



TRACIE

HEALTHCARE EMERGENCY PREPAREDNESS
INFORMATION GATEWAY

Radiological and Nuclear
Topic Collection
9/16/2015



Topic Collection: Radiological and Nuclear

A large-scale radiological release or nuclear detonation incident could result in a significant surge of patients, including those who may not have actually been exposed, but seek medical attention anyway. Power plant incidents, radiation dispersion devices, and improvised nuclear device detonations result in very different injury/exposure patterns and response planning will need to account for each of these. Patients exposed to radiation may simply be “irradiated” (gamma waves pass through them without any direct material on/in the patient) or can be “contaminated” if internal or external radioactive material is present. Both exposures result in dose-dependent damage to body tissues. In most cases of radiation dispersion devices, the risk of injury is very low, but in nuclear device detonations large numbers of patients may have acute radiation illness and require evaluation and treatment. The resources in this Topic Collection include toolkits, reference guides, plan guidance documents, modeling and simulation reports, and manuals that may help first responders and first receivers assess, triage, and treat casualties of radiological and nuclear emergencies.

Each resource in this Topic Collection is placed into one or more of the following categories (click on the category name to be taken directly to that set of resources). Resources marked with an asterisk (*) appear in more than one category. *(Please note: this Topic Collection does not include a comprehensive overview of responder health and safety issues. Please refer to the [Responder Safety and Health](#) and [Decontamination](#) Topic Collections for related information.)*

[Must Reads](#)
[Clinical Guidance](#)
[Education and Training](#)
[Event-Specific Lessons Learned](#)
[Pediatric Considerations](#)
[Plans, Tools, and Templates](#)
[Agencies and Organizations](#)

Must Reads *(Note: “Must Reads” were chosen by Subject Matter Experts on the basis of their overall value and the material covered. However, knowledge about Acute Radiation Syndrome [ARS] and patient management has evolved rapidly and prior conclusions about time to onset of vomiting and its correlation with toxicity as well as management of ARS patients may not reflect current practice. Readers are encouraged to use these resources as a starting point and seek specific assessment and treatment recommendations from websites such as the [U.S. Department of Health and Human Services Radiation Emergency Medical Management](#).)*

Quick Links (listed alphabetically)

- [Acute Radiation Syndrome: A Fact Sheet for Clinicians.](#)
- [Communication and Public Information in Radiation Disasters.](#)
- [Handbook for Responding to a Radiological Dispersal Device: First Responder’s Guide—the First 12 Hours.](#)
- [Radiation and Emergency Medical Management.](#)
- [Radiation Patient Treatment.](#)
- [Radiological Terrorism: Emergency Management Pocket Guide for Clinicians.](#)
- [Radiological Terrorism: Just in Time Training for Hospital Clinicians.](#)

American College of Radiology. (2006). [Disaster Preparedness for Radiology Professionals](#).

This primer is geared towards radiologists, radiation oncologists, and medical physicists and summarizes current information on preparing for and responding to a radiation emergency (e.g., handling contaminated patients, assessing dose, and health effects).

American College of Radiology. (2006). [Response to Radiological Terrorism: A Primer for Radiologists, Radiation Oncologists and Medical Physicists](#).

This document provides information that may guide hospital plans for radiological emergencies. It contains a list summarizing "10 basics of response," with individual sections for each of the 10 items.

Army Center for Health Promotion and Preventive Medicine Aberdeen Proving Ground. (2000). [The Medical NBC Battlebook](#).

This downloadable PDF serves as a quick reference guide for medical personnel in the field. The authors provide information on the following threats: nuclear, radiological hazards, biological, chemical, and lasers/ radiofrequency. Chapter 2 (nuclear) and 3 (radiation) provide rapidly accessible practical information such as prediction rules and response.

Berger, M. E., Leonard, R. B., and Ricks, R. C. (2010). [Hospital Triage in the First 24 Hours after a Nuclear or Radiological Disaster](#). Oak Ridge Institute for Science and Education.

This article focuses on the needs of emergency physicians following a radiological or nuclear emergency. Guides for taking a focused history; performing a physical exam and laboratory tests; and managing the initial treatment and disposition of victims of acute radiation syndrome and combined injury are provided.

Bomanji, J.B., Novruzov, F., and Vinjamuri, S. (2014). [Radiation Accidents and Their Management: Emphasis on the Role of Nuclear Medicine Professionals](#). Nuclear Medicine Communications. 35(10):995-1002.

This article summarizes protocols for decontaminating, assessing, and treating casualties of radiation accidents, and advocates for nuclear medicine specialists to be part of the multidisciplinary care team for these patients. Several relevant tables are also provided in the article.

Centers for Disease Control and Prevention, Emergency Preparedness and Response. (2015). [Radiation Emergencies: Information for Professionals](#).

This webpage contains links to resources for emergency health professionals and first responders tasked with preparing for and responding to a radiation emergency. *Note: many of the resources are included in this Topic Collection; key resources are noted under [the Center's listing](#) in the Agencies and Organizations category.*

Flynn, F. and Goans, R. (2006). [Nuclear Terrorism: Triage and Medical Management of Radiation and Combined-Injury Casualties](#). (First page only.) *Surgical Clinics of North America*. 86:601–636.

The authors discuss triage and medical management of patients with burns, trauma, and/or radiation sickness resulting from a nuclear detonation.

National Council on Radiation Protection and Measurements. (2011). [Management of Persons Accidentally Contaminated with Radionuclides \(NCRP Report No. 65\)](#). (Abstract only.)

Members of the Council synthesized data and ideas related to accidental contamination into one document that can help medical professionals called upon to manage contaminated patients. The report contains a "quick reference section," and sections on the initial management of the patient, diagnostic methods to measure radioactive contamination, information on therapy procedures and drugs, and other related topics.

National Security Staff, Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats. (2010). [Planning Guidance for Response to a Nuclear Detonation. Second Edition](#).

This document provides emergency planners (including emergency medical service planners, medical receiver planners, and mass care providers) recommendations specific to nuclear detonation incidents in an urban setting.

NYC Hospital Radiation Response Working Group, NYC Department of Health and Mental Hygiene, Healthcare Emergency Preparedness Program. (2009). [NYC Hospital Guidance for Responding to a Contaminating Radiation Incident](#).

This guidance was prepared to help New York City Hospitals prepare their response to an emergency involving radioactive contamination. The guidance and strategies can be tailored to other city hospitals.

Oak Ridge Institute for Science and Education. (2015). [Radiation Emergency Assistance Center/Training Site](#).

This webpage links to the Radiation Emergency Assistance Center/Training Site (REAC/TS), which offers several resources to prepare medical professionals to respond to radiological emergencies. There are links to books, live training courses, online trainings, and assessment and treatment guidance documents. REAC/TS staff are available for deployment to provide medical consultation during emergencies, upon request. *Note: many REAC/TS resources are included in this Topic Collection; key resources are noted under [the Institute's listing](#) in the Agencies and Organizations category.*

Ross, J., Case, C., Confer, D. et al. (2011). [Radiation Injury Treatment Network \(RITN\): Healthcare Professionals Preparing for a Mass Casualty Radiological or Nuclear Incident](#). *International Journal of Radiation Biology*. 87(8): 748–753.

This article discusses the Radiation Injury Treatment Network (RITN), which is a cooperative effort of the National Marrow Donor Program and the American Society for Blood and Marrow Transplantation. RITN works to educate hematologists, oncologists, and stem cell transplant specialists to treat casualties of radiation emergencies with marrow suppression. RITN members are transplant units within hospitals across the nation, and would be available to provide surge capacity either by having patients transferred to one of their sites, or by practitioners providing medical expertise in person or remotely to health care facilities caring for patients with marrow toxic injuries.

Turai, I., Veress, K., Günalp, B, and Souchkevitch, G. (2004). [Medical Response to Radiation Incidents and Radio Nuclear Threats](#). British Medical Journal. 328(7439):568-72.

The authors provide information on the basic medical management of radiation sickness and radiation injuries, and share information about related training on early recognition of and medical response to radiation accidents and purposeful incidents.

U.S. Department of Health and Human Services. (n.d.). [Radiation and Emergency Medical Management](#). (Accessed 9/14/2015.)

This webpage provides guidance on diagnosis and treatment for healthcare providers. It includes downloadable tools, templates, references, and contact lists. *Note: several REMM resources are included in this Topic Collection; key resources are noted under [the Department's listing](#) in the Agencies and Organizations category.*

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2012). [Medical Planning and Response Manual for a Nuclear Detonation Incident: A Practical Response Guide](#).

This comprehensive document provides emergency planners with information not only on the effects of radiation and how to measure and treat them, but also on how to communicate during a radiological or nuclear emergency. It also describes federal response roles and the distribution of medical countermeasures for acute radiation sickness in an environment of scarce resources.

U.S. Department of Homeland Security Working Group on Radiological Dispersion Device (RDD) Preparedness Medical Preparedness Sub-Group. (2003). [Department of Homeland Security Working Group on Radiological Dispersion Device \(RDD\) Preparedness \[Report\]: 5/1/03 version](#).

This report provides information for medical professionals on the immediate management of patients following detonation of an RDD, as well as decontamination, radiological assessment, psychological effects of the event, and how to deal with remains of deceased persons following radiological terrorism. It also provides an extensive discussion of radiological countermeasures.

Various authors. [Disaster Medicine and Public Health Preparedness](#). (2011). Volume 5; Supplement 1. (See [Clinical Guidance](#) section of this collection for a hyperlinked list of articles contained in this issue.)

This special issue contains 10 articles highlighting the work of the Nuclear Detonation Scarce Resources Project Working Group. Included are discussions of triage and medical management of casualties resulting from nuclear detonations; social and behavioral response considerations for planners; and guidance to support health care system preparedness to respond to a nuclear detonation.

Yale New Haven Health, Center for Emergency Preparedness and Disaster Response. (2013). [Radiation Clinical Guidelines: A Quick Guide for the Management of Radiation Disasters for Emergency Department Personnel](#).

This guide (and associated Job Aid) serves as a quick reference for an emergency department's response to radiation disasters. Steps based on the word "DISASTER" can help staff quickly assess and respond to an incident (Detection, ICS, Safety/Security, Assessment, Support, Triage and Treatment, Evacuate, Recovery).

Clinical Guidance

*Berger, M.E., Leonard, R.B., and Ricks, R.C. (2010). [Hospital Triage in the First 24 Hours after a Nuclear or Radiological Disaster](#). Oak Ridge Institute for Science and Education.

This article focuses on the needs of emergency physicians following a radiological or nuclear emergency. Guides for taking a focused history; performing a physical exam and laboratory tests; and managing the initial treatment and disposition of victims of acute radiation syndrome and combined injury are provided.

Bey, E., Prat, M., Duhamel, P., et al. (2010). [Emerging Therapy for Improving Wound Repair of Severe Radiation Burns Using Local Bone Marrow-Derived Stem Cell Administrations](#). Wound Repair and Regeneration. 18(1):50-8.

This article describes the use of mesenchymal stem cells (MSM) in combination with autograft to treat a severe radiation burn wound in a single patient. The addition of the MSM improved outcomes over traditional surgical techniques used for burn wound repair.

Bomanji, J.B., Novruzov, F., and Vinjamuri, S. (2014). [Radiation Accidents and Their Management: Emphasis on the Role of Nuclear Medicine Professionals](#). Nuclear Medicine Communications. 35(10):995-1002.

This article summarizes protocols for decontaminating, assessing, and treating casualties of radiation accidents, and advocates for nuclear medicine specialists to be part of the multidisciplinary care team for these patients.

*Centers for Disease Control and Prevention. (2013). [Acute Radiation Syndrome: A Fact Sheet for Clinicians.](#)

This fact sheet provides information on the symptoms and stages of acute radiation syndrome (ARS), as well as patient management for ARS. Information on cutaneous radiation syndrome is also included.

*Centers for Disease Control and Prevention. (2013). [Radiological Terrorism: Tool Kit for Emergency Services Clinicians.](#)

This toolkit contains resources on decontamination, injuries associated with radiation, and handling mass casualties in the aftermath of a radiological terrorist attack.

Dainiak, N., Gent, R.N., Carr, Z., et al. (2011). [First Global Consensus for Evidence-Based Management of the Hematopoietic Syndrome Resulting from Exposure to Ionizing Radiation.](#) Disaster Medicine and Public Health Preparedness. 5(3):202-12.

A panel convened by the World Health Organization conducted a literature review to develop evidence-based guidelines for the management of hematopoietic syndrome resulting from exposure to ionizing radiation. Although the panel determined the evidence was weak, members strongly recommended granulocyte colony-stimulating factor or granulocyte macrophage colony-stimulating factor. The use of erythropoiesis-stimulating agents or hematopoietic stem cell transplantation was less strongly supported by the evidence.

Dainiak, N., Gent, R.N., Carr, Z., et al. (2011). [Literature Review and Global Consensus on Management of Acute Radiation Syndrome Affecting Nonhematopoietic Organ Systems.](#) Disaster Medicine and Public Health Preparedness. 5(3):183-201.

A panel convened by the World Health Organization conducted a literature review to rank countermeasures for acute radiation sickness (ARS). Data was limited, and based on nonirradiated humans and animal models. Recommendations include the prophylactic use of a serotonin-receptor antagonist when the suspected exposure is greater than 2 Gy, and topical steroids, antibiotics, and antihistamines for radiation burns, ulcers, or blisters.

Demidenko, E., Williams, B.B., Swartz, H.M. (2009). [Radiation Dose Prediction Using Data on Time to Emesis in the Case of Nuclear Terrorism.](#) Radiation Research. 171(3):310-9.

The authors performed statistical analysis on estimated radiation dose and time to emesis in 108 cases of known radiation exposure over a 55-year period. They conclude that time to emesis is a quick and inexpensive way to estimate radiation dose, but it is imprecise and may lead to false positives. It therefore should be used with other methods to estimate dose received following exposure.

Dörr, H. and Meineke, V. (2011). [Acute Radiation Syndrome Caused by Accidental Radiation Exposure - Therapeutic Principles.](#) BMC Medicine. 25;9:126.

The authors describe therapeutic principles for the treatment of acute radiation sickness, with a focus on hematopoietic syndrome and cutaneous radiation syndrome.

Flynn, F. and Goans, R. (2006). [Nuclear Terrorism: Triage and Medical Management of Radiation and Combined-Injury Casualties](#). (First page only.) *Surgical Clinics of North America*. 86:601–636.

The authors discuss triage and medical management of patients with burns, trauma, and/or radiation sickness resulting from a nuclear detonation.

Müller, K., and Meineke, V. (2010). [Advances in the Management of Localized Radiation Injuries](#). (Abstract only.) *Health Physics*. 98(6):843-50.

This article discusses strategies to treat localized radiation injuries symptomatically, and notes the lack of evidence-based treatment guidelines. The authors advocate for follow-up with patients experiencing radiation injuries, as it could take days to weeks for symptoms to appear and internal damage may accompany skin lesions.

*National Council on Radiation Protection and Measurements. (2008). [NCRP Report No. 161, Management of Persons Contaminated With Radionuclides](#). (Abstract only.)

The information in this report is geared towards medical professionals caring for people exposed to and potentially contaminated in accidental or purposeful releases of large quantities of radionuclides.

*National Council on Radiation Protection and Measurements. (2011). [Management of Persons Accidentally Contaminated with Radionuclides \(NCRP Report No. 65\)](#). (Abstract only; available for purchase from author site.)

Members of the Council synthesized data and ideas related to accidental contamination into one key document that can help medical professionals called upon to manage contaminated patients. The report contains a "quick reference section," and sections on the initial management of the patient, diagnostic methods to measure radioactive contamination, information on therapy procedures and drugs, and other related topics.

Oak Ridge Institute for Science and Education. (n.d.). [Dose Estimates and Other Compendia](#). (Accessed 9/3/2015.)

The Oak Ridge Institute for Science and Education provides links to several compendia of dose information (e.g., dose estimates for children and pregnant women).

Oak Ridge Institute for Science and Education. (n.d.). [The Medical Aspects of Radiation Incidents](#). (Accessed 9/3/2015.)

This "pocket guide" (available in PDF and iBook formats) provides the basic information responders need to medically manage victims of radiation incidents.

*Oak Ridge Institute for Science and Education. (n.d.). [Procedure Demonstrations for Contaminated Patients](#). (Accessed 9/3/2015.)

These demonstrations show healthcare providers how to: dress to prevent the spread of radioactive contamination; prepare the treatment area; remove contaminated clothing from a patient; survey for radioactive contamination; decontaminate a wound; and decontaminate intact skin.

Radiation Emergency Assistance Center/Training Site. (2012). [Radiation Patient Treatment](#).

This algorithm can help healthcare providers make quick decisions when treating patients exposed to or contaminated by radiological hazards.

Ross, J., Case, C., Confer, D. et al. (2011). [Radiation Injury Treatment Network \(RITN\): Healthcare Professionals Preparing for a Mass Casualty Radiological or Nuclear Incident](#). *International Journal of Radiation Biology*. 87(8): 748–753.

This article discusses the Radiation Injury Treatment Network (RITN), which is a cooperative effort of the National Marrow Donor Program and the American Society for Blood and Marrow Transplantation. RITN works to educate hematologists, oncologists, and stem cell transplant specialists to treat casualties of radiation emergencies with marrow suppression. RITN members are transplant units within hospitals across the nation, and would be available to provide surge capacity either by having patients transferred to one of their sites, or by practitioners providing medical expertise in person or remotely to health care facilities caring for patients with marrow toxic injuries.

Ryan, J.L. (2012). [Ionizing Radiation: The Good, the Bad, and the Ugly](#). *Journal of Investigative Dermatology*. 132(3 Pt 2):985-93.

The author describes the effects of ionizing radiation on the skin, and includes a concise description of how radiation burns manifest, noting how they differ from other burns and why this causes treatment challenges. She concludes after a literature review that there is no “gold standard” for assessing and treating radiation skin injury.

Singh, V.K., Newman, V.L., Romaine, P.L., et al. (2014). [Radiation Countermeasure Agents: An Update \(2011-2014\)](#). *Expert Opinion on Therapeutic Patents*. 24(11):1229-55.

This article provides an extensive review of existing radiation countermeasures, as well as those under development and/or being considered for Emergency Use Authorization status by the U.S. Food and Drug Administration.

*Turai, I., Veress, K., Günalp, B, and Souchkevitch, G. (2004). [Medical Response to Radiation Incidents and Radio Nuclear Threats](#). *British Medical Journal*. 328(7439):568-72.

The authors provide information on the basic medical management of radiation sickness and radiation injuries, and share information about related training on early recognition of and medical response to radiation accidents and purposeful incidents.

*U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2012). [Medical Planning and Response Manual for a Nuclear Detonation Incident: A Practical Response Guide](#).

This comprehensive document provides emergency planners with information not only on the effects of radiation and how to measure and treat them, but also on how to communicate during a radiological or nuclear emergency. It also describes federal response roles and the distribution of medical countermeasures for acute radiation sickness in an environment of scarce resources.

*Various authors. [Disaster Medicine and Public Health Preparedness](#). (2011). Volume 5; Supplement 1.

This special issue contains articles highlighting the work of the Nuclear Detonation Scarce Resources Project Working Group. Included are discussions of triage and medical management of casualties resulting from nuclear detonations; social and behavioral response considerations for planners; and guidance to support health care system preparedness to respond to a nuclear detonation.

Coleman, C.N., Knebel, A. R., Hick, J.L. et al. [Scarce Resources for Nuclear Detonation: Project Overview and Challenges](#).

Knebel, A.R., Coleman, C.N., Cliffer, K.D. et al. [Allocation of Scarce Resources After a Nuclear Detonation: Setting the Context](#).

DiCarlo, A.L., Maher, C., Hick, J.L. et al. [Radiation Injury After a Nuclear Detonation: Medical Consequences and the Need for Scarce Resources Allocation](#).

Caro, J.J., DeRenzo, E.G., Coleman, C.N. et al. [Resource Allocation After a Nuclear Detonation Incident: Unaltered Standards of Ethical Decision Making](#).

Dodgen, D., Norwood, A.E., Becker, S.M. et al. [Social, Psychological, and Behavioral Responses to a Nuclear Detonation in a US City: Implications for Health Care Planning and Delivery](#).

Sherman, S. [Legal Considerations in a Nuclear Detonation](#).

Hick, J.L., Weinstock, D.M., Coleman, C.N. et al. [Health Care System Planning for and Response to a Nuclear Detonation](#).

Murrain-Hill, P., Coleman, C.N., Hick, J.L. et al. [Medical Response to a Nuclear Detonation: Creating a Playbook for State and Local Planners and Responders](#).

Casagrande, R., Wills, N., Kramer, E. et al. [Using the Model of Resource and Time-Based Triage \(MORTT\) to Guide Scarce Resource Allocation in the Aftermath of a Nuclear Detonation](#).

Coleman, C.N., Weinstock, D.M., Casagrande, R. et al. [Triage and Treatment Tools for Use in a Scarce Resources-Crisis Standards of Care Setting After a Nuclear Detonation.](#)

Double, E.B., Mabuchi, K., Cullings, H.M. et al. [Long-term Radiation-Related Health Effects in a Unique Human Population: Lessons Learned from the Atomic Bomb Survivors of Hiroshima and Nagasaki.](#)

Watkins, S.M., Perrotta, D.M., Stanbury, M. et al. [State-Level Emergency Preparedness and Response Capabilities.](#)

Meit, M., Redlener, I., Briggs, T.W. et al. [Rural and Suburban Population Surge Following Detonation of an Improvised Nuclear Device: A New Model to Estimate Impact.](#)

Tan, C.M., Barnett, D.J., Stolz, A.J., and Links, J.M. [Radiological Incident Preparedness: Planning at the Local Level.](#)

*Veenema, T.G. (2012). *Disaster Nursing and Emergency Preparedness: for Chemical, Biological, and Radiological Terrorism and Other Hazards*, 3rd edition. (Book available for purchase.) Springer Publishing.

This book provides information to prepare nurses to respond to disasters and public health emergencies. This latest edition includes information on hospital and emergency department preparedness, as well as a digital teacher's guide containing critical thinking questions and exercises.

Weisdorf, D., Chao, N., Waselenko, J.K., et al. (2006). [Acute Radiation Injury: Contingency Planning for Triage, Supportive Care, and Transplantation.](#) *Biology of Blood and Marrow Transplantation*. 12(6):672-82.

This article focuses on treatment of hematopoietic syndrome as one component of acute radiation sickness. The authors emphasize the value of having transplant physicians, hematologists, and oncologists participate in the development of plans for assessment, triage, treatment, and supportive care due to their respective patient care experience.

Wolbarst, A.B., Wiley, A.L. Jr., Nemhauser, J.B. et al. (2010). [Medical Response to a Major Radiologic Emergency: A Primer for Medical and Public Health Practitioners.](#) *Radiology*. 254(3):660-77.

This article discusses the thermal, blast, and radiation injuries that would be sustained by casualties of a nuclear or radiologic device detonation, or accidental release, such as from a power plant, as well as how to treat them. It also describes the important role physicians who understand the effects of radiation on the human body and how to treat them, will play during a radiological or nuclear emergency.

*Yale New Haven Health, Center for Emergency Preparedness and Disaster Response. (2013). [Radiation Clinical Guidelines: A Quick Guide for the Management of Radiation Disasters for Emergency Department Personnel.](#)

This guide (and associated Job Aid) serves as a quick reference for an emergency department's response to radiation disasters. Steps based on the word "DISASTER" can help staff quickly assess and respond to an incident (Detection, ICS, Safety/Security, Assessment, Support, Triage and Treatment, Evacuate, Recovery).

Education and Training

American Academy of Pediatrics. (2009). [Radiologic or Nuclear Terrorism and Agents.](#)

This fact sheet provides information for pediatricians on how to mitigate the effects of radiologic injuries in children.

American College of Radiology. (2006). [Disaster Preparedness for Radiology Professionals.](#)

This primer is geared towards radiologists, radiation oncologists, and medical physicists and summarizes current information on preparing for and responding to a radiation emergency (e.g., handling contaminated patients, assessing dose, and health effects).

Blumenthal, D.J., Bader, J.L., Christensen D., et al. (2014). [A Sustainable Training Strategy for Improving Health Care Following a Catastrophic Radiological or Nuclear Incident.](#) (Abstract only.) *Prehospital and Disaster Medicine.* 29(1):80-6.

The authors propose a training strategy that includes all members of the health care delivery team, from first responders to first receivers and hospital support staff, and divides them into four tiers for targeting educational strategies. These strategies are capabilities-driven, and include the addition of radiological and nuclear-focused modules to existing trainings; the incorporation of radiation contamination measures into everyday practice; and providing just-in-time training at the time of an event.

Brenner, D. (2011). [Potential Health Effects from Radioactive Emissions.](#) Columbia University, Earth Institute, National Center for Disaster Preparedness.

This 45-minute online presentation provides information on the health effects of radiation exposure, as well as risk communication strategies for nuclear and radiological disasters.

Centers for Disease Control and Prevention. (2005). [Radiological Terrorism: Just in Time Training for Hospital Clinicians.](#)

This 17-minute video provides a quick training for clinicians in radiation principles and procedures and provides demonstrations on their application in different patient care scenarios.

Centers for Disease Control and Prevention. (2006). [Radiological Terrorism: Medical Response to Mass Casualties.](#)

This 2-hour video training uses online lectures and case studies to prepare first receivers to assess, triage, treat, and make disposition decisions for patients following mass casualty radiation incidents.

Centers for Disease Control and Prevention. (2010). [Psychological First Aid in Radiation Disasters.](#)

This web-based course provides health professionals with training on psychological first aid, recognizing the unique psychological effects of radiation and nuclear events.

*Centers for Disease Control and Prevention. (2011). [Communication and Public Information in Radiation Disasters.](#)

This is an-hour-long archived webinar on communicating during a radiation disaster. It includes lessons learned from the Fukushima disaster.

Centers for Disease Control and Prevention (2014). [Radiation Basics Made Simple.](#)

Radiation Basics Made Simple is a training module that introduces participants to the fundamentals of radiation and radioactivity.

Centers for Disease Control and Prevention (2015). [Medical Countermeasures for Radiation Exposure and Contamination.](#)

Medical Countermeasures for Radiation Exposure and Contamination is a training module that aids in better understanding what medical countermeasures (treatments) are available for radiation exposure and contamination, how they work, and how and when they should be used.

*Centers for Disease Control and Prevention, Emergency Preparedness and Response. (2015). [Virtual Community Reception Center \(vCRC\).](#)

This web-based training tool teaches emergency healthcare planners how to conduct population monitoring after a mass casualty radiation emergency in community reception centers.

Columbia University, Earth Institute, National Center for Disaster Preparedness. (2011). [Public Health Risks of Ionizing Radiation.](#)

This online course includes information on how to differentiate between ionizing and non-ionizing radiation, and contamination and exposure, as well as how to minimize exposure to humans. It includes a case study and interactive tools.

*Crouch, G., Schor, K., and Fitzgerald, T. (2013). [Radiation Issues in Children: Knowledge Check, Primer, & Case-Based Activity](#). National Center for Disaster Medicine and Public Health, Uniformed Services University of the Health Sciences.

This webpage provides links to a knowledge check, primer, and case studies on radiation issues in children.

National Security Technologies. (n.d.) [Center for Radiological and Nuclear Training at the Nevada National Security Site](#). (Accessed 8/9/15.)

This website links to training for radiological and nuclear response (e.g., AWR-140-W and courses on improvised nuclear devices). Both online, and in person courses are available free of charge to qualified individuals.

*Oak Ridge Institute for Science and Education. (n.d.). [Procedure Demonstrations for Contaminated Patients](#). (Accessed 9/3/2015.)

These demonstrations show healthcare providers how to: dress to prevent the spread of radioactive contamination; prepare the treatment area; remove contaminated clothing from a patient; survey for radioactive contamination; decontaminate a wound; and decontaminate intact skin.

Oak Ridge Institute for Science and Education. (n.d.). [Understanding Radiation Video Series](#). (Accessed 9/3/2015.)

These short videos can help health officials and the public better understand radiation and radioactive contamination.

Oak Ridge Institute for Science and Education. (2015). [Radiation Emergency Assistance Center/Training Site](#).

This webpage links to the Radiation Emergency Assistance Center/Training Site (REAC/TS), which offers several resources to prepare medical professionals to respond to radiological emergencies. There are links to books, live training courses, online trainings, and assessment and treatment guidance documents. REAC/TS staff are available for deployment to provide medical consultation during emergencies, upon request.

*Tennessee Emergency Medical Services for Children. (2012). [Responding to Radiation Disasters](#).

This slide-based web training is part of an online Pediatric Disaster Educational Toolbox. It addresses pediatric-related response issues following radiation disasters.

Event-Specific Lessons Learned

- * Centers for Disease Control and Prevention. (2011). [Communication and Public Information in Radiation Disasters](#).

This is an hour-long archived webinar on communicating during a radiation disaster. It includes lessons learned from the Fukushima disaster.

- *Coleman, C.N., Blumenthal, D.J., Casto, C.A. et al. (2013). [Recovery and Resilience After a Nuclear Power Plant Disaster: A Medical Decision Model for Managing an Effective, Timely, and Balanced Response](#). (Abstract only.) Disaster Medicine and Public Health Preparedness. 7(2):136-45.

Based on experience from the Fukushima Daiichi nuclear power plant crisis, the authors propose a real-time medical decision-making model to ensure timely, organized, and effective response following a radiological or nuclear disaster. This model is in line with the current National Response Framework, and the authors suggest that it be used to manage "complex, large-scale, and large-consequence incidents."

- International Atomic Energy Agency. (n.d.). [Books on Accident Response](#). (Accessed 7/7/2015.)

This webpage provides links to books on real world responses to radiological and/or nuclear accidents.

- Tanisho, Y., Smith, A., Sodeoka, T., and Murakami, H. (2015). [Post-Disaster Mental Health in Japan: Lessons and Challenges](#). Health and Global Policy Institute.

This report describes lessons learned from the Fukushima nuclear disaster in 2012. It includes recommendations for ensuring that psychosocial and mental health interventions consider the unique circumstances and cultural issues of a given disaster.

Pediatric Considerations

- *Crouch, G., Schor, K., and Fitzgerald, T. (2013). [Radiation Issues in Children: Knowledge Check, Primer, & Case-Based Activity](#). National Center for Disaster Medicine and Public Health, Uniformed Services University of the Health Sciences.

This webpage provides links to a knowledge check, primer, and case studies on radiation issues in children.

- Siegel, D. (2009). [Preparation for Terrorist Threats: Radiation Injury](#). Clinical Pediatric Emergency Medicine. 10(3): 136-139.

The author addresses the specific clinical management issues related to the radioactive agents and the special characteristics and needs of child victims of this type of terrorism.

*Tennessee Emergency Medical Services for Children (TN EMSC). (2012). [Responding to Radiation Disasters.](#)

This training is part of an online Pediatric Disaster Educational Toolbox. It addresses pediatric-related response issues following radiation disasters.

Plans, Tool, and Templates

American College of Radiology. (2006). [Response to Radiological Terrorism: A Primer for Radiologists, Radiation Oncologists and Medical Physicists.](#)

This document provides information that may guide hospital plans for radiological emergencies. It contains a list summarizing "10 basics of response," with individual sections for each of the 10 items.

Army Center for Health Promotion and Preventive Medicine Aberdeen Proving Ground. (2000). [The Medical NBC Battlebook.](#)

This downloadable PDF serves as a quick reference guide for medical personnel in the field. The authors provide information on the following threats: nuclear, radiological hazards, biological, chemical, and lasers/ radiofrequency.

Becker, S. and Middleton, S. (2008). [Improving Hospital Preparedness for Radiological Terrorism: Perspectives From Emergency Department Physicians and Nurses.](#) (Abstract only.) Disaster Medicine and Public Health Preparedness. 2;3:174-184.

This article describes results from a series of focus groups conducted among 77 emergency department physicians and nurses to obtain their concerns and perceptions on radiation emergencies, and their feedback on response guidelines. The findings may assist hospitals with response planning and with identifying staff education and training needs.

Bell, W.C., and Dallas, C.E. (2007). [Vulnerability of Populations and the Urban Health Care Systems to Nuclear Weapon Attack--Examples from Four American Cities.](#) International Journal of Health Geographics. 28;6:5.

The authors analyzed the potential effects of 20 kiloton and 550 kiloton nuclear detonations on New York City, Chicago, Washington D.C., and Atlanta, and discuss the relative damage from radiation and blast injuries in each scenario. They conclude that most of the necessary health care resources will be within the blast and/or plume zone, further exacerbating what is expected to be a scarcity of resources following a nuclear weapon detonation.

*Berger, M. E., Leonard, R. B., and Ricks, R. C. (2010). [Hospital Triage in the First 24 Hours after a Nuclear or Radiological Disaster.](#) Oak Ridge Institute for Science and Education.

This article focuses on the needs of emergency physicians following a radiological or nuclear emergency. Guides for taking a focused history; performing a physical exam and laboratory tests; and managing the initial treatment and disposition of victims of acute radiation syndrome and combined injury are provided.

Bushberg, J.T., Kroger, L.A., Hartman, M.B., et al. (2007). [Nuclear/Radiological Terrorism: Emergency Department Management of Radiation Casualties](#). (Abstract only.) Journal of Emergency Medicine. 32(1):71-85.

The authors discuss the importance of educating emergency department staff on risks from radiation to prepare them to care for casualties of radiological and nuclear emergencies. They also emphasize the need to have plans in place to manage the anticipated large influx of potentially contaminated individuals to the emergency department, regardless of whether or not they are actually injured.

California Department of Public Health. (2011). [California Public Health and Medical Emergency Operations Manual](#).

Section II of this manual includes function-specific categories (e.g., hazardous materials, nuclear power plant emergencies, and nuclear weapon detonation). For every function, the plan includes an overview, list of response actions, steps for local health departments and other health providers to take, and the role of relevant state agencies.

Centers for Disease Control and Prevention. (2003). [Roundtable on Hospital Communications: Participants' Comments, Ideas, and Recommendations - A Summary Report](#).

This report summarizes recommendations for products and messages made by the roundtable on Hospital Communications in a Mass Casualty Radiological Incident that met in January 2003.

Centers for Disease Control and Prevention. (2005). [Radiological Terrorism: Emergency Management Pocket Guide for Clinicians](#).

This pocket guide is a supplement to the Centers for Disease Control and Prevention training program "Radiological Terrorism: Just in Time Training for Hospital Clinicians." The guide can help healthcare professionals who provide emergency care in a hospital setting following a radiological terrorism incident.

Centers for Disease Control and Prevention. (2009). [Use of Radiation Detection, Measuring, and Imaging Instruments to Assess Internal Contamination from Inhaled Radionuclides](#). Accessed July 7, 2015.

This webpage includes a series of handbooks for portable meters that may be used in the field to detect internal radiation contamination, as well as instructions for using Gamma cameras to assess internal contamination.

*Centers for Disease Control and Prevention. (2013). [Acute Radiation Syndrome: A Fact Sheet for Clinicians.](#)

This fact sheet provides information on the symptoms and stages of acute radiation syndrome (ARS), as well as patient management for ARS. Cutaneous radiation syndrome is also included.

*Centers for Disease Control and Prevention. (2013). [Radiological Terrorism: Tool Kit for Emergency Services Clinicians.](#)

This toolkit contains resources on decontamination, injuries associated with radiation, and handling mass casualties in the aftermath of a radiological terrorist attack.

Centers for Disease Control and Prevention. (2013). [Radiological Terrorism: Tool Kit for Public Health Officials.](#)

This toolkit contains resources on decontamination, population monitoring, and psychological first aid in radiation emergencies.

Centers for Disease Control and Prevention. (2014). [Internal Contamination Clinical Reference \(ICCR\) Application.](#)

The Internal Contamination Clinical Reference is an application (for Android devices, iPads, and iPhones) estimating reference concentrations of radionuclides in urine assuming intakes equal to one Clinical Decision Guide (CDG) for each radionuclide.

Centers for Disease Control and Prevention, Emergency Preparedness and Response. (2014). [Community Reception Center \(CRC\) Simulation Tools.](#)

The Centers for Disease Control and Prevention developed two simulation programs (CRC-STEP and RealOpt-CRC) that can help emergency healthcare providers test their Community Reception Center (CRC) models. The programs can help users: analyze CRC throughput; identify bottlenecks; and highlight the need for additional resources.

Centers for Disease Control and Prevention, Emergency Preparedness and Response. (2014). [Radioactive Isotopes.](#)

This webpage hosts links to information by isotope (e.g., cesium, iodine, plutonium). Users can click on the link to learn about each isotope's toxicity.

*Centers for Disease Control and Prevention, Emergency Preparedness and Response. (2015). [Virtual Community Reception Center \(vCRC\).](#)

This web-based training tool teaches emergency healthcare planners how to conduct population monitoring after a mass casualty radiation emergency in community reception centers.

Centers for Disease Control and Prevention, National Center for Environmental Health. (2015). [A Guide to Operating Public Shelters in a Radiation Emergency.](#)

This document can assist emergency managers with planning and response efforts related to shelter operations in a radiation emergency. The guide includes information on screening for radioactive contamination, decontamination, radiation monitoring, registration, health surveillance, and communications.

*Coleman, C.N., Blumenthal, D.J., Casto, C.A. et al. [Recovery and Resilience After a Nuclear Power Plant Disaster: A Medical Decision Model for Managing an Effective, Timely, and Balanced Response.](#) (Abstract only.) *Disaster Medicine and Public Health Preparedness*. 7(2):136-45.

Based on experience from the Fukushima Daiichi nuclear power plant crisis, the authors propose a real-time medical decision-making model to ensure timely, organized, and effective response following a radiological or nuclear disaster. This model is in line with the current National Response Framework, and the authors suggest that it be used to manage "complex, large-scale, and large-consequence incidents."

Conference of Radiation Control Program Directors. (2006). [Handbook for Responding to a Radiological Dispersal Device: First Responder's Guide—the First 12 Hours.](#)

This document provides a training and reference tool for first responders with various degrees of radiological experience to respond to a radiological event.

Dainiak, N., Carpini, D., Bohan, M., et al. (2006). [Development of a Statewide Hospital Plan for Radiologic Emergencies.](#) *International Journal of Radiation Oncology • Biology • Physics*. 65(1):16-24.

The authors describe the development process for and key components of Connecticut's plan for responding to radiologic emergencies.

Dallas, C.E., and Bell, W.C. (2007). [Prediction Modeling to Determine the Adequacy of Medical Response to Urban Nuclear Attack.](#) *Disaster Medicine and Public Health Preparedness*. (Abstract only.) *Disaster Medicine and Public Health Preparedness*. 1(2):80-9.

The authors modeled the effects of 20- and 550-kiloton nuclear detonations on Los Angeles and Houston, with a focus on thermal effects. They found that the number of burn casualties would number in the tens of thousands, with over 185,000 casualties after a 550-kiloton detonation in Los Angeles. The authors recommend that health care facilities greatly expand the number of personnel involved in burn care, and that regional planning be considered, along with air transport of victims.

Flood, A.B., Boyle, H.K., Du, G., et al. (2014). [Advances in a Framework to Compare Bio-dosimetry Methods for Triage in Large-Scale Radiation Events](#). Radiation Protection Dosimetry. 159(1-4):77-86.

The authors compared the performance of six bio-dosimetry methods for five different population sizes ranging from 100-1,000,000, at a rate of 15 or 15,000 people per hour with four additional time windows. They conclude that larger population sizes require longer triage times, which decreases the usefulness of time-intensive methods. They discuss the value of using multiple methods to assess casualties.

International Atomic Energy Agency. (2006). [Manual for First Responders to a Radiological Emergency](#).

This guide provides helpful information for first responders to use within the first few hours of a radiological emergency. Action guides for the incident commander are followed by guides for specific responders (e.g., fire, emergency medical service, law enforcement, forensic evidence collection team, public information officer, hospitals, and emergency operations centers).

Koerner J.F., Coleman, C.N., Murrain-Hill, P. et al. (2014). [The Medical Decision Model and Decision Maker Tools for Management of Radiological and Nuclear Incidents](#). (Abstract only.) Health Physics. 106(6):645-51.

The authors describe a medical decision-making model to assist decision makers during a radiological or nuclear disaster, when onsite subject matter experts may not be immediately available following an event and critical decisions for a complex response must be made. They also describe tools to facilitate timely and effective incident management.

Lawrence Livermore National Laboratory. (2012). [Key Planning Factors for Recovery from a Radiological Terrorism Incident](#). Federal Emergency Management Agency.

The authors cover seven key planning factors that can help communities prepare for and recover from a radiological incident. Section 4.2 of the guide focuses on public health and medical priorities.

Los Angeles County (2013). [Ambulance Guidelines for Response to Radiation Events](#).

This "consensus guidance document" can be used by ambulance services owners/operators to prepare for, respond to, and recover from, a radiological incident. It includes sample placards, a list of acronyms and abbreviations, and other resources that can be tailored by others.

McBurney, R. (2011). [Plan for Incorporating Local Volunteer Radiation Professionals into Existing Health Volunteer Programs to Assist in Population Monitoring: Final Report](#). Conference of Radiation Control Program Directors, Inc.

The author synthesized expert opinion on the feasibility of developing self-sustaining volunteer emergency response programs to perform tasks associated with radiation emergencies (e.g., population monitoring) and help in other ways at hospitals, community reception areas, and other areas.

*National Council on Radiation Protection and Measurements. (2008). [NCRP Report No. 161, Management of Persons Contaminated With Radionuclides](#). (Abstract only.)

The information in this report is geared towards medical professionals caring for people exposed to and potentially contaminated in accidental or purposeful releases of large quantities of radionuclides.

National Security Staff, Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats. (2010). [Planning Guidance for Response to a Nuclear Detonation. Second Edition](#).

This document provides emergency planners (including emergency medical service planners, medical receiver planners, and mass care providers) recommendations specific to nuclear detonation incidents in an urban setting.

NYC Hospital Radiation Response Working Group, NYC Department of Health and Mental Hygiene, Healthcare Emergency Preparedness Program. (2009). [NYC Hospital Guidance for Responding to a Contaminating Radiation Incident](#).

This guidance was prepared to help New York City Hospitals prepare their response to an emergency involving radioactive contamination. The guidance and strategies can be tailored to other city hospitals.

Oak Ridge Institute for Science and Education. (n.d.) [Frequently Asked Questions about Radiation](#). (Accessed 9/3/2015.)

This webpage lists questions and answers on topics such as: sources of radiation, how it is measured, and the difference between exposure and contamination. Links to other resources are also provided.

Oak Ridge Institute for Science and Education (ORISE). (2015.) [Quick Reference Information - Radiation](#).

This document provides a summary of information on radiation, including definitions; dose conversions; reference levels for assessing wound contamination; thresholds for skin injuries and acute radiation syndrome; and use of Potassium Iodide (KI).

Runge, J. and Buddemeier, B. (2009). [Explosions and Radioactive Material: A Primer for Responders](#). (Abstract only.) *Prehospital Emergency Care*.13:407-19.

The authors created a comprehensive, scenario-based primer on planning for and responding to "dirty bombs."

Salame-Alfie, A., Fisher-Tyler, F., Gardner, P., et al. (2006). [Handbook for Responding to a Radiological Dispersal Device: Dirty Bomb. First Responders' Guide-The First 12 Hours.](#) Conference of Radiation Control Program Directors.

This handbook is a companion to the "Radiological Dispersal Device-Dirty Bomb-First Responder's Guide," is geared towards state and local responders, and includes state-specific radiation control program contact information.

Sullivan, J.M., Prasanna, P.G., Grace, M.B., et al. (2013). [Assessment of Biodosimetry Methods for a Mass-Casualty Radiological Incident: Medical Response and Management Considerations.](#) Health Physics. 105(6):540-54.

The authors provide an extensive review of biodosimetry methods and their respective utility following a mass casualty radiological incident, taking into account disruptions in infrastructure, limited resources, ease of use, and time to results. They conclude that no single method will be sufficient, and that biodosimetry is one component of what must be a more comprehensive approach to triage and medical management of casualties.

The Center for HICS Education and Training. (n.d.). [Incident Response Guide: Radiation Incident.](#) (Accessed 7/14/2015.)

This document provides a checklist for hospital emergency planners to use to prepare for response to a radiation incident.

*Turai, I., Veress, K., Günalp, B, and Souchkevitch, G. (2004). [Medical Response to Radiation Incidents and Radio Nuclear Threats.](#) British Medical Journal. 328(7439):568-72.

The authors provide information on the basic medical management of radiation sickness and radiation injuries, and share information about related training on early recognition of and medical response to radiation accidents and purposeful incidents.

U.S. Department of Health and Human Services, Radiation and Emergency Medical Management. (2014). [Develop a Radiation Response Plan.](#)

This webpage provides links to guidance on developing a community hospital response plan, developing a hospital response team, and general information that should be considered when planning for a nuclear detonation or similar event.

*U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2012). [Medical Planning and Response Manual for a Nuclear Detonation Incident: A Practical Response Guide.](#)

This comprehensive document provides emergency planners with information not only on the effects of radiation and how to measure and treat them, but also on how to communicate during a radiological or nuclear emergency. It also describes federal response roles and the distribution of medical countermeasures for acute radiation sickness in an environment of scarce resources.

U.S. Department of Homeland Security Working Group on Radiological Dispersion Device (RDD) Preparedness Medical Preparedness Sub-Group. (2003). [Department of Homeland Security Working Group on Radiological Dispersion Device \(RDD\) Preparedness \[Report\]: 5/1/03 version.](#)

This report provides information for medical professionals on the immediate management of patients following detonation of an RDD, as well as decontamination, radiological assessment, psychological effects of the event, and how to deal with remains of deceased persons following radiological terrorism. It also provides an extensive discussion of radiological countermeasures.

*Various authors. [Disaster Medicine and Public Health Preparedness.](#) (2011). Volume 5; Supplement 1.

This special issue contains 10 articles highlighting the work of the Nuclear Detonation Scarce Resources Project Working Group. Included are discussions of triage and medical management of casualties resulting from nuclear detonations; social and behavioral response considerations for planners; and guidance to support health care system preparedness to respond to a nuclear detonation.

Coleman, C.N., Knebel, A. R., Hick, J.L. et al. [Scarce Resources for Nuclear Detonation: Project Overview and Challenges.](#) (First page only.)

Knebel, A.R., Coleman, C.N., Cliffer, K.D. et al. [Allocation of Scarce Resources After a Nuclear Detonation: Setting the Context.](#) (Abstract only.)

DiCarlo, A.L., Maher, C., Hick, J.L. et al. [Radiation Injury After a Nuclear Detonation: Medical Consequences and the Need for Scarce Resources Allocation.](#) (Abstract only.)

Caro, J.J., DeRenzo, E.G., Coleman, C.N. et al. [Resource Allocation After a Nuclear Detonation Incident: Unaltered Standards of Ethical Decision Making.](#) (Abstract only.)

Dodgen, D., Norwood, A.E., Becker, S.M. et al. [Social, Psychological, and Behavioral Responses to a Nuclear Detonation in a US City: Implications for Health Care Planning and Delivery.](#) (Abstract only.)

Sherman, S. [Legal Considerations in a Nuclear Detonation.](#) (Abstract only.)

Hick, J.L., Weinstock, D.M., Coleman, C.N. et al. [Health Care System Planning for and Response to a Nuclear Detonation.](#) (Abstract only.)

Murrain-Hill, P., Coleman, C.N., Hick, J.L. et al. [Medical Response to a Nuclear Detonation: Creating a Playbook for State and Local Planners and Responders.](#) (Abstract only.)

Casagrande, R., Wills, N., Kramer, E. et al. [Using the Model of Resource and Time-Based Triage \(MORTT\) to Guide Scarce Resource Allocation in the Aftermath of a Nuclear Detonation.](#) (Abstract only.)

Coleman, C.N., Weinstock, D.M., Casagrande, R. et al. [Triage and Treatment Tools for Use in a Scarce Resources-Crisis Standards of Care Setting After a Nuclear Detonation.](#) (Abstract only.)

Douple, E.B., Mabuchi, K., Cullings, H.M. et al. [Long-term Radiation-Related Health Effects in a Unique Human Population: Lessons Learned from the Atomic Bomb Survivors of Hiroshima and Nagasaki.](#) (Abstract only.)

Watkins, S.M., Perrotta, D.M., Stanbury, M. et al. [State-Level Emergency Preparedness and Response Capabilities.](#) (Abstract only.)

Meit, M., Redlener, I., Briggs, T.W. et al. [Rural and Suburban Population Surge Following Detonation of an Improvised Nuclear Device: A New Model to Estimate Impact.](#) (Abstract only.)

Tan, C.M., Barnett, D.J., Stolz, A.J., and Links, J.M. [Radiological Incident Preparedness: Planning at the Local Level.](#) (Abstract only.)

*Veenema, T.G. (2012). Disaster Nursing and Emergency Preparedness: For Chemical, Biological, and Radiological Terrorism and Other Hazards, 3rd Edition. (Book available for purchase.) Springer Publishing.

This book provides information to prepare nurses to respond to disasters and public health emergencies. This latest edition includes information on hospital and emergency department preparedness, as well as a digital teacher's guide containing critical thinking questions and exercises.

*Yale New Haven Health, Center for Emergency Preparedness and Disaster Response. (2013). [Radiation Clinical Guidelines: A Quick Guide for the Management of Radiation Disasters for Emergency Department Personnel.](#)

This guide (and associated Job Aid) serves as a quick reference for an emergency department's response to radiation disasters. Steps based on the word "DISASTER" can help staff quickly assess and respond to an incident (Detection, ICS, Safety/Security, Assessment, Support, Triage and Treatment, Evacuate, Recovery).

Agencies and Organizations

Note: The agencies and organizations listed in this section have a page, program, or specific research dedicated to this topic area.

[Advisory Team on Food, Health and the Environment.](#)

[Armed Forces Radiobiology Research Institute.](#)

Centers for Disease Control and Prevention, Emergency Preparedness and Response. [Radiation Emergencies.](#)

- [Acute Radiation Syndrome: A Fact Sheet for Clinicians.](#)
- [Communication and Public Information in Radiation Disasters.](#)
- [A Guide to Operating Public Shelters in a Radiation Emergency.](#)
- [Radiological Terrorism: Tool Kit for Emergency Services Clinicians.](#)
- [Radiological Terrorism: Tool Kit for Public Health Officials.](#)

[Conference of Radiation Control Program Directors, Inc.](#)

Oak Ridge Institute for Science and Education. [Radiation Emergency Assistance Center/Training Site.](#)

- [Dose Estimates and Other Compendia.](#)
- [The Medical Aspects of Radiation Incidents.](#)
- [Procedure Demonstrations for Contaminated Patients.](#)
- [Frequently Asked Questions about Radiation.](#)
- [Quick Reference Information - Radiation.](#)

[Radiation Injury Treatment Network.](#)

U.S. Department of Health and Human Services, [Radiation and Emergency Medical Management.](#) Resources are placed into the following sections:

- Emergency Type
- Initial Incident Activities
- Tools & Guidelines
- Reference/Data Center
- Patient Management
- Management Modifiers
- Other Audiences (e.g., first responders, planners, veterinarians)

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