



REMM

From Dirty Bombs to Nuclear Events: Prepare with REMM

Radiation Emergency Medical Management

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National Network of Libraries of Medicine, Pacific Southwest Region



AGENDA



- What is REMM?



- Patient Management &



Triage Algorithms



- Web & Standalone versions



- Using REMM for Training



- Your Digital Go-Bag



- More free CBRNE resources



Download Today's Presentation Here:
<http://guides.nnlm.gov/psr/REMM>



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REMM Training

Last Updated: Jun 28, 2016 | URL: <http://guides.nnlm.gov/psr/REMM> | [Print Guide](#) | [RSS Updates](#) | [Email Alerts](#)

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Search: This Guide

Disaster Response Tools



REMM for Clinicians and First Responders

REMM is a free, evidence-based tool to help health care providers and first responders in the event of a radiological or nuclear emergency. REMM is available as a web-based resource and in several other formats for mobile devices, including versions that provide essential tools and resources even when the user does not have an Internet connection. It was developed by the National Library of Medicine and the Office of the Assistant Secretary for Preparedness and Response, U.S. Department of Health and Human Services.

What are the goals of the REMM site?

- Provide guidance for health care providers, *primarily physicians*, about clinical diagnosis and treatment of radiation injury during radiological and nuclear emergencies

REMM Presentation & Handouts

- [REMM Presentation](#)
- [Digital Go-Bag](#)
- [Disaster Info Flyer](#)
- [Enviro Health and Toxicology Handout](#)

[Comments \(0\)](#)

Packing Your Digital Go-Bag

Download this two-page brochure in PDF format for a list of disaster and emergency response apps and mobile resources!

Intended Audience



Physicians, primarily:

- Acute care providers (emergency medicine physicians and surgeons)

Other Health Providers and First Responders:

- Nursing staff (ER, OR, ICU and trauma units)
- Other hospital staff
- EMT, fire department

Management and Planning:

- Administrators, trainers, public information officers, public health personnel, emergency/disaster planners, and more



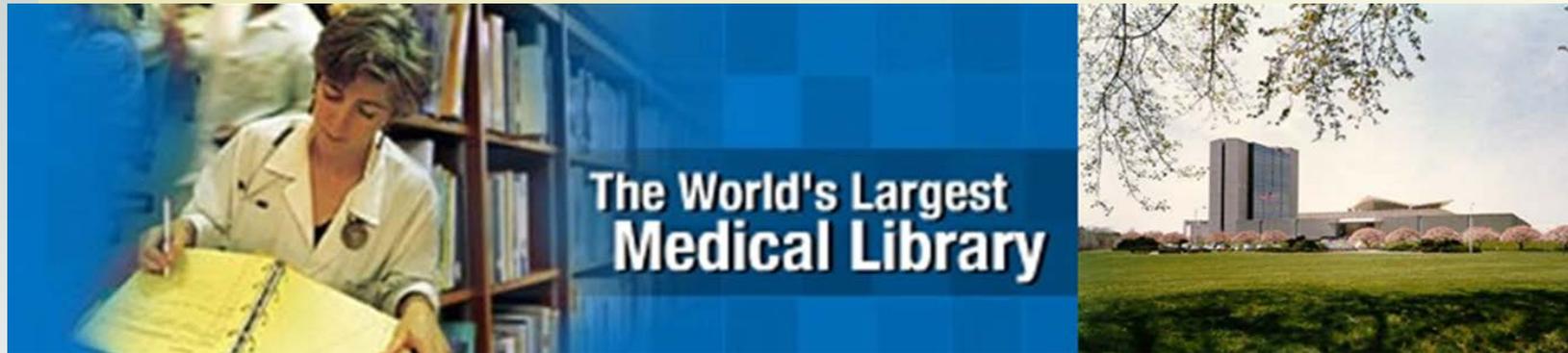
- Understand Radiation
- Plan Ahead
- Practice Teamwork
- Work Safely

REMM is:

- A robust web site and a downloadable, standalone resource if Internet is unavailable
- Algorithms and clinical guidance for diagnosis and treatment during radiological emergencies
- Just-in-time, evidence-based information
- For health professionals *without* formal radiation medicine expertise

<https://www.remm.nlm.gov/>

Who Produces REMM?



The National Library of Medicine, in cooperation with many others (DHHS, ASPR, NCI, CDC)

NLM produces MEDLINE/PubMed, REMM, and many others

- DIMRC is an NLM center (Disaster Information Management Resource Center)

Key Messages

- ✓ Download REMM before you need it!
- ✓ Try it out
- ✓ Check out the content areas
- ✓ Watch some videos

remm.nlm.gov

Sign up for updates:
remm.nlm.gov/email.htm

REMM Website and REMM App

U.S. Department of Health & Human Services
REMM RADIATION EMERGENCY MEDICAL MANAGEMENT

Guidance on Diagnosis and Treatment for Healthcare Providers

- Understand Radiation
- Plan Ahead
- Practice Teamwork
- Work Safely

Interactive Clinical Tools | Diagnosis & Treatment | Reference & Data | Overview | Get REMM App | Search...

What Kind of Emergency?

- Nuclear Detonation: Weapons, Improvised Nuclear Devices
- Radiological Dispersal Devices, Dirty Bombs
- Nuclear Power Plant/ Reactor Incidents
- Radiological Exposure Devices
- Transportation Incidents

Management Modifiers

- Radiation + Trauma
- Burn Triage and Treatment
- Mass Casualty
- Psychological Issues
- At-risk / Special Needs Populations

Initial Incident Activities

- Discovering an Incident
- Describing an Incident
- On-site Activities
- Triage Guidelines
- Transport Victims
- Hospital Activities

Other Audiences

- First Responders
- Mental Health Professionals
- Hospital Staff
- Public Information Officers
- Radiation Safety Officers
- Planners
- Trainers: Practices & Drills

Management Algorithms

- Choose Appropriate Algorithm
- Contamination
- Exposure (Acute Radiation Syndrome)
- Exposure + Contamination
- Triage Guidelines
- Hospital Orders Template

Practical Guidance

- Use of Blood Products
- Population Monitoring
- Decontamination Procedures
- Follow-up Instructions
- Management of the Deceased
- Develop a Response Plan

REMM Multimedia Library

- Dirty Bomb
- Contamination
- Exposure

Radiation Incidents | Radiation Basics | Exposure (ARS) | Contamination | Radiation Safety | Triage & Transport | All Videos

REMM Menu

- Management Algorithms
- Dose Estimator
- Scarce Resources Triage Tool
- Isotopes of Interest
- Countermeasures
- START Triage (Adults)
- JumpSTART Triage (Children)
- SALT Triage
- Emergency Contacts

REMM
Guidance for Healthcare Providers
about Radiological and Nuclear
Emergencies

<http://www.remm.nlm.gov>

REMM Platforms and Devices

- Downloadable app (iTunes, Play Store)
- Full website (with Internet)
- Download to computer for standalone website (without internet)
- Install on USB drive

Download for computer or USB here:

<https://www.remm.nlm.gov/download.htm>



PC,
MAC



iPhone,
iPad



Blackberry

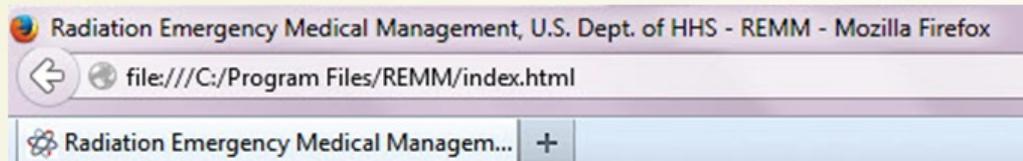
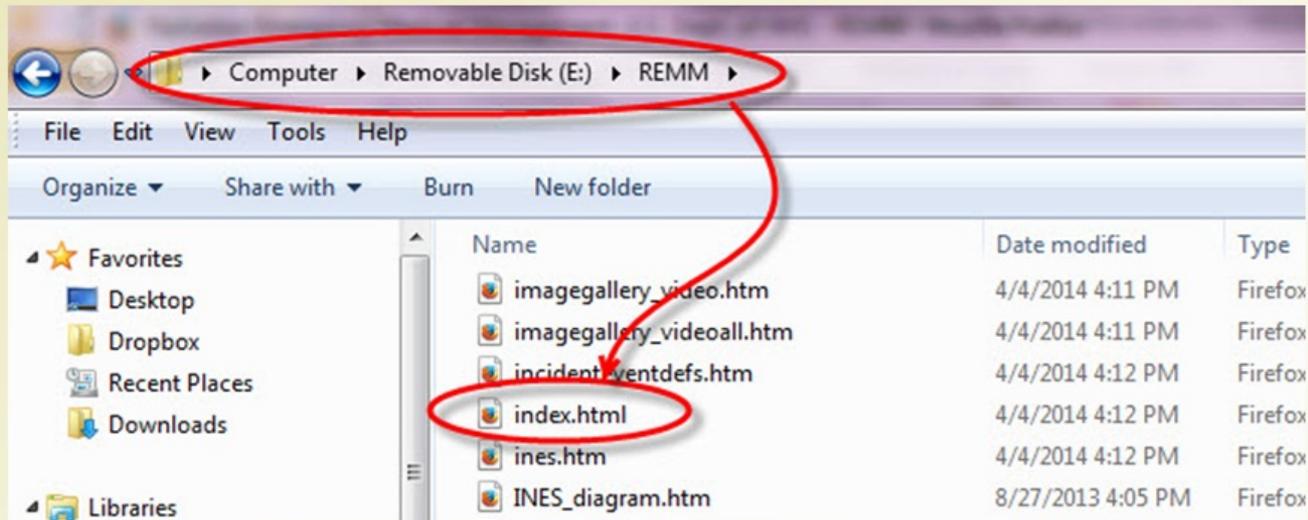


Windows Mobile



Android

Running REMM from USB Drive



Content and Resources in REMM

**Emergency
Medical
Treatment**

and

**Training,
Education, &
Planning**

- Radiation principles (e.g., exposure vs. contamination)
- Patient management algorithms
- Initial onsite activities
- Decontamination procedures
- Assess internal contamination
- Countermeasures

Emergency Types

What Kind of Emergency?



- › Nuclear Detonation: Weapons, Improvised Nuclear Devices
- › Radiological Dispersal Devices, Dirty Bombs
- › Nuclear Power Plant/ Reactor Incidents
- › Radiological Exposure Devices
- › Transportation Incidents

Initial Incident Activities

Initial Incident Activities



- › Discovering an Incident
 - › Describing an Incident
-
- › On-site Activities
 - › Triage Guidelines
 - › Transport Victims
 - › Hospital Activities

Patient Management

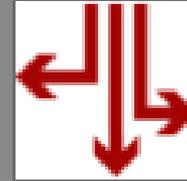
Patient Management



- › Choose Appropriate Algorithm
- › Contamination
- › Exposure
(Acute Radiation Syndrome)
- › Exposure + Contamination
- › Triage Guidelines
- › Hospital Orders Template

Management Modifiers

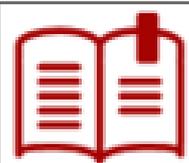
Management Modifiers



- › Radiation + Trauma
- › Burn Triage and Treatment
- › Mass Casualty
- › Psychological Issues
- › At-risk / Special Needs Populations

Practical Guidance

Practical Guidance



- › Use of Blood Products
- › Population Monitoring
- › Decontamination Procedures
- › Follow-up Instructions
- › Management of the Deceased
- › Develop a Response Plan

More...

Practical Guidance

- [Template for Adult/Pediatric Orders](#)
- [Use of Blood Products](#)
- [Collection of Data](#)
- [Follow-up Instructions](#)
- [Population Monitoring](#)
- [Management of the Deceased](#)
- [Develop a Radiation Response Plan](#)
- [Equip an Emergency Department for Decontamination](#)
- [Recovery / Resilience after an Incident](#)
- [How to Volunteer](#)

Other Audiences

Other Audiences



- › First Responders
- › Mental Health Professionals
- › Hospital Staff
- › Public Information Officers
- › Radiation Safety Officers
- › Planners
- › Trainers: Practices & Drills

More...

Other Audiences

- [First Responders in the Field](#)
- [Mental Health Professionals](#)
- [Hospital Staff](#)
- [Public Information Officers](#)
- [Radiation Safety Officers](#)
- [Planners: Preparedness and Response](#)
- [Trainers: Practices and Drills](#)
- [Public Health Officers](#)
- [Legal Advisors](#)
- [Senior Leaders](#)
- [Veterinarians](#)
- [Medical Examiners / Coroners](#)
- [Public Health Emergency Researchers](#)

Content for Planners Example

U.S. Department of Health & Human Services

REMM RADIATION
EMERGENCY
MEDICAL
MANAGEMENT

Guidance on Diagnosis and Treatment for Healthcare Providers

 • Understand Radiation
• Plan Ahead
• Practice Teamwork
• Work Safely

Interactive Clinical Tools ▾ Diagnosis & Treatment ▾ Reference & Data ▾ **Overview ▾** Get REMM App 

You are here: [Home](#) > [Develop a Radiation Response Plan](#)

Develop a Radiation Response Plan

- [Important General Issues](#)
- [Planning Guidance for Response to a Nuclear Detonation](#)
- [Develop a State Radiation Response Plan](#)
- [Develop a Generic Facility Radiation Incident Response Plan](#)
- [Develop a Community Hospital Response Plan](#)
- [Develop a Hospital Response Team](#)
- **See also:**
 - [NIMS Implementation for Healthcare Organizations Guidance](#) (PDF - 183 KB) (HHS/ASPR Hospital Preparedness Program, January 2015)
 - [Nuclear Terrorism Response Plans: Major Cities Could Benefit from Federal Guidance on Responding to Nuclear and Radiologic Attacks. GAO-13-736](#) (U.S. Government Accountability Office, Sept 30, 2013)
 - [Equip an Emergency Department for Decontamination](#)
 - [Preparedness and Response Planning](#)
 - [Hospital Incident Command System](#)

Important General Issues

- A mass casualty radiation response plan requires collaboration among
 - Healthcare professionals from [many different specialties](#)
 - Professionals from many other response disciplines, including first responders, security, law enforcement, and many others
 - Governmental (tribal, local, city, county, State, Federal) and non-governmental entities
- Planning responses for a large mass casualty radiation event requires
 - Generic (all types of hazards) responses activities
 - Activities unique to any radiation event
 - Medical activities appropriate for the [specific kind of radiation event](#) that develops
 - Developing, equipping, training and exercising response teams on a regular basis

Reference Data Center

U.S. Department of Health & Human Services

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Interactive Clinical Tools ▾ Diagnosis & Treatment ▾ **Reference & Data ▾** Overview ▾ Get REMM App 

[Home](#) > [Reference & Data](#)

Reference & Data

- **QUICK REFERENCES**
 - [Top 10 Items for Radiation Emergencies](#)
 - [Key Guidance Documents](#)
 - [Emergency Contacts](#)
 - [Dictionary of Radiation Terms](#)
 - [Abbreviations](#)
 - [Multimedia Library](#)
- **BIBLIOGRAPHIES**
 - [REMM Bibliography](#)
 - [REMM Biodosimetry Bibliography](#)
- **LEARNING**
 - [Understand Radiation](#)
 - [Training and Education](#)

Browse Site Map or Do A Search

U.S. Department of Health & Human Services

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Interactive Clinical Tools ▾ Diagnosis & Treatment ▾ Reference & Data ▾ **Overview ▾** Get REMM App 📱 **Search...**

What Kind of Incident?

- > Nuclear Power Plant
- > Improvised Explosive Device
- > Radiological Dispersal Source
- > Dirty Bomb
- > Nuclear Reactor
- > Radiological Source
- > Transportation Incident

UNDERSTANDING REMM

- > About REMM
- > What's New on REMM? (9/2015)

DOWNLOAD REMM OPTIONS

- > Get Mobile REMM App (8/2015)
- > Download REMM Website to Your Computer (9/2015)

KEY TOOLS

- > Top 10 Items for Radiation Emergencies
- > Interactive Tools
- > Multimedia Library
- > REMM Youtube Channel
- > [REMM Site Map](#)
- > Sign Up for REMM Email Updates
- > Provide Feedback to REMM
- > Print REMM Algorithms

Initial Incident Activities

- > Discovering an Incident
- > Describing an Incident
- > On-site Activities
- > Triage Guidelines
- > Transport Victims
- > Hospital Activities

Advanced Search

U.S. Department of Health & Human Services

REMM RADIATION
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Guidance on Diagnosis and Treatment for Healthcare Providers



- Understand Radiation
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Show results with

All of these words

This exact phrase

Any of these words

None of these words

File Type

All ▼

Safe Search

Off Moderate Strict

Search

You can also use [advanced search operators](#) to help limit and focus your searches.

Search Results

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8 results • [Advanced Search](#)

[PPE Image Gallery: Respiratory Protective Equipment ...](#)

www.remm.nlm.gov/respiratory_ppe.htm

PPE Image Gallery: Respiratory Protective Equipment - Civilian. Respiratory PPE - Civilian. Air-Purifying Respirator (APR) **Powered Air-Purifying** ...

[Personal Protective Equipment \(PPE\) Classification Systems ...](#)

www.remm.nlm.gov/ppe_classification.htm

Personal Protective Equipment (PPE) Classification Systems . Civilian PPE; Military PPE; ... (2007 ed.) "Class 4" PPE ensemble worn with NIOSH CBRN ...

[OSHA/NIOSH Interim Guidance - April 2005 - Notes on PPE ...](#)

www.remm.nlm.gov/osha_niosh_cbrn_ppe.htm

OSHA/NIOSH Interim Guidance - April 2005 * - Notes on PPE Selection Matrix for Emergency Responders Guidance Overview; ... **Powered, air-purifying** ...

[PPE Classification System from OSHA and EPA - Radiation ...](#)

www.remm.nlm.gov/osha_epa_ppe.htm

PPE Classification System from OSHA and EPA. Level A PPE Ensemble Elements; ... **(PAPR)** is more comfortable and easier to use. top of page. Level D PPE ...

[Abbreviations - Radiation Emergency Medical Management](#)

www.remm.nlm.gov/abbreviations.htm

Abbreviations ; Multimedia Library; Bibliographies; ... **PAPR: Powered air-purifying respirator**. PCC: Premature chromosome condensation: PDF: Portable ...

Site Map - Comprehensive List

- [START Adult Triage Algorithm](#)
- [JumpSTART Pediatric Triage Algorithm](#)
- [SALT Mass Casualty Triage Algorithm, Adapted for a Very Large Radiation Emergency](#)
- [Establishing Patient Handling Flow](#)
- [Transport Victims of Radiation Emergencies](#)
- [Hospital Activities](#)

Other Audiences

- [First Responders in the Field](#)
- [Mental Health Professionals](#)
- [Hospital Staff](#)
- [Public Information Officers](#)
- [Radiation Safety Officers](#)
- [Planners: Preparedness and Response](#)
 - [Incident Command System and Hospital \(Emergency\) Incident Command System](#)
- [Trainers: Practices and Drills](#)
- [Public Health Officers](#)
- [Legal Advisors](#)
- [Senior Leaders](#)
- [Veterinarians](#)
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- [Public Health Emergency Researchers](#)

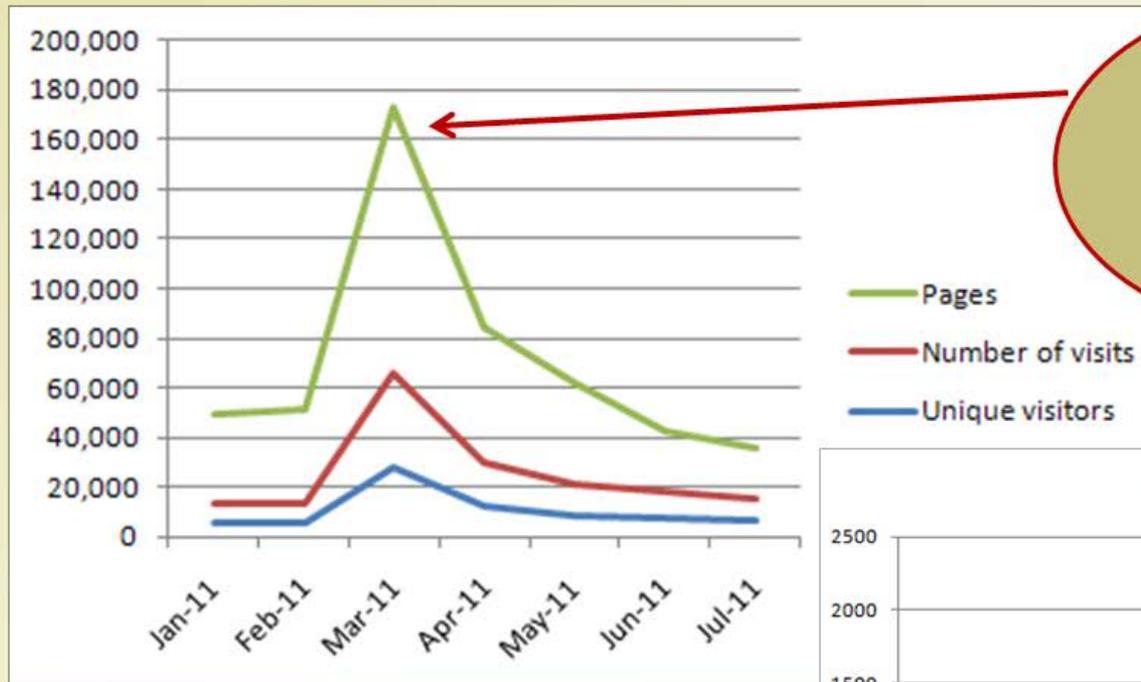
About This Site

- [What Are the Goals of This Site?](#)
- [Who Produced This Site?](#)
- [Disclaimers](#)

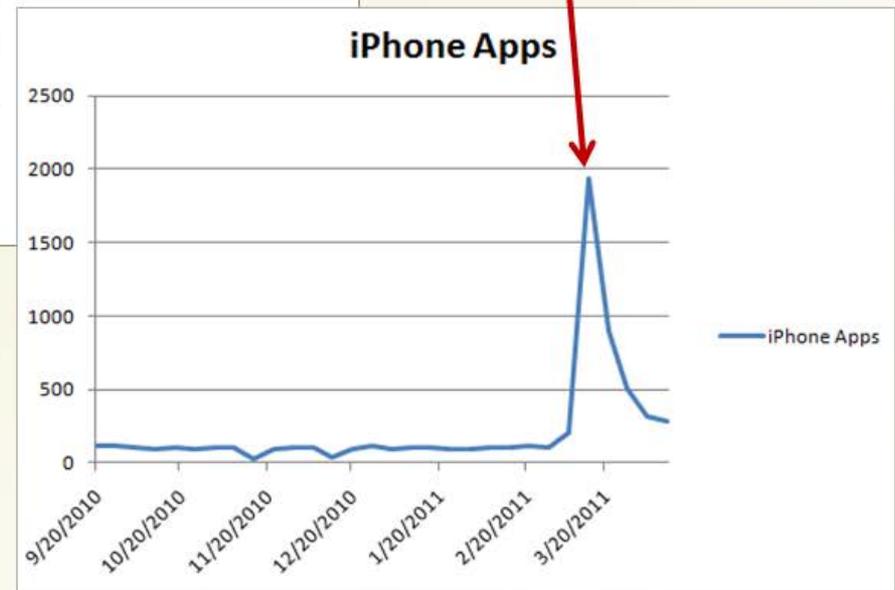
Reference/Data Center

- [Training and Education](#)
- [Dictionary of Radiation Terms](#)
- [Multimedia Library: Animations, Illustrations, Photos](#)
- [Emergency Contacts](#)
- [Abbreviations](#)
- [Understanding Radiation](#)
- [REMM Bibliography](#)
 - [Books, Handbooks, Pamphlets, Pocket Guides](#)
 - [Software Tools](#)
 - [Government Entities with Radiation Information for Healthcare Providers](#)
 - [International Agencies with Radiation Information for Healthcare Providers](#)
 - [Professional Societies with Radiation Information for Healthcare Providers](#)
 - [Radiation Safety](#)
 - [Preparedness and Planning](#)
 - [Medical Management of Radiation Injury](#)
 - [Radiation Biodosimetry](#)
 - [Isotopes of Interest, Countermeasures for Internal Contamination](#)
 - [Contamination, Decontamination](#)
 - [Nuclear Detonation Incidents](#)
 - [RDD Incidents](#)
 - [Nuclear Reactor Incidents](#)
 - [Late Effects of Ionizing Radiation](#)
 - [History of Radiation Incidents](#)

REMM in Real Life – Fukushima 2011



Usage spiked during the Fukushima nuclear incident in Japan



Japanese Translation of REMM Content

TRI 臨床研究情報センター [公益財団法人 先端医療振興財団] [関連リンク](#) | [サイトマップ](#) | [交通アクセス](#) | [お問い合わせ](#) | [ENGLISH](#)

 **臨床研究情報センター**
Translational Research Informatics Center

HOME 研究相談 研究支援 **がん情報** アルツハイマー病 CDISC 橋渡し研究 サービス

TRIとは >
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 TRI 支援研究
ポータルサイト
TRI Clinical Trial Portal

臨床研究情報センター (TRI) は神戸医療産業都市構想に基づき、基礎研究から臨床応用の橋渡し研究 (トランスレーショナルリサーチ) を推進するための情報拠点として、わが国で初めて整備された研究施設であり、神戸市が整備を行い、(公財) 先端医療振興財団が管理運営を受託しています。

 **神戸医療産業都市**
KIBC KOBE Biomedical Innovation Cluster

HOME > 放射線緊急医療管理


放射線緊急医療管理
Radiation Emergency Medical Management

1. 情報公開のお知らせ
 - 放射線緊急医療管理 -医療従事者のための診断・診療ガイダンス-
2. 放射線緊急医療管理
 - 原子炉の事故 Nuclear Reactor Accidents
 - 放射線を理解する Understanding Radiation
 - Radiation Emergency Medical Management (米国サイトへ)
3. 監修者からのコメント
 - 「放射性ブルーム」とは

Training: Start Here

Interactive Clinical Tools ▾ Diagnosis & Treatment ▾ Reference & Data ▾ Overview ▾

What Kind of Incident?

- Nuclear Reactor
- Improvised Explosive Device
- Radiological Dirty Bomb
- Nuclear Reactor
- Radiological
- Transportation Incidents

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US Department of Health & Human Services

REMM RADIATION EMERGENCY MEDICAL MANAGEMENT

Guidance on Diagnosis and Treatment for Healthcare Providers

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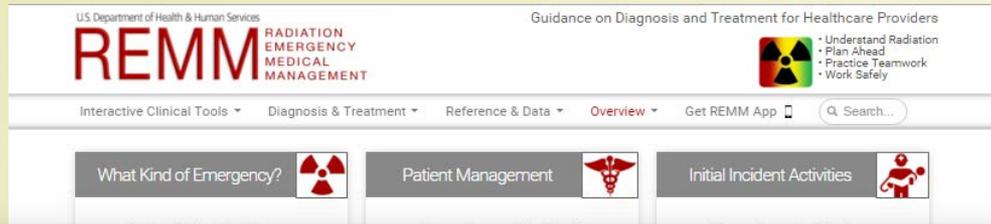
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You are here: [Home](#) > [Top 10 Items for Radiation Emergencies](#)

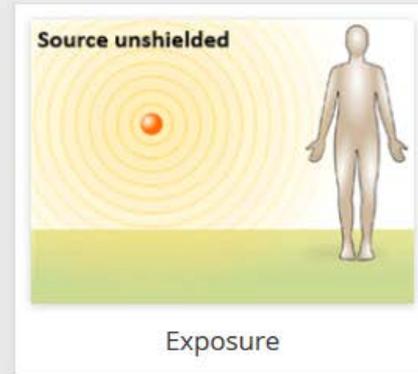
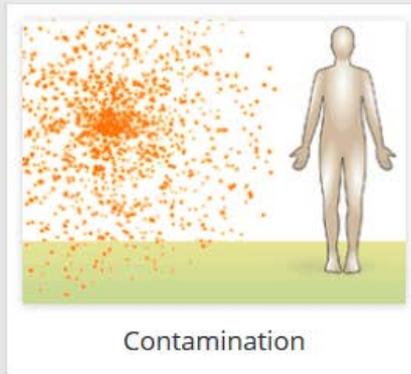
Top 10 Items for Radiation Emergencies

1. Learn the basics:
 - [Radiation Principles: Video](#) (HHS/CDC) (YouTube - 1:52 min) 
 - [Types of Ionizing Radiation and Shielding Required: Video](#) (HHS/CDC) (YouTube - 1:44 min) 
 - [Radiation Basics Made Simple](#) (HHS/CDC)
 - [Basic Information](#) (DOT/TEPP/MERTT)
 - [Factors that Decrease Radiation Exposure: Time, Distance, Shielding](#)
2. Learn the difference:
 - What is **exposure**? [Animations](#)
 - What is **contamination**? [Animations](#)
3. Learn the [kinds of radiation emergencies](#) that could be mass casualty incidents
4. Learn [how radiation emergencies are discovered](#)
5. Learn about [Describing a Radiation Emergency: Definition, Severity, Phases, Timeline](#)
6. Learn about the Acute Radiation Syndrome
 - Learn about the [Effects of Acute Radiation Syndrome](#)

Training: REMM's Multimedia Library



REMM Multimedia Library

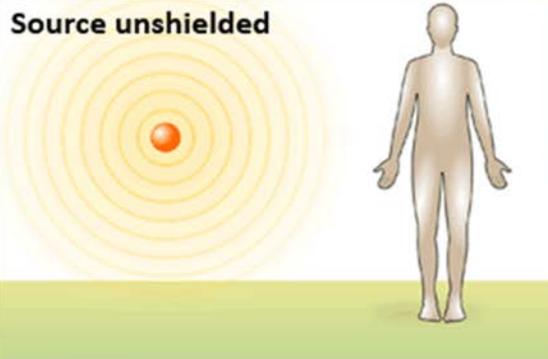
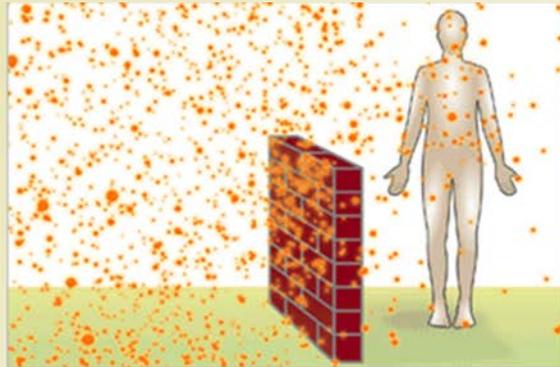


[Radiation Incidents](#) [Radiation Basics](#) [Exposure \(ARS\)](#) [Contamination](#) [Radiation Safety](#) [Triage & Transport](#) [All Videos](#)

Scroll through illustrations/videos in a carousel format or click on categories

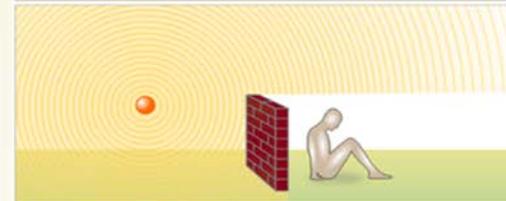
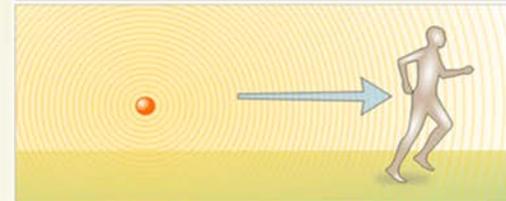
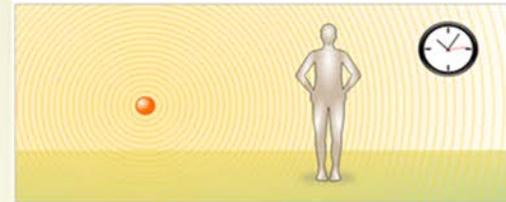
[Radiation Incidents](#) [Radiation Basics](#) [Exposure \(ARS\)](#) [Contamination](#) [Radiation Safety](#) [Triage & Transport](#) [All Videos](#)

Training: Important Radiation Concepts



Factors that decrease radiation from exposure

- Decreased **time** near source
- Increased **distance** from source
- Increased **shielding** between source and victim



Animations, illustrations, and photos teach important radiological and clinical concepts

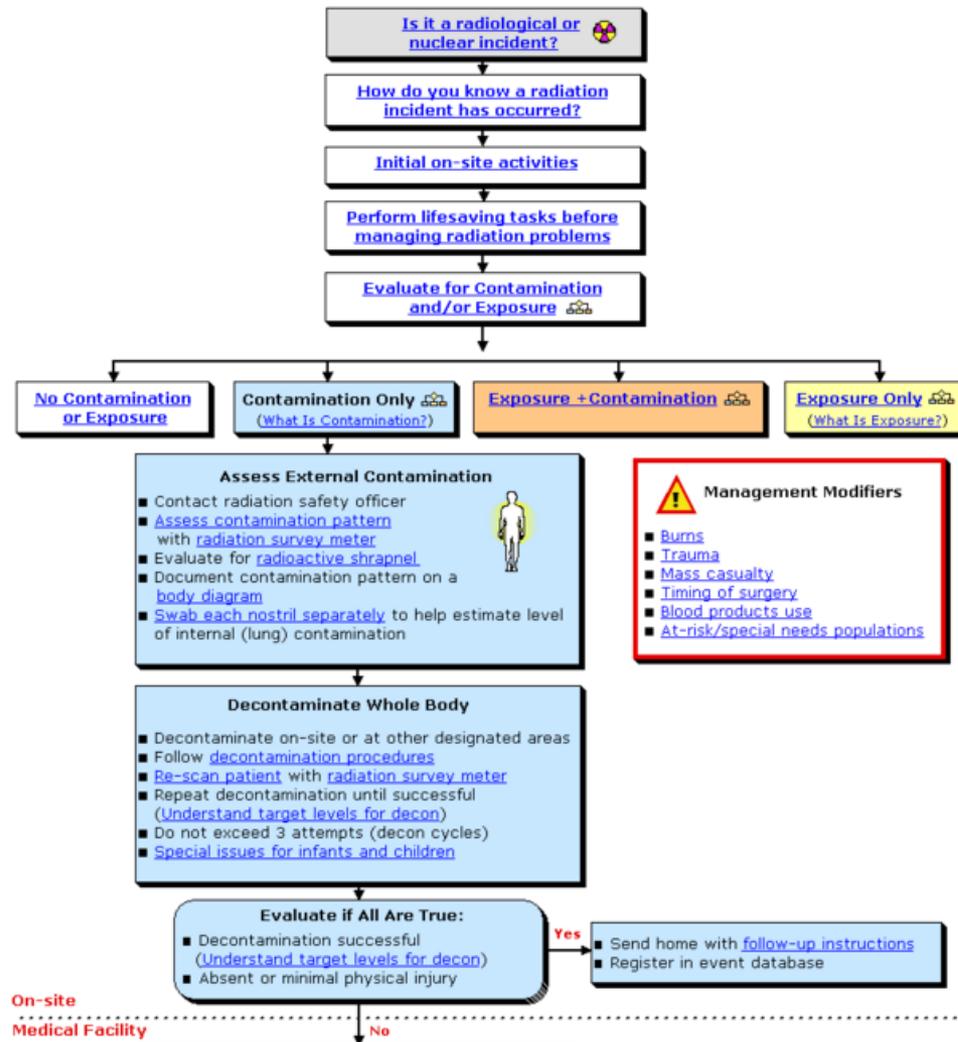
Medical Treatment: Patient Management Algorithms

[View/Print as PDF](#) (PDF - 38 KB) [Text Version](#)

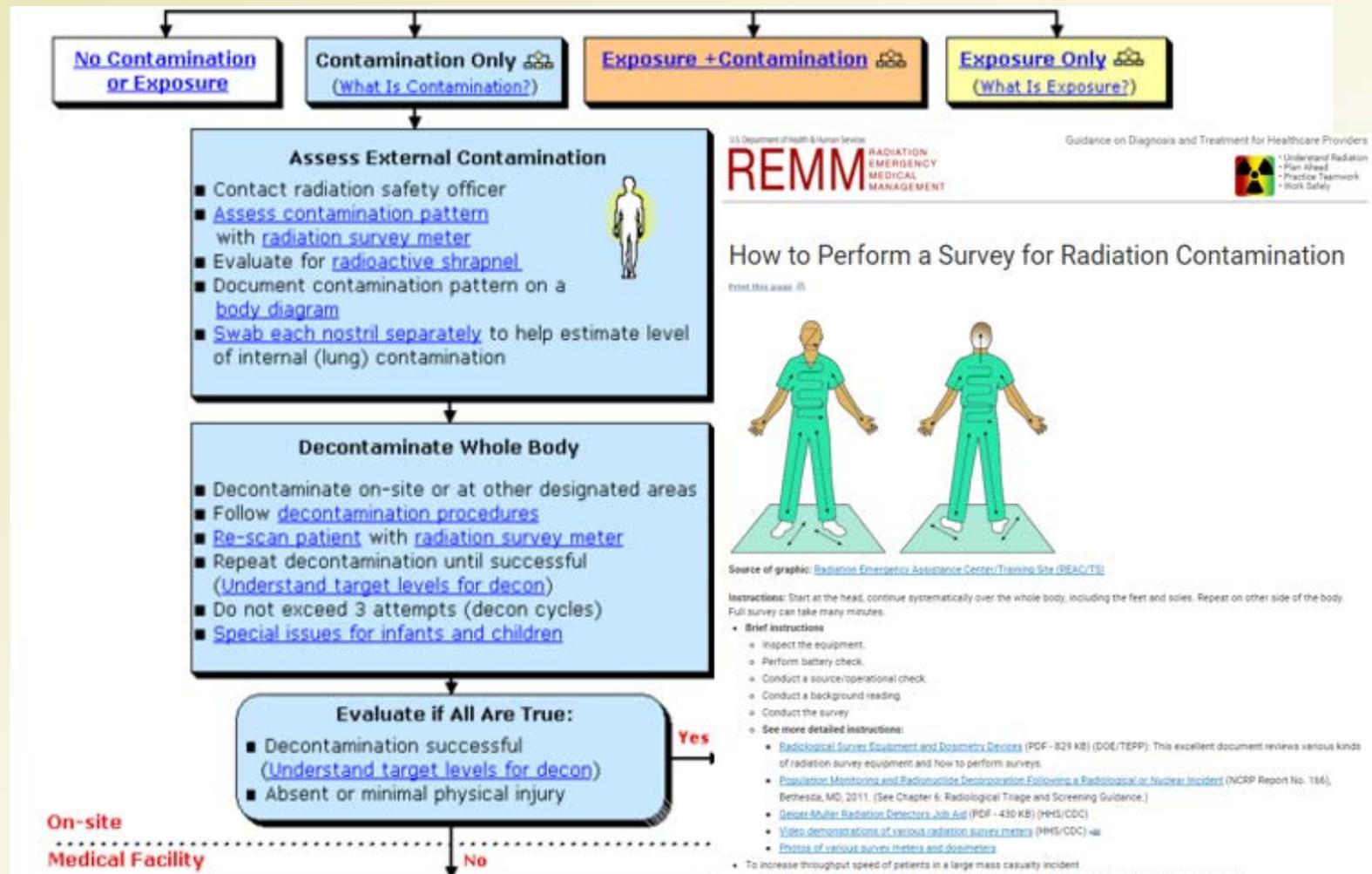


Video Tutorial (3:33)

Contamination: Diagnose/Manage



Medical Treatment: Algorithm Content Example



Choose Appropriate Algorithm: Contamination and/or Exposure

Choose Appropriate Algorithm: Evaluate for Contamination and/or Exposure

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Choose Appropriate Algorithm: Evaluate for Contamination and/or Exposure

Is It a Radiological or Nuclear Incident?

• Key

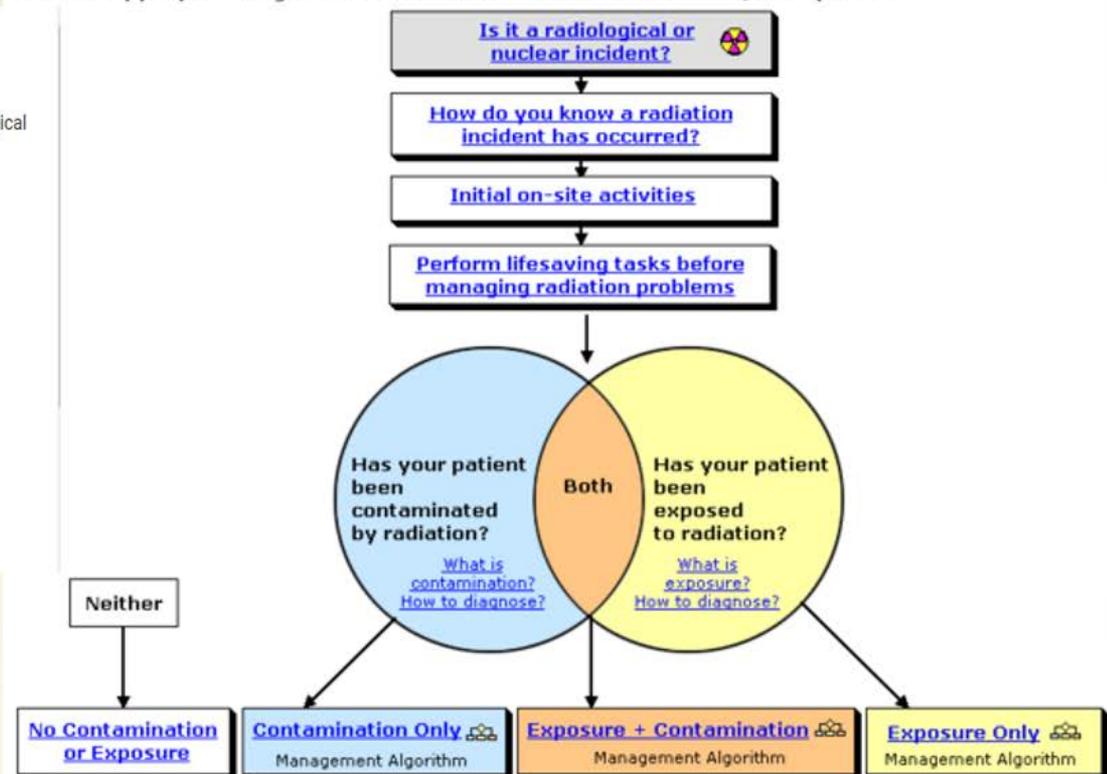
- Nuclear incidents involve detonation of a nuclear device whereas radiological incidents produce radiation without detonation of a nuclear device.

• Radiological incidents

- Victim can have [contamination](#) and/or [exposure](#)
- Examples:
 - [Radiological Dispersal Device \(RDD\)](#): explosive/non-explosive
 - [Hidden radioactive source](#): radiological exposure device (RED)

• Nuclear incidents (blast, detonation, explosion)

- Involves a nuclear explosion (fission)
- Victims can have [contamination](#) and/or [exposure](#)
- Examples:
 - Nuclear weapon detonation
 - [Improvised Nuclear Device detonation](#)



Medical Treatment: Dose Estimator for Exposure Tools



**Time to
Onset of Vomiting**



**Lymphocyte
Depletion Kinetics**



**Dicentric
Chromosome Assay**

| 1. Time to Onset of Vomiting | 2. Lymphocyte Depletion Kinetics |
|---|---|
| <p>Warning Background Illustrations References</p> <p>1. Date/time exposure began <input type="text" value="mm/dd/yyyy"/> <input type="text" value="00:00"/> (e.g., 01/22/2008, 14:25)</p> <p>2. Date/time vomiting began <input type="text" value="mm/dd/yyyy"/> <input type="text" value="00:00"/></p> <p>3. <input type="checkbox"/> Estimate dose from exposure</p> <p>4. Dose estimate <input type="text"/> Gy 95% confidence limits <input type="text"/> Gy</p> <p>5. Print this result</p> | <p>Warning Background Illustrations References</p> <p>1. Date/time exposure began <input type="text" value="mm/dd/yyyy"/> <input type="text" value="00:00"/> (e.g., 01/22/2008, 14:25)</p> <p>2. Date/time of one or more blood counts <input type="text" value="mm/dd/yyyy"/> <input type="text" value="00:00"/> <input type="text" value="mm/dd/yyyy"/> <input type="text" value="00:00"/> <input type="text" value="mm/dd/yyyy"/> <input type="text" value="00:00"/> (e.g., 01/22/2008, 23:00)</p> <p>Lymphocyte count (x 10⁶ cells/L) <input type="text"/> <input type="text"/> <input type="text"/> (e.g., 1.25)</p> <p>3. <input type="checkbox"/> Estimate dose from exposure</p> <p>4. Dose estimate <input type="text"/> Gy 95% confidence limits <input type="text"/> Gy</p> <p>5. Print this result</p> |
| <p>3. Dicentric Chromosome Assay</p> <p>Warning Background Illustrations References</p> <p>To estimate radiation dose, the Dicentric Chromosome Assay should be performed in a reference laboratory.</p> | |

Countermeasures

| Medical countermeasure | Administered for | Mechanism of action | Route of administration | Dosage | Duration of treatment | References for use |
|--|-------------------|---------------------|-------------------------|---|--|---|
| EDTA | Cobalt (Co-60) | Chelating agent | IV | 1000 mg/m ² /day in 500 cc 5% dextrose in water (D5W) or 0.9% sodium chloride (normal saline, NS); infuse over 8-12 hours | Given as a single dose | NCRP-suggested EDTA is FDA-approved for Rx of lead poisoning only |
| | | | IM | Divide IV dose equally into two doses and administer 8-12 hours apart | Given as a divided dose | |
| D-Penicillamine (DailyMed) | Polonium (Po-210) | Chelating agent | PO | Adults: 0.75-1.5 g (250 mg/capsule) QD Children: 30 mg/kg/day (250 mg/capsule) divided into 4 doses | <ul style="list-style-type: none"> Obtain bioassay to assess Continue only if clinically indicated D-Penicillamine has a narrow therapeutic index; use is associated with high risk of toxicity | NCRP-suggested D-Penicillamine is FDA-approved for Rx of copper poisoning only |
| Potassium iodide (KI) | Iodine (I-131) | Blocking agent | PO | Adults >40 years: 130 mg/day (For projected thyroid dose ≥500 cGy) Adults 18 - 40 years: 130 mg/day (For projected thyroid dose ≥10 cGy) Pregnant or lactating women of any age: 130 mg/day (For projected thyroid dose ≥5 cGy) Adolescents ≥70 kg: 130 mg/day (For projected thyroid dose ≥5 cGy) Children & adolescents 3 - 18 years: 65 mg/day (For projected thyroid dose ≥5 cGy) | <ul style="list-style-type: none"> Some incidents will require only a single dose of KI. Incident managers may recommend additional daily doses if ongoing radioactive iodine ingestion or inhalation represents a continuing threat. See also: Potassium iodide (KI): Duration of Therapy. | FDA-approved NCRP-preferred |

Countermeasures

| Medical countermeasure | Administered for | Mechanism of action | Route of administration | Dosage | Duration of treatment | References for use |
|------------------------|------------------|---------------------|-------------------------|--|------------------------|--|
| EDTA | Cobalt (Co-60) | Chelating agent | IV | 1000 mg/m ² /day in 500 cc 5% dextrose in water (D5W) or 0.9% sodium chloride (normal saline, NS); infuse over 8-12 hours | Given as a single dose | NCRP-suggested EDTA is FDA-approved for Rx of lead poisoning only |

Potassium Iodide (KI)

[D-Penicillamine](#)
(DailyMed)

Polonium (Po-210)

- [Key Information About I-131](#)
- [How and When KI Protects](#)
- [Prescribing Information](#)
- [Duration of Therapy](#)
- [Contraindications to KI](#)
- [How to Follow Patients Exposed to I-131](#)
- [How to Get KI?](#)
- [KI information sheet for the general public](#) (HHS/CDC)
- [Time Line of Potassium Iodide Distribution Policies in the US](#)
- [References](#)

[Potassium iodide \(KI\)](#)

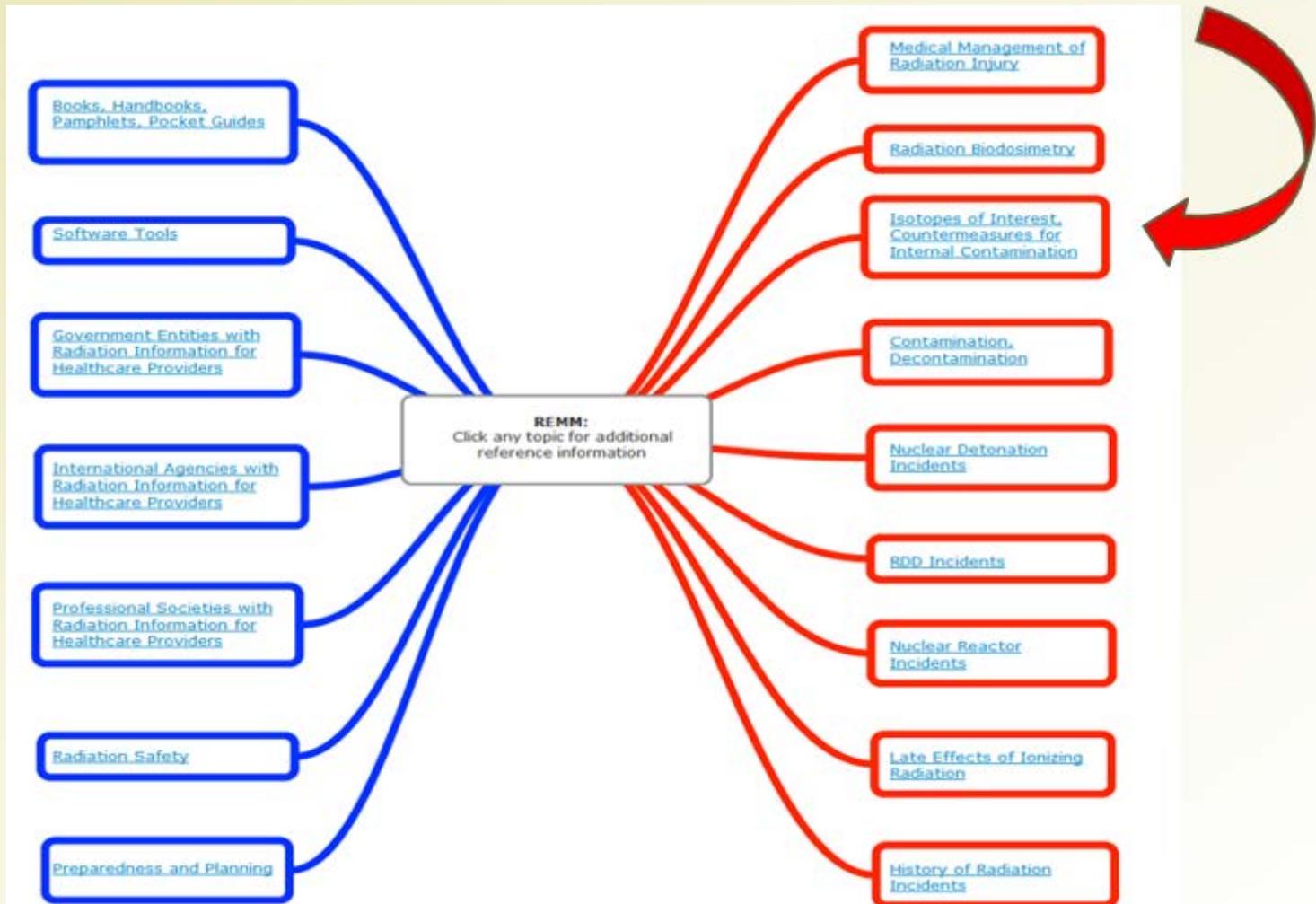
Iodine (I-131)

Key Information about I-131

- Sources of I-131:
 - I-131 releases have occurred most frequently after incidents involving nuclear reactors (e.g., Chernobyl, Japan).
 - Nuclear bomb detonation produces a small amount of local I-131 fallout. Most I-131 distributes over large distances, typically with only 10% making its way to the earth's surface before undergoing spontaneous radioactive decay to stable xenon-131.
 - Radioactive iodine is difficult to obtain in quantity and is not considered a likely isotope for use in a [Radiological Dispersal Device \(RDD\)](#).
 - Untoward releases of I-131 requiring medical management are rare.
- Routes of contamination:
 - After an I-131 release, the amount of the radioisotope available to contaminate the public depends on
 - Amount of I-131 released
 - Distance between a given individual and the place of release
 - Vertical height of the release
 - Meteorological conditions at and after the time of the release

Bibliography (Reference & Data Section)

https://www.remm.nlm.gov/remm_SourcesofRadInfo.htm



REMM Bibliography

REMM Bibliography - Isotopes of Interest, Countermeasures for Internal Contamination

- [Isotopes of interest fact sheets](#)
- [Medical countermeasures in radiological incidents](#)
- [Hazardous Substances Data Bank \(National Library of Medicine\)](#)
- [Radiation countermeasures research](#)

See also: [Countermeasures: Internal Contamination](#)

Isotopes of interest: fact sheets

| Isotope | Government agencies | | | |
|-------------------------------|--------------------------|-----------------------------|------------------------|---|
| | HHS/CDC* | HHS/ATSDR** | EPA*** | Argonne National Laboratory |
| Americium-241 | View | View | View | View |
| Californium-252 | | | | View |
| Cesium- 134/137 | View | View | View | View |
| Cobalt-57/60 | View | View | View | View |
| Curium-244 | | | | View |
| Iodine-124/125/129/131 | View | View | View | View |
| Iridium-192 | View | | | View |
| Phosphorus-32 | | | | |
| Plutonium-238/239/240/241/242 | View | View | View | View |
| Polonium-210 | View | | | View |
| Radium-226 | | View | View | View |
| Strontium-89/90 | View | View | View | View |
| Uranium-235/238 | View | View | View | View |
| Yttrium-86/90†/91 | | | | View† |

[Medical Management of Radiation Injury](#)

[Radiation Biodosimetry](#)

[Isotopes of Interest, Countermeasures for Internal Contamination](#)

[Contamination, Decontamination](#)

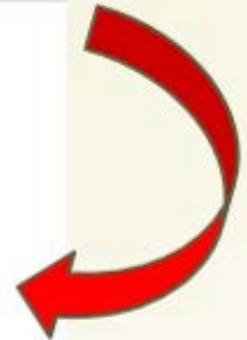
[Nuclear Detonation Incidents](#)

[RDD Incidents](#)

[Nuclear Reactor Incidents](#)

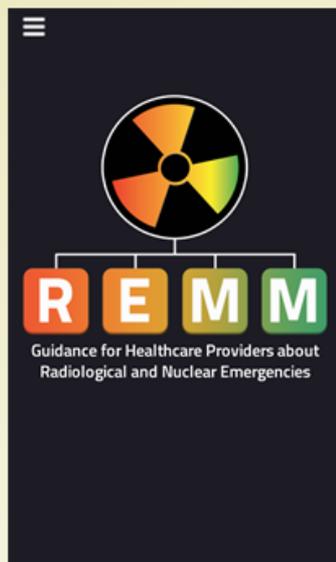
[Late Effects of Ionizing Radiation](#)

[History of Radiation Incidents](#)

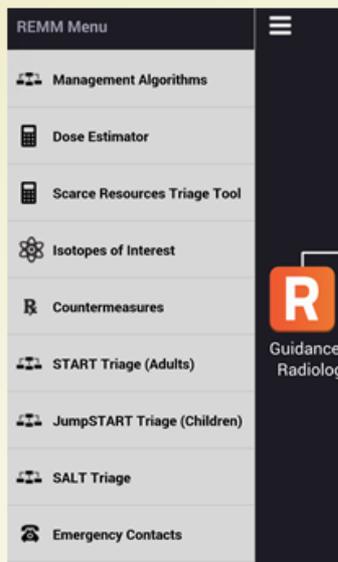


REMM App

Home Screen



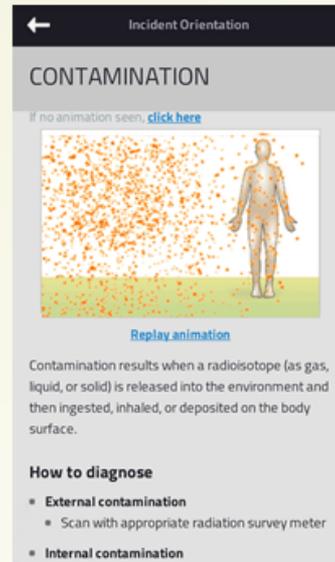
Main Menu



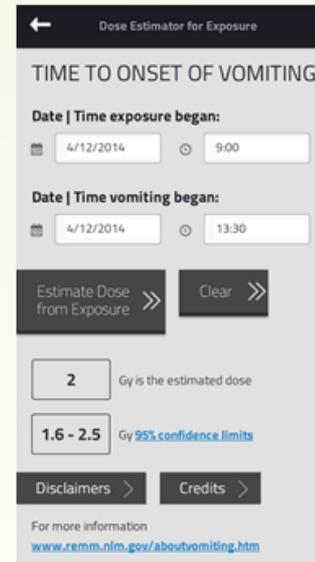
Management Algorithms



Contamination Animation



Dose Estimator
Onset of Vomiting



More Content and Tools

COUNTERMEASURES

Only the 3 FDA-approved countermeasures for internal contamination are listed on Mobile REMM.

Countermeasures for treating internal contamination

- Ca-DTPA, Zn-DTPA
- Potassium iodide
- Prussian blue

Hematopoietic countermeasures: myeloid cytokines

- G-CSF: filgrastim (Neupogen®)*
- Pegylated G-CSF: pegfilgrastim (Neulasta®)*
- GM-CSF: sargramostim (Leukine®)*

* Neupogen®, Neulasta®, and Leukine® are currently (February, 2014) not FDA-approved as countermeasures for radiation injury. During a mass casualty incident, an Emergency Use Authorization may be requested to release Strategic National Stockpile assets of Neupogen®.

[See REMM online for more detailed countermeasure information.](#)

Radiation Units

- SI Unit and Common Unit Terminology
- Conversion Equivalence
- Prefixes
- Dose Unit Conversion Tool
- Radioactivity Unit Conversion Tool
- Exposure Unit Conversion Tool
- Conversion Factors
- More Information

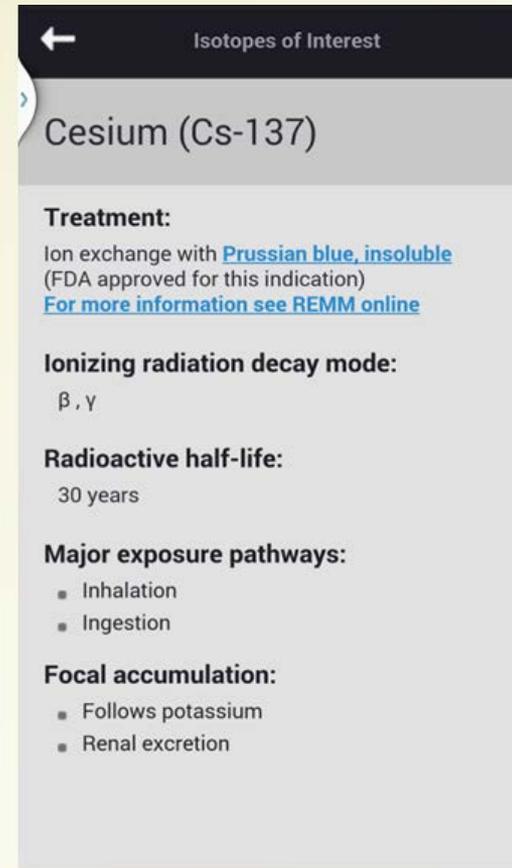


A Few Exercises

Use REMM to answer the questions:

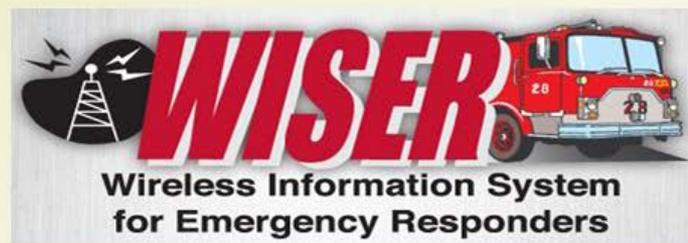
1. *What is the radioactive half-life of the isotope Cesium?
What is the FDA-approved countermeasure?*
2. *What is the treatment for a patient who presents with
no injuries and was exposed to radiation at 9:00 today
and began vomiting at 15:00?*
3. *Review the four management algorithms*

Isotopes of Interest - Cesium



NLM's CBRNE Tools

- Wireless Information System for Emergency Responders (WISER)



- Chemical Hazards Emergency Medical Management (CHEMM)



- Radiation Emergency Medical Management (REMM)



Disaster Information Management Research Center from NLM

U.S. Department of Health & Human Services | www.hhs.gov

Disaster Information Management Research Center
IMPROVING ACCESS TO DISASTER INFORMATION

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NATIONAL INSTITUTE OF HEALTH
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Emergency Response Tools ▶
Disaster Health Literature ▶
Disaster Information ▶
Epidemiology & Disasters ▶
NLM Projects & Research ▶
Search TOXNET® Database ▶
Health Organizations ▶

2013 Disaster Health Information Outreach Projects

- American Samoa: PREL (Pacific Resources for Education and Learning)
- El Paso, Texas: Pan American Health Organization
- Fort Worth, Texas: Texas Health Resources (Texas Health Fort Worth, Medical Library, Texas Health Resources, Emergency Management, Texas Health Fort Worth, Safety Department)

In the Spotlight

- Typhoon Haiyan/Yolanda: Health Related Information Resources
- Tornadoes: Health Resources
- Floods: Health Resources
- Resources about Coping with Disasters, Violence and Traumatic Events
- Disaster Apps and Mobile Web Sites

Search Our Web Pages

A to Z Index of Resources

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About the Center ▶

- Fact Sheet
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- Publications about the Center
- Staff Publications
- Promotional Materials
- Collaborations & Partnerships

Find Disaster Organizations

Level to: State (Optional)
NLM | Get this widget
Get More Widgets

Announcements

Disaster Information Specialist Program
Next Meeting: Thursday, December 12, 2013 at 1:30 pm ET
Topic to be Announced
Recordings and information about previous meetings...

Disaster Medicine and Public Health Literature ▶

- Resource Guide for Disaster Medicine and Public Health**
Guide to disaster medicine and public health literature and related information.
- PubMed**
Database of biomedical journal citations and abstracts.

HazMat/CBRN (Chem, Bio, Rad, Nuclear) ▶

- WISER: Wireless Information System for Emergency Responders**
System to assist first responders and first receivers in hazardous material incidents. *Now with CHEMM content.*
- REMM: Radiation Emergency Medical Management**
Guidance about clinical diagnosis and treatment of radiation injuries during radiological and nuclear emergencies.
- CHEMM: Chemical Hazards Emergency Medical Management**
Guidance on planning, response and recovery related to chemical mass casualty incidents.

New Documents from the Resource Guide

- Australian Guidelines for the Treatment of ASD (Acute Stress Disorder) and PTSD (Posttraumatic Stress Disorder)
- More...

New in PubMed

- Medical Ethics Versus Governmental Objectives.
- More...

News about Disasters ▶
DISASTR List Archives ▶

Tweets

- HLM Examiner @NLM_DIBPC: RT @stewartorange2003: Planning for Work: CHEMM/WHO/WHO: A Guide for Hospital & Health Care Facilities @jme0470307P2
- HLM Examiner @NLM_DIBPC: First Responders - sdy... @NLM_DIBPC: @CDCgov

Access WISER, CHEMM and REMM all from the DIMRC Home Page
<http://disasterinfo.nlm.nih.gov/>

Apps for Your Digital Go Bag

U.S. Department of Health & Human Services www.hhs.gov

Disaster Information Management Research Center
IMPROVING ACCESS TO DISASTER HEALTH INFORMATION

National Library of Medicine
National Institutes of Health
SPECIALIZED INFORMATION SERVICES 

Disaster Apps and Mobile Optimized Web Pages

Disaster Medicine Tools

| | | |
|---|---|---|
| <p>WISER</p> <p>By: National Library of Medicine</p>  <p>WISER (Wireless Information System for Emergency Responders) assists first responders in Hazmat incidents, with</p> | <p>Mobile REMM</p> <p>By: National Library of Medicine</p>  <p>REMM (Radiation Emergency Medical Management) provides guidance about clinical diagnosis and treatment of radiation</p> | <p>PubMed</p> <p>By: National Library of Medicine</p>  <p>PubMed Mobile provides access to more than 21 million citations for biomedical literature from MEDLINE, life science journals, and</p> |
| <p>ERG 2012</p> <p>By: National Library of Medicine and U.S. Department of Transportation</p>  <p>2012 Emergency Response Guidebook (ERG) from the DMCA (U.S. Department of</p> | <p>MedlinePlus</p> <p>By: National Library of Medicine</p>  <p>The MedlinePlus mobile enhanced Web page provides access to consumer-oriented health information on disaster topics in English and</p> | <p>LactMed</p> <p>By: National Library of Medicine</p>  <p>LactMed provides access information about maternal and infant drug levels and possible effects of vaccines and radiologic agents on</p> |
| <p>BioAgent Facts</p> <p>By: UPMC Center for Health Security</p>  <p>BioAgent Facts provides facts about pathogens that could cause serious disease resulting from a natural epidemic or release of</p> | <p>Clinicians' Biosecurity Resource</p> <p>By: UPMC Center for Health Security</p>  <p>Clinicians' Biosecurity Resource provides clinicians with detailed information and recommended treatments for the most</p> | <p>mTBI Pocket Guide</p> <p>By: National Center for Telehealth & Technology</p>  <p>mTBI (Traumatic Brain Injury) Pocket Guide provides access to clinical guidelines for</p> |
| <p>Med Field Ops</p> <p>By: Northern New England Metropolitan Response System</p>  <p>Mobile Medical Unit Field Operations Guide was developed for the Northern New</p> | <p>Hands-Only™ CPR</p> <p>By: American Heart Association</p>  <p>Hands-Only™ CPR provides quick instructions for CPR without mouth-to-mouth breaths.</p> | <p>First Aid by American Red Cross</p> <p>By: American Red Cross</p>  <p>First Aid by American Red Cross provides free lifesaving first aid instruction and disaster preparedness information including videos.</p> |

Psychological Health Tools

| | | |
|--|---|---|
| <p>SAMHSA Behavioral Health Disaster Response</p> <p>By: Substance Abuse & Mental Health Services Administration</p>  <p>This app will connect behavioral health responders to evidenced-based behavioral health resources for use in the field. Users</p> | <p>PFA Mobile</p> <p>By: The National Child Traumatic Stress Network</p>  <p>PFA Mobile assists responders who provide psychological first aid as part of an organized response effort. The app was funded by the</p> | <p>Responder Self Care</p> <p>By: University of Minnesota School of Public Health</p>  <p>This mobile app aids those deployed to emergency response events in maintaining</p> |
| <p>PTSD Coach</p> <p>By: U.S. Department of Veterans Affairs</p>  <p>PTSD Coach provides users with information about post-traumatic stress disorder (PTSD).</p> | <p>Provider Resilience</p> <p>By: National Center for Telehealth & Technology, U.S. Department of Defense</p>  <p>Provider Resilience gives frontline providers</p> | |

<http://disasterinfo.nlm.nih.gov/dimrc/disasterapps.html>

Additional Resources of Note

The screenshot shows the homepage of the Disaster Information Management Research Center (DIMRC), part of the National Library of Medicine (NLM). The header includes the U.S. Department of Health & Human Services logo and the website URL www.hhs.gov. The main navigation bar contains links for SIS Home, About Us, Site Map & Search, SIS News, and Contact Us. A search bar is located in the top right corner.

The main content area is divided into several sections:

- Disaster Types and Topics:** A vertical list of menu items including Emergency Response Tools, Disaster Health Literature, Disaster Information Specialist, Librarians & Disasters, NLM Projects & Research, Search TOXNET® Databases, and Disaster Information Training.
- Learn how to pack your digital go-bag with our free online course!** A featured banner for "Packing Your Digital Go-Bag: Essential Disaster Health Information on Your Mobile Device" featuring an image of a blue go-bag and a tablet displaying a mobile app interface.
- Search Our Web Pages:** A search box with a "Search" button.
- A to Z Index of Resources:** A grid of letters from A to Z for navigating through resources.
- Stay Connected:** Social media links for joining listservs, subscribing to RSS, following on Twitter, and sharing.
- About the Center:** A list of links for Fact Sheet, News, Publications about the Center, Staff Publications, Promotional Materials, and Collaborations & Partnerships.
- Announcements:** A section for "Disaster Information Specialist Program" with details about the next meeting on March 13 at 1:30 pm ET.
- Disaster Medicine and Public Health Literature:** A section with a "Resource Guide" for disaster medicine and public health literature, and a link to PubMed.
- HazMat/CBRN (Chem, Bio, Rad, Nuclear):** A section with three sub-sections: WISER (Wireless Information System for Emergency Responders), REMM (Radiation Emergency Medical Management), and CHEMM (Chemical Hazards Emergency Medical Management).
- In the Spotlight:** A section highlighting the NIH Disaster Research Response Project, resources about coping with disasters, and disaster apps and mobile web sites.
- New Documents from the Resource Guide:** A section for new documents, including the User Interface Platform (UIP) of the Global Platform for Climate Services.
- New in PubMed:** A section for new publications, including Disaster Research/Evaluation Frameworks, Part 1: An Overview.
- News about Disasters:** A section for disaster news.
- DISASTR List Archives:** A section for disaster list archives.
- Tweets:** A section for tweets from the NLM Disaster Info account, including a tweet about the latest eNews and a tweet about National Flood Safety Awareness Week.

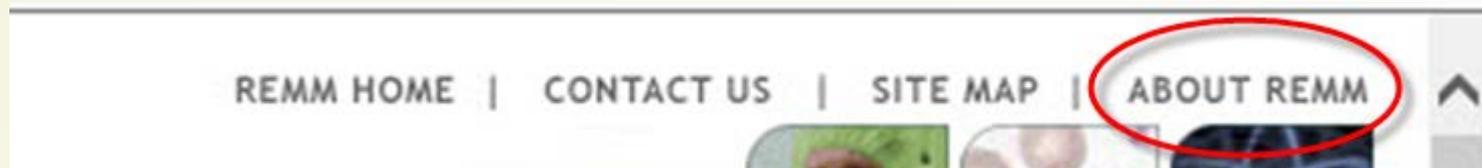
- Disaster Literature
- Topic pages
- R&D
- Social Media
- Apps
- HazMat/CBRN Tools
- Disaster Info Specialists



- ✓ Download REMM to computer
- ✓ Try out mobile app
- ✓ Check out the content areas
- ✓ Watch some videos
- ✓ Sign up for REMM listserv
remm.nlm.gov/email.htm
- ✓ Look at DIMRC site for more apps
disaster.nlm.nih.gov

REMM Team

- **Partnership: ASPR, NIH/NCI, CDC, NLM**
- Content Team
Managing Editor: Judith Bader, MD, NCI
ASPR Project Manager: Norman Coleman, MD, NCI
- Technical Team
Florence Chang, NLM
Jennifer Pakiam, NLM
- Over 50 Subject Matter Experts



Next Steps

- What will you do with this knowledge?
- How can you help your organization prepare?



Download Today's Presentation Here:
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Disaster Response Tools



REMM for Clinicians and First Responders

REMM is a free, evidence-based tool to help health care providers and first responders in the event of a radiological or nuclear emergency. REMM is available as a web-based resource and in several other formats for mobile devices, including versions that provide essential tools and resources even when the user does not have an Internet connection. It was developed by the National Library of Medicine and the Office of the Assistant Secretary for Preparedness and Response, U.S. Department of Health and Human Services.

What are the goals of the REMM site?

- Provide guidance for health care providers, *primarily physicians*, about clinical diagnosis and treatment of radiation injury during radiological and nuclear emergencies

REMM Presentation & Handouts

-  [REMM Presentation](#)
-  [Digital Go-Bag](#)
-  [Disaster Info Flyer](#)
-  [Enviro Health and Toxicology Handout](#)

[Comments \(0\)](#)

Packing Your Digital Go-Bag

Download this two-page brochure in PDF format for a list of disaster and emergency response apps and mobile resources!

Questions?



Thank You!

Kelli Ham, MLIS
Consumer Health Librarian
kkham@library.ucla.edu

National Network of Libraries of Medicine, Pacific SW Region
UCLA Louise M. Darling Biomedical Library
<http://nnlm.gov/psr>



This project is funded by the National Library of Medicine, National Institutes of Health, Department of Health and Human Services, under Cooperative Agreement Number UG4LM012341 with the UCLA Louise M. Darling Biomedical Library.

