emergency will occur quickly-staff must be prepared to pivot operational procedures immediately.
- Initial trauma care should precede radiation injury management.
- Radiation contamination assessments will require rapid protocol and education implementation. Staff will need to evaluate real versus possible exposure, internal versus external contamination, and assess overall exposure levels for at-risk patients based on serial blood testing.
- Specialized expertise (such as clinical advisors, Radiation Safety Experts and Radiation Medical Management Experts) will be needed to manage the complexities of a major radiological incident (e.g., dose estimation, exposure type, treatment plans, site evaluations, decontamination protocol).
- Contaminated injury care and decontamination may require rapid expert consultation.
- Community screening sites will be required to assess low-risk patients.
- Depending on the scale of the radiological event, it may be necessary to establish alternate care sites, especially for radiological exposure requiring higher levels of care.
- Emergency departments, outpatient care centers, and alternate care sites, must be prepared to rapidly screen large groups of potentially exposed individuals, triage, and transport as needed.
- Allocation of limited/scarce resources, and their distribution, should be based on agreed upon prioritization systems / methods and crisis standards of care.
- Large-scale radiological incidents may require the recruitment of volunteers (e.g., Medical Reserve Corp), retirees, and trainees to support and relieve screeners and healthcare workers.
- Some individual healthcare facilities may require large-scale fatality management support.
- Community-based interventions will require significant public health effort if an evacuation or shelter in place order is necessary. Critical infrastructures will be impacted (e.g., food distribution, isolation assistance, surveillance activities).
- Health concerns, prolonged response requirements, difficult work environments, and stress may present behavioral health challenges among staff of coalition members and the public.
- Rural areas may be severely impacted by citizens fleeing an affected area and seeking care.

- Some of the exposed and/or contaminated people will require long term follow up to pick up delayed effects of radiation.

2. Concept of Operations

2.1 Activation

Nuclear/radiological incidents can occur anywhere in Florida, in multiple geographical regions, and throughout the world, requiring systems and protocols to respond to, prevent, and recover from any incident, regardless of location. They may occur for a wide variety of reasons and can range significantly in scope and severity. The most common nuclear/radiological incidents occur because of loss, theft, or mismanagement of relatively minor or low-level radioactive sources or technologically enhanced, naturally occurring radioactive material. Further, natural hazards, such as fires and including severe weather, may impact nuclear or radiological facilities resulting in an incident. The 2011 Fukushima Daiichi nuclear disaster is an example of how this could result in a major international nuclear or radiological incident. Nuclear/radiological incidents can also result from terrorist attempts to acquire or use nuclear threat devices or the nuclear proliferation. The United States faces the threat of both nuclear proliferation and nuclear terrorism. Nuclear or radiological responses can occur as part as the effort to thwart imminent terrorist threats or would occur in response to a nuclear or radiological attack.

Nuclear and radiological facilities include fixed facilities that store nuclear material such as U.S. nuclear weapons and special nuclear material; those that store or use radioactive material that includes commercial nuclear reactors and fuel cycle facilities (uranium enrichment, fuel fabrication, and disposal); some non-fuel cycle industries (such as radiation source and radiopharmaceutical manufacturers); and other facilities and industries involved in the production, refinement, handling, storage, transportation, or use of nuclear/radioactive materials to the environment. Nuclear threat devices include radiological devices and improvised nuclear devices (IND). Radiological dispersal devices (RDD) and radiation exposure devices (RED) release radioactive material into the environment or emit radiation as part of criminal activity or an act of terrorism. The radiological harm caused by a RDD is principally contamination, and denied use of the contaminated area, perhaps for many years. High radiation exposures are unlikely, but costs associated with remediation and loss of access due to an effective RDD could be significant. In addition, an IND using lost or stolen special nuclear material or introduced into the United States from a program of a nuclear state can achieve a nuclear yield and result in mass destruction of property and radioactive contamination. Even a relatively small nuclear detonation in an urban area could result in tens of thousands of fatalities, many survivors requiring, medical care, behavioral health, and dose assessments given concerns of medically relevant exposure, as well as massive infrastructure damage and hundreds of square miles of contamination.

Once the presence of radiation is discovered or suspected, the responding agency should notify appropriate authorities, secure the scene, and establish incident command. Anyone responding to the scene and receiving patients at hospitals would wear personal dosimeters and appropriate PPE and follow the guidance of the designated safety officer to ensure compliance with Emergency Worker Exposure Guidelines. For radiation incidents, protective measures are

founded on the following principles: (1) minimize exposure time to radiation sources or contamination; (2) use shielding where possible; and (3) maintain a safe distance from the source of contamination. Radiation control zones will need to be established near the scene.

For a small dispersal device affecting just a few individuals, the initial response may be handled by on-scene first responders performing any necessary decontamination, or through the coordinated response by Miami-Dade Fire Rescue - HAZMAT/EMS, and any receiving hospital (for victims requiring medical care). For events that affect a larger geographic area and/or large population of individuals, or for incidents in which the presence of radioactive material is not quickly recognized, first responders and victims may unknowingly spread contamination to secondary locations before the radiation event has been detected. Additional information for pre-hospital and hospital medical staff can be found at www.remm.nlm.gov/.

Radiation exposure incidents and events involving the food and water supply pose a unique challenge because the identification of potentially exposed persons may be difficult and require the collection of a large number of human/environmental samples for testing to determine the size and scope of the incident.

For most radiological incidents, law enforcement officials will be involved as they investigate the cause of the emergency. The local Miami-Dade (and perhaps state, depending on the size of the incident) EOC may be activated, or the response operation may be managed by incident command/unified command. The Miami-Dade County Department of Health may serve as part of a unified command and/or the lead for ESF-8.

In some radiological dispersal (contamination) events, there is the chance that individuals might not receive screening/decontamination at the scene of the incident. In this scenario, messages should be crafted to notify citizens of the event, provide instructions for self-care (e.g., at-home decontamination), and direct citizens to the most appropriate source/location for additional information, care, or follow-up. In general, citizens should be directed NOT to go to a medical facility so medical resources are available for those who are seriously injured. Careful messaging is also necessary for events involving radiation exposure devices— to alert people who may have unknowingly come into contact with the device. ESF-8 may take a lead role in developing these messages.

If a Community Reception Center is necessary, ESF-8 will play a key role in coordinating the activities of the CRC and providing staff for the CRC. Individuals potentially affected by the

radiation event should be instructed to report to the CRC in a prioritized fashion (based on proximity to the scene of the incident) to avoid overcrowding of the facility. CRCs allow for the screening of individuals for radioactive contamination and onsite decontamination and provide public health the opportunity to obtain demographic information for an exposure registry and to provide mental health services to those who may need them. Some CRCs may have capabilities to perform internal contamination monitoring and to obtain samples (likely urine) for isotope identification and dose determination. As people exit the CRC, they will either be referred for additional care or discharged to their home, the home of a family member or friend, or to an emergency shelter.

While the long-term monitoring of health and the environment are not the focus of this template, pre-event recovery planning is necessary for an effective response. Recovery planning is primarily the responsibility of the state/local government, with federal assistance available upon request. For example, the CDC may be able to assist with long-term health monitoring of affected individuals. The EPA or NRC may assist with removal of radioactive debris and environmental clean-up. Refer to the Nuclear/Radiological Incident Annex of the NRF for additional information on recovery assistance.

This plan will be activated upon rapid identification and communication to the local jurisdiction of a potential Radiation Emergency Surge incident. This plan can be initiated by any of Miami Dade county's hospitals, health clinics and offices, local health departments, emergency medical services, or County Emergency Operations Centers when a potential event occurs.

A Radiation Emergency Surge incident will result in patients that will exceed radiation (including trauma blast and burn) care resources available. EMS/Hospitals shall consult with the Radiation Safety Bureau Specialist, if immediately available, and can request assistance from The State Bureau of Radiation Control. ESF-8 activates the Radiation Emergency Surge Plan. The Miami-Dade County Office of Emergency Management is responsible for characterizing the incident severity level to establish accurate timelines, impact zones, and assess infrastructure damage.

Note:

1. *OEM Duty Officer is notified by County Warning Point (CWP) of all MCIs above level 2 (20 patients)*

2.2 Notifications

The Coalition has redundant communication capabilities with its members and has demonstrated its effectiveness during real world incidents including the COVID-19 pandemic. During blue skies, the Coalition uses Constant Contact to share information on meetings, plans, trainings, and exercises with its members. During exercises and gray skies, the Coalition uses the Everbridge health alert network to share information with members. During a Radiation Emergency Surge incident, Everbridge system is the usual method of notification via mass notification alerts. The OEM or hospitals would notify each other of a possible Radiation Emergency Surge incident depending on who receives the initial alert. The MDCHPC will maintain continuous communication with ESF-8 to ensure that all healthcare facilities receive the most up to date and

accurate information, instructions, and alerts. The MDCHPC will also assist in the coordination of patient transfers, allocating additional resources, communicating with other agencies that have the capability to assist during such an event.

2.3 Roles and Responsibilities

2.3.1 Command and Coordination

The Incident Command System (ICS) is a management system that is used to achieve optimal command and control within an organization as well as seamless inter-agency coordination during any type of emergency. It uses a clearly defined chain of command with a limited span of control. The overarching goal is to assist Emergency Management and Emergency Support Function 8 (ESF-8) with the National Preparedness Goals mission areas: Prevention, Protection, Mitigation, Response, and Recovery as it relates to healthcare disaster operations.

State Role:

Responsibilities of The Department of Health, Bureau of Radiation Control:

- Provide technical consultation and support to the Governor, the Division of Emergency Management, local governments, and CHDs regarding radiation and radiological health (e.g., determine levels of radiation, health hazards, and need for radiological decontamination) as the principal radiological assessment agency.
- Manage stocks of potassium iodide (KI) and assist the DOH State Pharmacy and DOH Division of Emergency Medical Operations in managing other potentially useful radiation countermeasures.
- Provide dosimetry equipment for emergency responders.
- Coordinate the distribution of radiological data to state and county response organizations.
- Determine the severity of radiological/nuclear emergencies when an actual release of radioactive materials occurs and make recommendations as the primary radiological assessment agency to the Governor, the State Coordinating Officer, and the emergency managers of Risk Counties on protective actions to be taken based on a technical analysis of the situation.
- Maintain liaison with State agencies, local governments, nuclear power plants (NPP), and other users of radiological materials for planning and operational purposes.
- Provide criteria and technical support for the decision to relax protective actions and allow for recovery and reentry into the affected area.
- Collect samples from public and surface water supplies for radiological analysis in the event a radiological release occurs.
- Coordinate with the Department of Environmental Protection in collecting and analyzing air and water samples for radiological contamination.
- Provide staffing and equipment for special events, PRND missions and the missions of other agencies, as feasible.
- The Florida Department of Health has a radiochemistry laboratory in Orlando with a full range of capability for analysis of environmental media, including; air, fauna, milk, soil, vegetation, and water.
- The Florida Department of Health also maintains a Mobile Emergency Radiological Laboratory (MERL) that may be dispatched to the vicinity of the radiological emergency

at the time of an incident. The MERL provides a wide range of capability for analysis of environmental media. The mobile laboratory is self-contained and may be operated without support services, when necessary. (Orlando Bureau of Radiation Control staff will bring the mobile lab, sample preparation vehicle, and field team vehicles, as required)

Regional Role: The State and local ICS structure will expand and contract as the situation warrants. If an area command or multi-agency coordination system (MAC) is used, it will follow Regional Domestic Security Taskforce (RDSTF) geographical boundaries.

Local Role: Ensure provision of health and medical services—Work with local area hospitals to establish "first receiver" facilities for radiation patients. Provide medical professionals with guidance on the medical management of patients affected by radiation as needed. Determine resource needs (e.g., staffing, medical countermeasures) and work through pre-established procedures to request additional resources from neighboring jurisdictions, the state, and/or the federal government (for Strategic National Stockpile, deployable medical teams, etc.). Mental health needs will be significant during and after a radiological event and The County Health Department should work with existing partners (private providers, community services board, voluntary organizations active in disaster, etc.) to ensure access to disaster mental health services for the general public and the responder community.

- Contribute to worker health and safety—Provide the safety officer with recommendations for protecting responder health and safety. This may include establishing radiation control zones around the scene of an incident, providing PPE recommendations, and/or issuing guidance on the safe handling of remains.
- Ensure emergency shelters are safe—Generally, public health is not the lead for shelter operations in a local community (which falls within the realm of ESF 6) unless it is a special needs shelter, in which The Miami-Dade County Health department will operate and staff. However, public health may need to take actions to ensure the safety/health of individuals who are referred to an emergency shelter after a radiation incident. Potential actions may include performing environmental health assessments at shelter sites, providing onsite health department staff to monitor shelter residents for health issues (including ARS), ensuring shelters are accessible to persons with disabilities, potentially monitoring for the presence of radioactive contamination, and provide Potassium Iodide (KI) pills as planned for by The Cities Readiness Initiative.
- Coordinate biological/environmental sampling—For the most effective medical management of patients, it is helpful to know what amount and type of radioactive material has affected the body (internally and externally). Monitoring for internal contamination or significant exposure to external radiation will require biological samples (likely urine) and specific laboratory capabilities. Local/state laboratory capabilities for radiation emergencies are generally limited. Federal laboratories will be called upon to contribute their expertise and expand available lab capacity. Local public health may be able to assist by prioritizing specimens (from those individuals thought to be at higher risk of exposure) and by assisting with specimen collection.
- Ensure the safety of food, water, and air— ESF-8 may be asked to assist with the collection of environmental samples (water, soil and air) in the cold zone. Work with state/federal

emergency response to perform environmental radiological monitoring, sampling, and assessment activities for the response.

- Distributing Potassium Iodide Pills (KI): Cities Readiness Initiative (CRI) is a federally funded nationwide project that focuses on enhancing preparedness in counties and major metropolitan statistical areas. Through CRI, state and large metropolitan county health departments develop plans for delivering medical countermeasures to respond to a large-scale bioterrorist event within 48 hours. Through this program the CHD is able to distribute KI during a radiation emergency. The CHD has established agreements with different community partners to help distribute KI to their workers and families, and the community at large.

EMS Role: During a Radiation Emergency Surge incident, EMS transport symptomatic exposed and injured patients from the scene to radiation treatment facilities and trauma centers or a local hospital for initial treatment and stabilization. Depending on the event, EMS/HAZMAT may also execute gross decontamination of all individuals present at or near the site of the incident.

- Patients with life threats will be cocooned in sheets or radiological materials secured in place and airway protected. Radiological survey will not be performed if it interferes with stabilization.
- Non-life threats will be decontaminated in the field.

If burn/blast injuries are present:

- Major/critical burn patients or any burn patients that meet trauma criteria shall be transported to the nearest trauma center.
- Major/critical burn patients or any burn patients that does not meet trauma criteria shall be transported to the most appropriate burn center.
- Minor burn patients not meeting trauma criteria shall be transported to the most accessible receiving facility.
- Providers may use REMM app for Just-In-Time-Training (JITT).

Hospital Role: Hospitals are responsible for acute health care service provision. All hospitals providing emergency services should be equipped to initially assess, decontaminate, and stabilize victims. Please refer to the following resources for hospital personnel just-in-time trainings: Appendix 3.3.1

- Hospitals caring for a few casualties with exposures in excess of 200 Rad (2 Gy) or with Cytopenia should call REAC/TS for assistance and The Radiation Injury Treatment Network for the coordination of care for large groups of casualties with marrow toxic injuries.
- The MDCHPC can also be utilized to assist hospitals in identifying additional resources.
- Hospitals are to follow normal organizational transfer protocols.
- Hospitals are to follow their own established Crisis Standards of Care protocols when responding to a community-wide radiological event with mass casualties and injuries.

Coalition Role: The Coalition's role in information sharing is to monitor communications from local and State ESF8 and share information with member organizations that is not provided via other partners, such as regional status. Informational posts are monitored, and relevant

information is forwarded or included in the daily situation report. County situation reports are reviewed for situational awareness. The Coalition will also be a main source of information sharing among hospitals receiving patients during a radiological event to identify any supply needs, facilitate patient transfers, and coordinate supply delivery when needed.

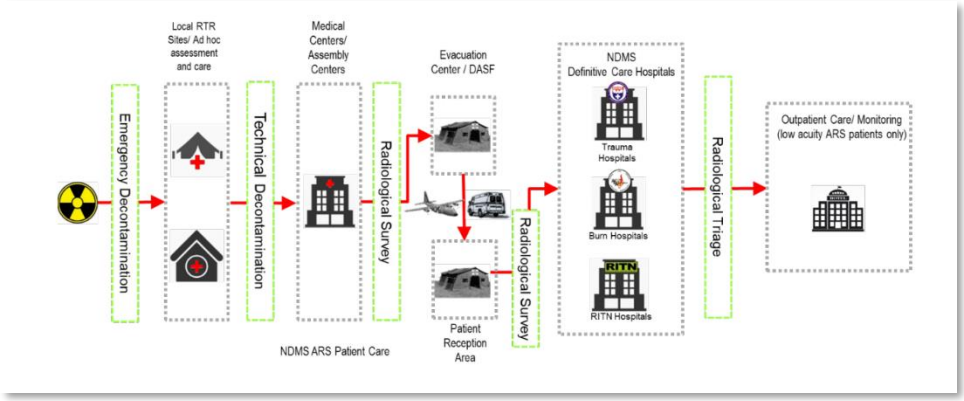
RITN Facility Roles:

- After a nuclear detonation, RITN and other cancer/blood and marrow transplant (BMT) centers may receive large numbers of irradiated casualties, especially those with little or no trauma or burns.
- The goal of pre-incident planning and post-incident management is to maintain a "functional equivalent" of routine care for both casualties and existing patients at RITN centers.
- Biodosimetry can predict prognosis and guide treatment.
- Prioritization for myeloid cytokines (e.g., G-CSF) and other key resources may be necessary due to limited supply of drug, staff, and space.
- Patient tracking, psychosocial care and family re-unification will be key objectives.
- Many evacuated patients will not require hospitalization, and thus outpatient facilities for housing and care will be required.
- Current planning includes patient decontamination prior to transfer to RITN centers via the National Disaster Medical System or other entity. Most initial decontamination will have been self-decon due to large numbers of potential casualties so confirmation may be necessary. However, RITN centers should have plans to confirm adequate decontamination upon arrival.

If adequate resources are available, management of casualties with ARS should utilize the similar approaches and decision points as for patients with cancer receiving myelosuppressive therapy, including, if necessary:

1. Hospitalization
2. Prophylactic antibiotics and myeloid cytokines
3. Placement of venous access
4. Management of emesis, gastrointestinal toxicity, and nutrition
5. Reverse isolation and dietary restrictions
6. Irradiated/leukocyte-depleted transfusions

Guidance on additional radiation-related issues, including internal decontamination, Biodosimetry, adult and pediatric medical order sets and incident response are available at the National Library of Medicine website (https://www.nlm.nih.gov/) and the Centers for Disease Control and Prevention radiation emergency site https://www.cdc.gov/nceh/radiation/emergencies/index.htm. The Figure below shows the conceptual flow of casualties to a RITN Center. The injury pattern and required resources will vary depending on the location relative to the blast. Casualties are expected to undergo decontamination prior to triage for evacuation.



Guidance for Establishing Crisis Standards of Care for Use in Disaster Situations, a Letter Report (https://www.remm.nlm.gov/stdsofcare.htm). The table below describes the transition across different Standards of Care at individual medical venues, based on the imbalance between available resources and need. Transition from conventional (normal operations) to contingency indicates a functional equivalent of routine care through alterations in approach (e.g., repurposing units, extending staff, substituting supplies). In contrast, transition to crisis standards occurs when a functional equivalent of normal care cannot be maintained (e.g., severely injured casualties must be triaged to expectant care) because of inadequate resources. Initially resources will be used from the hospital, however those may deplete quickly. Mutual aid from regional partners may need to be requested once local resources have been exhausted. Some resources may be available through the Strategic National Stockpile (SNS) as regional resources run out. Facilities would need to contact their state SNS coordinator for inventory and request those available resources.

Response Resource Availability and Crisis Standards of Care

Resource continuum:		Normal	Good	Fair/Poor
Operating conditions:		Normal/usual operating conditions, with normal "space, staff, and supplies"	Care functionally equivalent to normal but with constrained resources	Austere operating conditions: care with insufficient "space, staff, and/or supplies"
Response resource adequacy	Space	Usual patient care space fully utilized	–Patient care areas re-purposed (PACU) –Monitored units for ICU-level care	Facility damaged/unsafe, or, Non-patient care areas (e.g. classrooms, etc.) used for patient care
	Staff	Usual staff called in and utilized	Staff extension: –Brief deferrals of non-emergent service –Supervision of broader group of patients –Change in responsibilities, documentation, etc.	Trained staff unavailable or unable to adequately care for volume of patients even with extension techniques
	Supplies	Cached and usual supplies used	Conservation, adaptation, and substitution of supplies with occasional re-use of select supplies	Critical supplies lacking, possible re-allocation of life-sustaining resources
Standard of care continuum:		Medical Standards of Care		
		Conventional care[1]: usual care	Contingency Care[2]	Crisis standards of care[3]: austere operating conditions
			Indicator: potential need to implement "crisis standards of care"	**Trigger:** "crisis standards of care"

Incident demand / resource imbalance increases →

Risk of morbidity / mortality to patient increases →

1 "**Conventional capacity:** The spaces, staff, and supplies used are consistent with daily practices within the institution. These spaces and practices are used during a major mass casualty incident that triggers activation of the facility emergency operations plan."
2 "**Contingency capacity:** The spaces, staff, and supplies used are not consistent with daily practices but provide care that is functionally equivalent to usual patient care practices. These spaces or practices may be used temporarily during a major mass casualty incident or on a more sustained basis during a disaster (when the demands of the incident exceed community resources)."
3 "**Crisis capacity:** Adaptive spaces, staff, and supplies are not consistent with usual standards of care, but provide sufficient of care in the setting of a catastrophic disaster (i.e., provide the best possible care to patients given the circumstances and resources available). Crisis capacity activation constitutes a significant adjustment to standards of care."

* **Adapted from:**
Guidance for Establishing Crisis Standards of Care for Use in Disaster Situations, a Letter Report (Institute of Medicine of the National Academies, 2009, see especially pages 52-54).

2.4 Logistics

ESF-8 is responsible for resource management include logging, tracking, and vetting resource requests across the HCC and in coordination with the ESF-8 lead agency. The state uses WebEOC to track all mission requests. MDCHPC has a Supply Mitigation Strategy that can be used as a supporting document to this annex. Examples of supply or resource issues that may present during a radiation emergency incident include staffing, PPE, clean water, decontamination equipment (tents, showers, etc.), radiation detection equipment, and radiation treatment medication/prophylaxis.

2.4.1 Space

Under the direction of the County Office or Emergency Management, emergency shelters may be opened to the public for sheltering and/or environmental health assessments and mass prophylaxis. Miami-Dade County has pre-identified shelter sites using local public-school structures. Alternative Care Centers may be used depending on the incident.

2.4.2 Staff

MDCHPC will utilize available health care facility and/or Bureau of Radiation Control radiation safety officers/nuclear medicine personnel to assist with critical decision making and response coordination. Consideration for cross-training staff on radiological safety and response protocol and leveraging staff from Radiation Injury Treatment Network (RITN) medical centers, pediatric critical care hospitals, or other major medical centers will take place. All decontamination teams at Miami-Dade County hospitals have protocols in place to guide radiologic decontamination activities within those facilities. Local healthcare facilities may also leverage existing government and non-governmental volunteer registration programs (e.g., Emergency System for Advance Registration of Volunteer Health Professionals [ESAR-VHP] or MRC personnel) or NDMS staffing support. During a Radiation Emergency Incident, hospitals may consider implementing plans to expedite credentialing, licensing, and onboarding while reducing liability, compensation policies for temporary staff.

Maintaining appropriate staffing in healthcare facilities is essential to providing a safe work environment for healthcare personnel (HCP) and safe patient care. Healthcare facilities must be prepared for potential staffing shortages and have plans and processes in place to mitigate them. Plans may include communicating with HCP about actions the facility is taking to address shortages, maintain patient and HCP safety and providing resources to assist HCP with anxiety and stress.

Health care facilities should be in communication with local healthcare coalitions, federal, state, and local public health partners (e.g., public health emergency preparedness and response staff) to identify additional HCP (e.g., hiring additional HCP, recruiting retired HCP, using students or volunteers), when needed. The state of Florida has an approved vendor list that includes nursing and support staff through contractual augmentation. This was tested in the real-world pandemic response.

2.4.3 Supplies

Resource management include logging, tracking, and vetting resource requests across the HCC and in coordination with the ESF-8 lead agency. This is done at the county level ESF-8. The state uses WebEOC to track all mission requests.

The process for redistribution of available resources in the event of a medical surge event is outlined below:

- If a Coalition member organization needs assistance during a disaster response (staff, equipment, supplies, or other resources), the member organization submits a request to the County Emergency Operations Center (EOC). It is the county's responsibility to try to fulfill the organization's request.
- If the County EOC is unable to fulfill the request, the County submits requests to the State EOC through WebEOC. Once a request has been received by the State EOC from a county, it is initially processed by the County Liaison Desk under the direction of the Operations Support Branch, who verifies the information. From there, it is assigned to the proper branch for tasking to the appropriate ESF. If the ESF can meet the provisions of the request, resource information is forwarded to the county EOC. If the ESF cannot provide the requested resources, it is then forwarded to the Logistics Section, who will work with either private vendors or through the Emergency Management Assistance Compact (EMAC) to secure the resources. If the resources are identified from private sources, the vendor information is given to the county emergency operations center.
- The Coalition has a cache of resources that may be available to coalition members among requests. Currently, a Coalition radiation cache is maintained by UHealth/Jackson as the local RITN Facilities. Please see MDCHPC Radiation Response Cache.
- The Supply Chain Annex is also used as a reference during resource shortages and allocation.

2.5 Operations – Medical Care

Radiation guidance for emergency responders:

A summary of emergency response guidance to radiation incidents is presented in the table below, (this guidance is subject to change):

Table 1

Suggested Radiation Exposure Guidance for Emergency Actions

Action	Guidance or Suggested Trigger Levels
First response (emergency work)	500 mSv (50 rem) TEDE (life-saving activities)[1] 250 mSv (25 rem) TEDE (life-saving activities)[2] 0.5 Gy (50 rad) Decision Dose (life-saving activities) 100 mSv (10 rem) TEDE (protect property only)[2] 500 mSv (50 rem) TEDE (protect property only)[4]
Turn back value for emergency response personnel	10 mSv/hr (1 rem/hr)[1] 50 mSv/hr (5 rem/hr) [3]
Follow up response (non-emergency work)	50 mSv/yr (5 rem/yr) TEDE[1] 5 mSv/day (0.5 rem/day) TEDE[3]
Sheltering	5-50 mSv (0.5 – 5 rem) TEDE averted[1]
Evacuation	50-500 mSv (5 – 50 rem) TEDE averted[1]
Administer KI	50-500 mSv (5 – 50 rem) averted thyroid dose[1]
Restriction on use of contaminated foodstuffs during an emergency	10 mSv/yr (1 rem/yr) TEDE from any single source[1]

TEDE = Total Effective Dose Equivalent = sum of deep dose equivalent for external radiation and the committed dose equivalent for internal radiation.

Exposure Monitoring:
Instrument Selection: Radiation cannot be detected by the human senses. A variety of instruments are available for detecting and measuring radiation.

During the first few hours in which responders may be exposed to ionizing radiation, a method to evaluate accumulated exposure as well as detecting contamination and measuring exposure rates would be useful.

To determine accumulated exposure, it is recommended that self-reading dosimeters, i.e., "pocket dosimeters", and chargers or electronic dosimeters, e.g., radiological pagers, be used to monitor exposure to individuals. The Electronic Personal Dosimeters (EPD) have proven to be more effective in an emergency response situation when compared to self-reading dosimeters because they read both gamma and beta doses, whereas the pocket dosimeters read only gamma.

The Department of Health has a contract with a National Voluntary Laboratory Accreditation Program-certified dosimetry company to pro- vide dosimeter badges to State Emergency Response Team personnel. These dosimeter badges are stored in each location at risk for nuclear reactor incidents and include: Palm Beach County; Indian River County; Brevard County; Miami-Dade County; Monroe County; Levy County; Citrus County; St. Lucie County; Martin County; and, at the Division of Emergency Management building in Tallahassee.

Exposure rate measurements are important in determining the length of time a person can remain in a certain radiation field. An exposure rate meter, typically an ion chamber or energy-compensated Geiger-Mueller (GM) device, is energy independent and can be used for determining control zone boundaries and assessing package integrity.

GM meters are not designed to measure radiation exposure. Their greatest benefit lies in locating contamination on personnel and equipment and verifying the success of removing contamination. A practical goal for whole body personnel decontamination has been set at no more than twice background using a sensitive detector such as a pancake GM meter.

All emergency personnel will be monitored at appropriate county monitoring and decontamination stations.

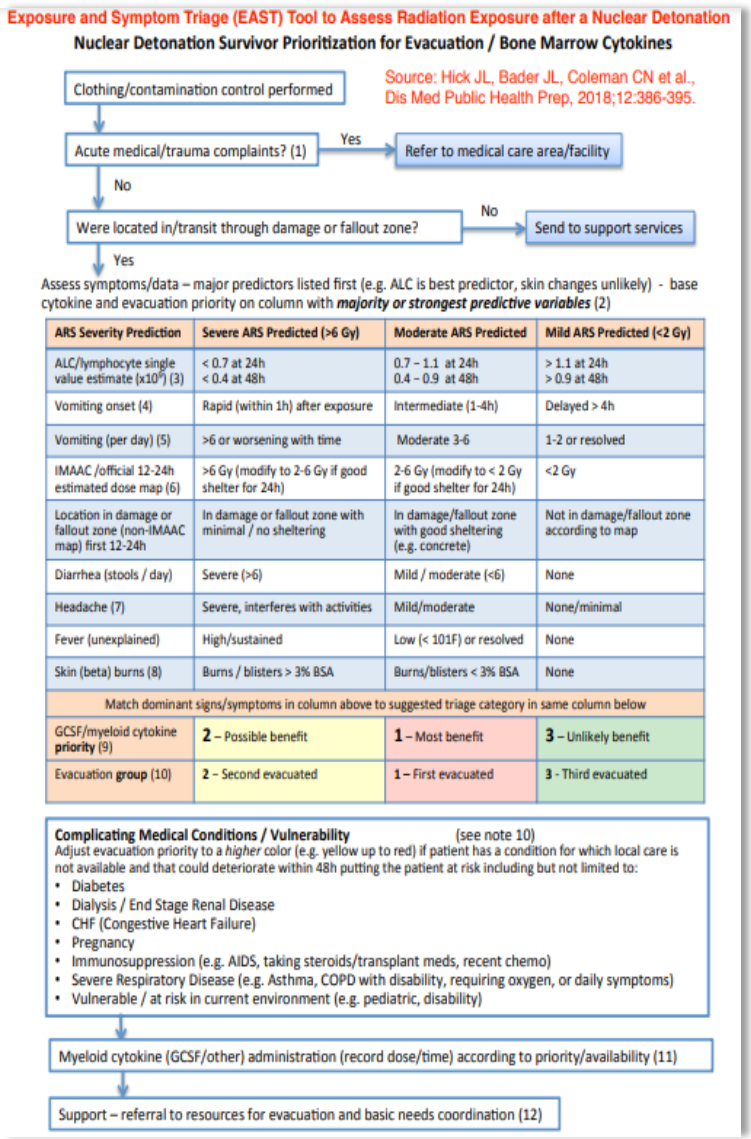
Every hospital should have plans to maintain operations during a radiological or nuclear incident of any type and scope, and to provide care for the victims of such an incident. The role of a hospital in a radiological or nuclear incident is to provide medical treatment for persons with significant injuries from the incident, medically significant internal contamination, life-threatening radiation doses, or a combination of these. Furthermore, the hospital still has responsibilities to care for those not involved in the incident. It is not the role of hospitals to decontaminate uninjured persons with external radionuclide contamination. Pre-incident planning is necessary to ensure appropriate triage of the victims of a radiological or nuclear incident despite possible hindrances such as large numbers of patients with traumatic injuries; medical facilities being overwhelmed by uninjured patients concerned about possible radiation exposure and radionuclide contamination; and medical staff's lack of experience in triage of, and possibly fear of, such patients.

2.5.1 Triage and Screening

Each hospital in or near a major metropolitan area should prepare for the contingency that it could be in the hot zone [outdoor exposure rate >10 mR h–1 (~0.1 mGy h–1 air-kerma rate). Health care providers may use the REMM app for triaging and JITT, the Exposure and Symptom Triage (EAST) tool after a nuclear detonation or Trauma/Combined Injury for patients with injuries.

Health care providers should look for signs of ARS by performing a targeted physical examination. Following the physical examination, clinicians should estimate dose from exposure, begin assessment and management, and follow up with care recommendations based on findings. The following link includes guidance on diagnosing and managing Acute Radiation Syndrome (ARS). Pre-hospital triage and Radiation Patient Treatment Algorithm job aides are provided in the Appendices section of this Annex under Additional Resources.

The Exposure and Symptom Triage (EAST) tool to assess radiation is also a recommended resource for clinicians and first responders.



Exposure and Symptom Triage (EAST) Tool to Assess Radiation Exposure after a Nuclear Detonation

Nuclear Detonation Survivor Prioritization for Evacuation / Bone Marrow Cytokines

Source: Hick JL, Bader JL, Coleman CN et al., Dis Med Public Health Prep, 2018;12:386-395.

Clothing/contamination control performed

Acute medical/trauma complaints? (1) — Yes → Refer to medical care area/facility

No

Were located in/transit through damage or fallout zone? — No → Send to support services

Yes

Assess symptoms/data – major predictors listed first (e.g. ALC is best predictor, skin changes unlikely) - base cytokine and evacuation priority on column with ***majority or strongest predictive variables*** (2)

ARS Severity Prediction	Severe ARS Predicted (>6 Gy)	Moderate ARS Predicted	Mild ARS Predicted (<2 Gy)
ALC/lymphocyte single value estimate ($x10^9$) (3)	< 0.7 at 24h < 0.4 at 48h	0.7 – 1.1 at 24h 0.4 – 0.9 at 48h	> 1.1 at 24h > 0.9 at 48h
Vomiting onset (4)	Rapid (within 1h) after exposure	Intermediate (1-4h)	Delayed > 4h
Vomiting (per day) (5)	>6 or worsening with time	Moderate 3-6	1-2 or resolved
IMAAC /official 12-24h estimated dose map (6)	>6 Gy (modify to 2-6 Gy if good shelter for 24h)	2-6 Gy (modify to < 2 Gy if good shelter for 24h)	<2 Gy
Location in damage or fallout zone (non-IMAAC map) first 12-24h	In damage or fallout zone with minimal / no sheltering	In damage/fallout zone with good sheltering (e.g. concrete)	Not in damage/fallout zone according to map
Diarrhea (stools / day)	Severe (>6)	Mild / moderate (<6)	None
Headache (7)	Severe, interferes with activities	Mild/moderate	None/minimal
Fever (unexplained)	High/sustained	Low (< 101F) or resolved	None
Skin (beta) burns (8)	Burns / blisters > 3% BSA	Burns/blisters < 3% BSA	None
Match dominant signs/symptoms in column above to suggested triage category in same column below			
GCSF/myeloid cytokine **priority** (9)	**2** – Possible benefit	**1** – Most benefit	**3** – Unlikely benefit
Evacuation **group** (10)	**2** – Second evacuated	**1** – First evacuated	**3** - Third evacuated

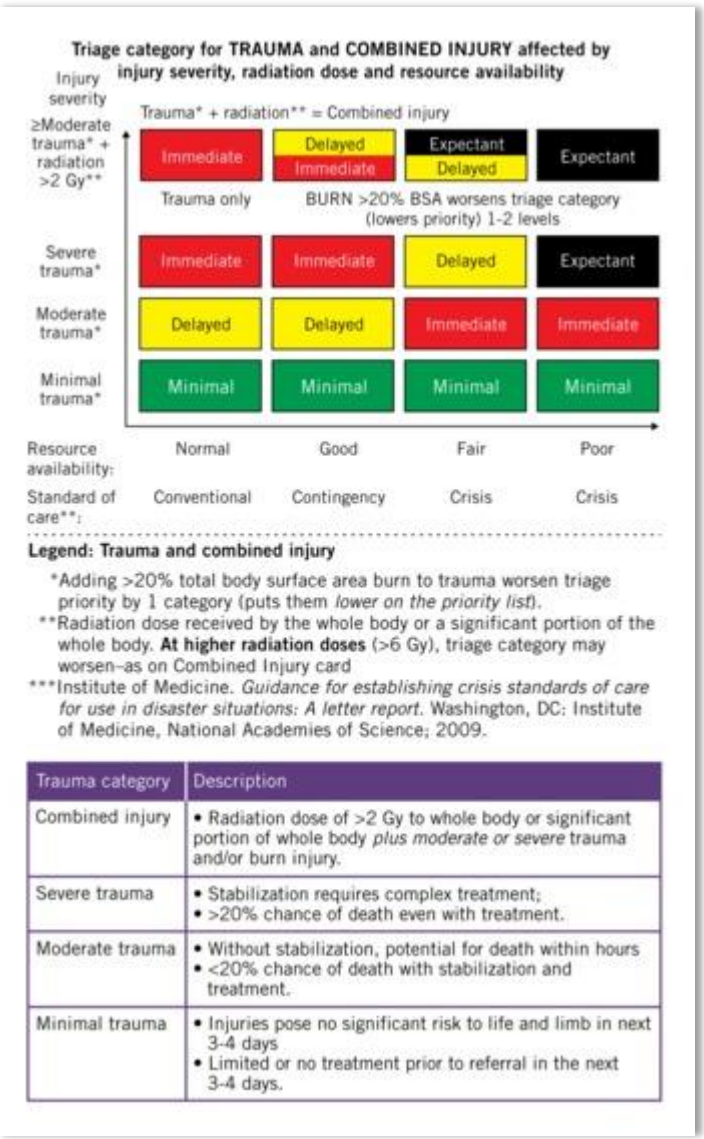
Complicating Medical Conditions / Vulnerability (see note 10)

Adjust evacuation priority to a *higher* color (e.g. yellow up to red) if patient has a condition for which local care is not available and that could deteriorate within 48h putting the patient at risk including but not limited to:

- Diabetes
- Dialysis / End Stage Renal Disease
- CHF (Congestive Heart Failure)
- Pregnancy
- Immunosuppression (e.g. AIDS, taking steroids/transplant meds, recent chemo)
- Severe Respiratory Disease (e.g. Asthma, COPD with disability, requiring oxygen, or daily symptoms)
- Vulnerable / at risk in current environment (e.g. pediatric, disability)

Myeloid cytokine (GCSF/other) administration (record dose/time) according to priority/availability (11)

Support – referral to resources for evacuation and basic needs coordination (12)



Triage category for TRAUMA and COMBINED INJURY affected by injury severity, radiation dose and resource availability

Injury severity	Trauma* + radiation** = Combined injury			
≥Moderate trauma* + radiation >2 Gy**	Immediate	Delayed Immediate	Expectant Delayed	Expectant
	Trauma only	BURN >20% BSA worsens triage category (lowers priority) 1-2 levels		
Severe trauma*	Immediate	Immediate	Delayed	Expectant
Moderate trauma*	Delayed	Delayed	Immediate	Immediate
Minimal trauma*	Minimal	Minimal	Minimal	Minimal
Resource availability:	Normal	Good	Fair	Poor
Standard of care**:	Conventional	Contingency	Crisis	Crisis

Legend: Trauma and combined injury

*Adding >20% total body surface area burn to trauma worsen triage priority by 1 category (puts them *lower on the priority list*).

Radiation dose received by the whole body or a significant portion of the whole body. **At higher radiation doses (>6 Gy), triage category may worsen–as on Combined Injury card

***Institute of Medicine. *Guidance for establishing crisis standards of care for use in disaster situations: A letter report*. Washington, DC: Institute of Medicine, National Academies of Science; 2009.

Trauma category	Description
Combined injury	• Radiation dose of >2 Gy to whole body or significant portion of whole body *plus moderate or severe* trauma and/or burn injury.
Severe trauma	• Stabilization requires complex treatment; • >20% chance of death even with treatment.
Moderate trauma	• Without stabilization, potential for death within hours • <20% chance of death with stabilization and treatment.
Minimal trauma	• Injuries pose no significant risk to life and limb in next 3-4 days • Limited or no treatment prior to referral in the next 3-4 days.

2.5.2 Patient Care/Management

Radioactive contamination, internal or external, is rarely immediately life-threatening and, therefore, treatment of significant medical conditions should always take precedence over radiological assessment or decontamination of the patient. Crisis Standards of Care Plans should be followed by each healthcare facility to ensure the appropriate treatment is given to save the most lives during austere conditions and limited resources.

The MDCHPC will facilitate communication between local government and all healthcare and long-term facilities affected by a radiation surge incident. The MDCHPC may assist in allocating additional resources, coordinating the communication between hospitals to move patients to receiving hospitals during the surge, and ensuring that all coalition members are supported and being provided with the latest information, guidance, and alerts.
The Radiation Injury Treatment Network has many RITN hospitals throughout the nation with 4 in Florida and 1 in Miami-Dade County (UM Sylvester Comp. Cancer Center). The RITN has published Acute Radiation Syndrome Treatment Guidelines for hospitals to use as a resource.

The MDCHPC also has a Pediatric Surge and Burn Surge Annexes that can be referenced during an MCI.

2.5.3 Treatment

The MDCHPC's main function is communication and resource sharing. The MDCHPC does not plan for and implement any monitoring and treatment protocols for radiologically exposed patients. The MDCHPC can assist in facilitating patient transfers to receiving facilities from overwhelmed hospitals experiencing a medical surge due to a radiation emergency surge incident. The MDCHPC can facilitate the resource requests for treatments and prophylaxis *(See image below)* that may be provided by the local and state government in collaboration with The Strategic National Stockpile and the CDC. The MDCHPC may establish consultation and coordination mechanisms with hematology, oncology, radiology facilities in Miami-Dade County and neighboring counties during a widespread incident/event. The MDCHPC will also maintain engagement with the Radiation Injury Treatment Network (RITN) and other similar organizations to stay up to date on currently approved treatment protocol and share the information with coalition members.

The U.S. Department of Health and Human Services (HHS) has compiled several resources to guide clinicians in triaging and managing treatment for radiation and combined injuries: The Radiation Emergency Medical Management program. Clinicians can visit the aforementioned resource to find guidance and best practices for managing treatment and triage. They may also reach out to REAC/TS for help managing a few patients with ARS and RITN or large groups of casualties with marrow toxic injuries.

REAC/TS Mission

RADIATION MEDICINE

- **Provide advice and consultation on diagnosis and management of ionizing radiation-related injuries**
- **Deployment capabilities in US support of DOE/NNSA and internationally**

EDUCATION AND EXPERTISE

- **Provide state of the science educational opportunities for the emergency preparedness and response community in the US and throughout the world**
- **REAC/TS Emergency Number: 865-576-1005**
- **REAC/TS Website, Radiation Emergency Resources: www.orise.orau.gov/resources/reacts/triage.html**

RADIATION DOSE ASSESSMENT

- **Perform cytogenic dicentric chromosome assay (DCA) as "gold" standard of Biodosimetry**

Additional resources can be found in the Appendices section of this annex with just-in-time trainings and printable job aide sheets. One resource worth highlighting is the "Prototype / Template for Adult and Pediatric Hospital Orders During a Radiation Emergency". This document outlines several elements that providers need to document while caring for patients, and most importantly, a guide on what medication to administer depending on the isotope in question. For example, if the isotope is Cesium (Cs-137), Prussian Blue insoluble is recommended to be orally administered. The guide for both adult and pediatric patients can be accessed here.

2.5.4 Safety and Control Measures

The MDCHPC will facilitate communication and critical alerts to and between hospitals and long-term care facilities. Communications may include warnings, instructions, guidance from local government, or call for resource requests. A hospital should initiate its emergency radiological response upon notification of a radiation emergency. Designated personnel should immediately report to the individual in charge of the facility's radiation protection program. Ambulance personnel should be notified which entrance has been designated for receipt of radiological casualties for transport to the emergency room. Nonskid plastic sheeting can be placed as needed down the corridors where ambulance stretchers are wheeled to the ER. If injuries are not serious, the patient may be wrapped in clean sheets and transferred from the ambulance stretcher to a clean stretcher and then down the usual corridors with the contamination contained within the wrappings. By using a double sheet, contaminated clothing can be cut off and removed by rolling the patient from one side to the other to free the clothing. Clothing is wrapped in the inner sheet and removed to a plastic bag. The outer sheet remains around the patient (ASTRO, 2006).

2.5.5 Fatality Management

From a planning perspective, handling contaminated remains is very similar to screening and decontaminating living people. Responders and ME/Cs responsible for receiving and processing decedents should have access to radiation detectors to survey remains; appropriate dosimetry; and either soap and water or an appropriate dry decontamination method (e.g., vacuums with HEPA filters). Radiation contamination control methods should be included in plans to prevent the spread of radiation and reduce dose to ME/Cs working to process fatalities. Generally, following decontamination, no special container or transport method will be required for contaminated remains. If remains still exceed contamination limits following decontamination, temporary internment or storage at the site may be necessary. The final resting place for contaminated remains should be considered carefully during planning. Lead coffins are generally not recommended as they pose an additional environmental hazard due to leeching heavy metals. Cement coffins are a better alternative, serving the same purpose without the environmental risks. Similarly, cremation is not generally recommended due to the potential concentration of remaining radionuclides and the potential for contamination of the cremation facility. As with all fatality management, care should be taken in planning to ensure respect for the remains is maintained throughout the process. Handling of contaminated remains still requires planners to accommodate the social, cultural, and religious considerations of the deceased and their families to the maximum extent possible. Please refer to The CDC Guidelines for Handling Decedents Contaminated with Radioactive Materials.

2.5.6 Transport

Miami-Dade Fire Rescue agencies are responsible for the transport of patients to healthcare facilities. Patient transfers will be coordinated by ESF-8 with MDCHPC's support from the Emergency Operations Center (EOC) at the Miami-Dade County Office of Emergency Management System (OEM). In the event of a large-scale event, hospitals may operate while collaborating with The National Disaster Medical System (NDMS) and DMAT.

During a federally declared disaster or public health emergency, the number of patients that need to be evacuated or cared for may exceed state and local resources. When that happens, states can request federal assistance. In response, the National Disaster Medical System (NDMS), within the U.S. Department of Health and Human Services (HHS), provides medical teams and equipment to support the initial emergency response, transportation, and definitive care for patients who are at-risk or have become seriously ill or injured as the result of the disaster or emergency. Federal patient movement is a coordinated partnership between HHS, Department of Homeland Security (DHS), the Department of Veterans Affairs (VA), and the Department of Defense (DoD).

NDMS provides support for patient movement and evacuation from areas impacted by the disaster to designated reception facilities within the NDMS health care facility network. Patient movement is coordinated by 64 Federal Coordinating Centers (FCCs) across the country that are managed by DoD and VA. NDMS responders from Disaster Medical Assistance Teams (DMAT) and Trauma Critical Care Teams (TCCT) provide pre-hospital care and support patient transport in disaster zones during patient evacuation.

2.5.7 Surveillance, Tracking, and Situational Awareness

The MDCHPC is committed to its role in maintaining and promoting situational awareness. The MDCHPC has protocol for developing and sharing critical situational awareness information including availability of essential resources and burn beds, surge capacity status of hospitals, decontamination, shelter in place, evacuation status and locations and more. The MDCHPC uses email, Constant Contact, Everbridge Mass Notification Systems, and SMS to maintain and promote situational awareness.

2.5.8 Rehabilitation and Outpatient Follow Up Services

An important element of planning is establishing procedures and identifying resources for initiating a registry that will track all potentially affected people (responders, emergency workers, public, etc.). Similar to information collected at Points of Dispensing (PODs) during response to infectious diseases, data collection for a radiation registry should start at Coordinated Resource Centers (CRC) or mass care shelters to identify and contact people who may require short-term medical follow-up or long-term health monitoring. Acknowledging that many CRCs may only be able to collect basic information such as name, location during the event, and contact information for future follow-up, the registry should also collect radiation-related information, such as contamination measurements and distance from the incident, from all individuals who visit the CRC or mass care shelter. This includes the public, first responders, public health workers, and medical staff. Information can be collected using paper forms with digital data entered at a later time. Use of paper forms is a common option in CRC plans, as they require less trained staff. Tools such as the CDC CRC Electronic Data Collection Tool (CRC eTool); Agency for Toxic Substances and Disease Registry (ATSDR) Rapid Response Registry (RRR) and Epi Contact Assessment Symptom Exposure (Epi CASE); and NIOSH Emergency Responder Health Monitoring and Surveillance (ERHMS) system can also be used to gather and assess data, though these tools may require more staff and training to utilize.

2.5.9 Deactivation and Recovery

The MDCHPC will deactivate this annex once local county government deactivates (OEM), or in the case of a larger scale incident, The Florida Department of Emergency Management (FDEM) deactivates. The MDCHPC will create an After-Action Report (AAR) that will include input from all the local healthcare facilities, local government, EMS, and more. The AAR will be used to identify areas for improvement and next steps to initiate projects to accomplish the necessary improvements. Projects may include trainings, exercise, acquiring resources, establishing partnerships, and more.

2.6 Special Considerations

2.6.1 Behavioral Health

Disaster Behavioral Health responders work with survivors, families, responders, and the community to assist with the mitigation of emotional, psychological, and physical effects of a disaster, natural or man-made. Disaster behavioral health responders apply the concepts of psychological first aid to help those affected overcome the initial impact of shock, denial, and depression when confronting disasters. The MDCHPC will promote situational awareness on

available resources for psychological first aid and/or stress first aid. The MDCHPC also has certified Stress First Aid instructors in its cadre that are available to deploy to any member facility and provide Stress First Aid to healthcare providers, staff, and first responders.

2.6.2 Pediatric and At-Risk Populations

The MDCHPC as a documented Pediatric Surge Annex that can be used as an additional resource to this annex. The Pediatric Surge Annex includes guidance and recommended actions to responding to a pediatric surge emergency in Miami-Dade County. Special considerations and care options are identified in the annex with emphasis on available resources for special populations during an emergency or MCI.

2.6.3 Communications

The MDCHPC has protocol for developing and sharing critical situational awareness information including availability of essential resources and burn beds, surge capacity status of hospitals, decontamination, shelter in place, evacuation status and locations and more. The MDCHPC uses email, Constant Contact, Everbridge Mass Notification Systems, and SMS to maintain and promote situational awareness. The MDCHPC will work with member organizations and local government to ensure streamlined communications efforts across the community to prevent the public from overwhelming healthcare systems. Priority will be placed on consistent messaging and understanding of incident status and severity via use of the Centers for Disease Control Radiation Hazard Scale. Mechanisms are in place to maintain awareness of current conditions within Miami-Dade County and surrounding areas, and every effort will be made to monitor multiple sources of information to identify and counter rumors and misinformation. The MDCHPC also ensures the marketing of FEMA's Public Information Office (PIO) course to its members on a regular basis to maintain readiness for any emergency.

2.6.4 Jurisdictional-Specific Considerations

Planners should be aware that pre-established relationships with neighboring communities are vital to facilitate message dissemination support during a radiation emergency. The MDCHPC prioritizes collaboration with other healthcare coalitions in Florida, especially when it comes to exercising plans in a collective approach. This unified approach ensures that Florida healthcare coalitions can rely on each other when it comes to resource sharing and are aware of their planning strategies to hopefully establish a unified approach during an emergency.

3. Appendices (links)

3.1 Training and Exercises

The Miami Dade County Healthcare Preparedness Coalition tested this Radiation Emergency Surge Annex through a Tabletop Exercise. The exercise was held on May 17th, 2023. Players included local ESF-8, Office of emergency management, EMS/Fire Rescue, Miami Dade County's 2 radiation treatment centers, and trauma hospitals and acute care centers from Miami-Dade and Palm Beach County.

3.2 Legal Authorities

The annex provides guidance to support a coordinated healthcare response to a radiation emergency in which the number and severity of exposed or possibly exposed patients challenges the capability of The Miami-Dade County Healthcare Preparedness Coalition (MDCHPC) member facilities. This Annex does not replace other county or local emergency operations plans or procedures, but rather builds upon the existing plans and their annex.

3.3 Additional Resources/References

3.3.1 Just-in-time Training

- **Just-in-time training video series**

The REAC/TS just-in-time training videos are intended for emergency medical responders and providers who need rapid information when called to care for individuals who are ill or injured during a radiological incident. This series is divided into multiple videos by subject matter, each 2-3 minutes in length. You can also watch the entire series in approximately 20 minutes, providing valuable information in a short timeframe.

https://orise.orau.gov/resources/reacts/just-in-time-training-videos.html

- **REAC/TS RadMed App**

The REAC/TS RadMed application is now available for download on Apple and Android devices. The application provides resources on radiation incidents and medical management in an easily navigated format. The eGuide *The Medical Aspects of Radiation Incidents, 5th edition* provides information needed for the medical management of those involved in radiation incidents in an easy-to-understand manner.

- **Radiation Injury Treatment Network Training Materials**

3.4 Supporting Documents

Pediatric Surge Annex
Burn Surge Annex
Disaster Preparedness for Radiology Professionals

3.5 Additional Resources

- NRC RDD/Dirty Bomb Backgrounder and FAQ document
- NRF Nuclear/Radiological Incident Annex
- HHS/ASPR Radiological Dispersal Device Playbook
- Program Manual | Radiological Emergency Preparedness FEMA P-1028

- Community Reception Centers – with posters, video, job action sheets, and customizable job aids for CRCs.
- Handbook for Responding To A Radiological Dispersal Device (Dirty Bomb) First Responder's Guide
- Population Monitoring in Radiation Emergencies
- Planning Guidance for Response to a Nuclear Detonation
- Disaster Mental Health: Assisting People Exposed to Radiation from New York State Department of Health
- Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies
- Clive M. Tan, Daniel J. Barnett, Adam J. Stolz, and Jonathan M. Links
    - Radiological Incident Preparedness: Planning at the Local Level Disaster Medicine and Public Health Preparedness 2011 v. 5, p. S151-S158.
- **NACCHO Advanced Practice Center (APC) Tools** (http://apc.naccho.org)
- PPE, Decontamination, and Mass Triage: A Short Course
- Psychosocial/Behavioral Response to Radiological and Nuclear Disasters
- Responding to Chemical and Radiological Disasters: A Self-Paced Training Course and Training Manual
- Crisis, Emergency, and Risk Communication (CERC) Toolkit— radiation specific message maps and fact sheets
- Urban to Rural Evacuation Tool
- Designing, Implementing, and Evaluating a Public Health Exercise: A Dirty Bomb Disaster
- Master the Disaster!
- Planning and Implementing a Public Health Exercise for Radiological Events: An Exercise Guide
- Prehospital Radiological Triage
- Radiation Patient Treatment Algorithm
- PPE Donning and Doffing
- Personnel Monitoring
- Patient Radiological Surveys
    - How to use patient survey sheet
    - Patient Radiological Survey Sheet
- Area Radiological Survey Sheet
- Radioactive Contamination Survey Instrumentation Job Aid
- **Radiation related infographics**
- This link contains downloadable infographics in PDF form that can be used to display at different facilities or for public awareness and education. The infographics contain illustrations on the below topics:
    - Decontamination for yourself and others
    - Dirty bomb or radiological dispersal device
    - How potassium Iodide works
    - How Prussian Blue works
    - How you can help in a radiation emergency

- Improvised nuclear device
- Nuclear explosion Preparedness
- Nuclear powerplants accidents
- Nuclear weapon
- Nuclear detonation
- Radiation contamination vs. Exposure
- Radiation emergencies and pregnancy
- Radiation units
- Radiological exposure device
- Transportation accidents
- Where to go in a radiation emergency
- Workplace radiation accidents

3.6 MDCHPC Radiation Response Cache

- 48-4231 Model 3005 Digital Survey Meter w/Internal Detector 3
- 4498-1018 LMI Lumic Calibration Kit Model 3000 Series 1
- 48-1611 Model 14C Survey Meter 7
- 47-3789 Model 44-9DOSE Pancake GM Detector w/Dose Filter 7
- 48-3967 Model 711i Isotope Identifier 1
- 48-4237 Model 52-8/2 Outdoor Portable Portal Monitor 1
- 48-3603 Model 52-6-1 Portable Portal Monitor 1
- 4215-374 Model 52-1 Base for Vehicle Monitoring 1

3.7 Abbreviations and Acronyms

AMA	American Medical Association
ARS	Acute radiation syndrome
ASPR	Assistant Secretary for Preparedness and Response
CDC	Centers for Disease Control and Prevention
CRC	Community reception center
CRCPD	Conference of Radiation Control Program Directors
CSTE	Council of State and Territorial Epidemiologists
DHS	Department of Homeland Security
DOE	Department of Energy
DTPA	Diethylentriamene pentaacetate
EMS	Emergency medical services
EOC	Emergency operations center
EPA	Environmental Protection Agency
ESF	Emergency support function
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FRMAC	Federal Radiological Monitoring and Assessment Center
Hazmat	Hazardous materials
HHS	U.S. Department of Health and Human Services
KI	Potassium iodide

LHD	Local health department
MRC	Medical Reserve Corps
NRC	Nuclear Regulatory Commission
NRF	National Response Framework
PIO	Public information officer
PPE	Personal protective equipment
RDD	Radiation dispersal device
REAC/TS	Radiation emergency assistance center/training site
RED	Radiation emission/exposure device
REMM	Radiation emergency medical management