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. This Topic Collection was updated in August 2017.

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” 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.
**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.)


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).


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.


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.


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.


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.


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


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.


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.

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.


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.


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.


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.

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.


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.


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.


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.


Sherman, S. *Legal Considerations in a Nuclear Detonation.*


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


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.


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.


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.


This toolkit contains resources (such as videos and pocket guides) on decontamination, population monitoring, and psychological first aid in radiation emergencies.


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.
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.

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.

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

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

The authors describe a “push-pull” model that estimated the evacuation from Manhattan to counties within a 150 mile radius after a nuclear detonation. This model predicted that arriving evacuees could increase the population needing services by between 50 and 150 percent.

The authors describe advances in the management of localized radiation injuries.
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.


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.


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.


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.


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).


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

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


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.


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.


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 federal Food and Drug Administration.


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.

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.


This guidance can help preserve responder health and safety in the event of a 10 kiloton improvised nuclear device within the first 72 hours of a detonation.


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.


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.


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.


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.

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.


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**


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


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).


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.

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.


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.


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.


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


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


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.

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


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.


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


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.


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


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.

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


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


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."


The authors reviewed literature on human responses to radiation incidents and disasters in general, with a focus on behavioral health care provider (BHCP) contributions in the hours and days after a nuclear detonation. They listed the following six broad categories of interventions: promoting appropriate protective actions, discouraging dangerous behaviors, managing patient/survivor flow to facilitate the best use of scarce resources, supporting first responders, assisting with triage, and delivering palliative care when appropriate. The authors also shared recommendations regarding response and recovery phase BHCP interventions.

This report covers the June 30, 2010 Host Community Reception Center (CRC) Drill conducted in Windham, CT. The Improvement Plan highlights recommendations and adjudications to the state CRC plan specific to the performance of offsite response organizations. Appendices are included; Appendix C specifically covers the CRC.


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


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**


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


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.


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


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.


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.


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.


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.


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.


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.


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.


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.


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.


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.

This toolkit contains resources (such as videos and pocket guides) on decontamination, population monitoring, and psychological first aid in radiation emergencies.


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


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.


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.


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.


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


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 consistent with Centers for Disease
Control and Prevention Community Reception Center guidance.


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."


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


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


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.


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.


The authors share results from the work of an interdisciplinary working group composed of federal, state, and local public health experts who developed the Exposure And Symptom Triage (EAST) tool. This tool combines estimates of exposure from maps with clinical assessments and single lymphocyte counts (if available) to help emergency healthcare providers triage patients (at assembly centers and fallout zones) after a nuclear incident.


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).


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.


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.

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.


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.


The authors describe a “push-pull” model that estimated the evacuation from Manhattan to counties within a 150 mile radius after a nuclear detonation. This model predicted that arriving evacuees could increase the population needing services by between 50 and 150 percent.


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.


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.

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.


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.


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).


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


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.


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.


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


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.


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.


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.


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.

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.


Sherman, S. *Legal Considerations in a Nuclear Detonation.*


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.


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.)

**Population Monitoring/Community Reception Centers**


This guide provides information for state and local planners to develop post radiological emergency response plans. This guide describes processes for managing the radiation monitoring required to evaluate exposure in the affected population, including the use of community reception centers.


The CRC Drill toolkit provides guidance and templates that any jurisdiction can adapt to exercise the full range of CRC operations. The drill was developed to be compatible with the U.S. Department of Homeland Security’s Homeland Security Exercise and Evaluation
Program (HSEEP). It also incorporates insights, issues, and lessons learned from real-world events.

Chatham County (GA) Health Department. (2013). **EOP/ Incident Annex G / Appendix 1: CRC Specifications**.

Appendix 1 includes Community Reception Center (CRS) features and requirements, and includes an equipment list, a staffing matrix, and a list of potential CRC sites.

Florida Department of Health. (n.d.). **Community Reception Center (CRC) Form**. (Accessed 4/25/2017.)

First responders can use this intake form as a model when creating their own CRC forms. It includes incident-specific questions and two pages of instructions.


This report covers the July 12, 2011, Community Reception Center (CRC) Drill conducted at Cypress Creek High School in Orlando, Florida. The Improvement Plan highlights recommendations and adjudications to the state CRC plan. Appendices are included.

Los Angeles County. (2009). **Community Reception Center Flow Diagram**.

This is a set of floorplans for various stages of Community Reception Centers, including intake, emergency medical care or transfer, and discharge.


This document provides steps for responders to take upon receipt of residents at Community Reception Centers. It includes forms for responders and handouts for visitors.


This master’s thesis includes a detailed literature review of published and gray literature on the effectiveness of community reception centers for managing population evaluation.

This website includes a “Templates and Forms” tab that takes the user to a Dropbox page. Helpful templates include; Kansas Community Center Flow Diagram; Kansas Radiation Incident Community Reception Center Standard Operating Guidelines; Kansas Department of Health and Environment CRC Template; and Union County (OH) Example CRC Supply and Equipment List.

Scarce Resources


The authors provide practical ethical guidance for healthcare providers faced with making decisions after a nuclear detonation, prior to the establishment of a coordinated response.


The authors used the model of resource- and time-based triage (MORTT) and found that in settings where resources were scarce, prioritizing victims with moderate life-threatening injuries over victims with severe life-threatening injuries saves more lives and reduces demand for intensive care.


This article summarizes the medical challenges associated with scarce resources and nuclear detonations, and serves as an introduction to the rest of the articles in this issue.


Based on the information shared in other articles in this issue, the authors discuss possible triage options during the first four days after an event.

This literature review focuses on radiation injuries from human exposures and animal models and is accompanied by various triage and management approaches (covered in the rest of this special issue).


The authors use vignettes to describe how a nuclear the incident may unfold for the various components of the health and medical systems. They also emphasize the need for first responders to protect themselves physically and psychologically.


The authors emphasize the need for all involved sectors to plan and practice for the allocation of scarce resources in a nuclear incident.


This link takes users to the full triage module on REMM. This provides users access to an online flowchart/decision tree for complex triage decisions and links to various resources which provide the background information on the triaging and medically managing patients in the early days following a radiological event. The online Triage tool allows for data entry and customization of decision-making.

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.
• 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.

Radiation Injury Treatment Network.

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.

U.S. Department of Health and Human Services. Radiation 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).

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. CBRNE Branch.

This ASPR TRACIE Topic Collection was comprehensively reviewed in July and August 2015 by the following subject matter experts (listed in alphabetical order): Eric Alberts, BS, FPEM, CHS-V, CDP-1, CHPP, CHEP, SEM, CFRP, FABCHS; John Donovan, MPH, Health Communications/Education Specialist, Centers for Disease Control and Prevention/Radiation Studies Branch; Anthony “Tony” Egan, RN, MSN, Manager, Security and Emergency Training, Network Emergency Management, North Shore-Long Island Jewish Health System; John Hick, MD, HHS ASPR and Hennepin County Medical Center; Ruth E. McBurney, MS, CHP, Executive Director, Conference of Radiation Control Program Directors; Mary Russell, EdD MSN, Emergency Services, Boca Raton Regional Hospital; and CAPT Kevin Sheehan, MPH, MBA, CIH, CSP, REHS, U.S. Public Health Service, U.S. Department of Health and Human
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