Nuclear Terrorism: Preparedness and Response for Hematology/Oncology Centers

The RITN is a cooperative effort of the National Marrow Donor Program® (NMDP) and the American Society for Blood and Marrow Transplantation (ASBMT).

Monday, May 18, 2009
8:00 a.m. – 5:15 p.m.
(Registration/Breakfast begins at 7:00 a.m.)
Marriott Bethesda
5151 Pooks Hill Road, Bethesda, MD 20814
# Nuclear Terrorism: Preparedness and Response for Hematology/Oncology Centers

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  - Logistical Issues – Bed Management, Use of Non-hospital Location and staffing
  - Provision of Medical Care – Early and Late Care
  - Report of Findings
Conference Agenda

7:00 – 8:00 a.m.  Registration and Breakfast

8:00 – 8:15 a.m.  Opening Remarks  
RADM Ann R. Knebel, RN, DNSc, FAAN  
HHS - ASPR

8:15 – 8:45 a.m.  Threat Scenario Overview  
Carl A. Curling, Sc.D.  
Institute for Defense Analyses

8:45 – 9:15 a.m.  National Disaster Medical System  
CAPT Clare Helminiak, M.D., M.P.H.  
HHS - ASPR

9:15 – 9:30 a.m.  Break

9:30 – 10:00 a.m.  Medical Response Expectations  
After a Nuclear Detonation  
C. Norman Coleman, M.D.  
HHS - ASPR

10:00 – 10:30 a.m.  Altered Standards of Medical Care  
Overview  
Sally Phillips, Ph.D., R.N.  
HHS – AHRQ

10:30 – 11:00 a.m.  NMDP Planning and Data Collection  
Willis Navarro, M.D.  
National Marrow Donor Program

11:00 a.m. – 12:00 noon Lunch

In the afternoon, conference attendees will rotate through one-hour breakout sessions on the topics of altered standards of care, the logistical challenges of providing care after a nuclear incident, and the medical management of victims of a mass casualty incident producing marrow-toxic injuries.

Altered Standards of Care:
Moderator – David Weinstock, M.D.
Subject Matter Experts – Sally Phillips, Ph.D., R.N. and John Hick, M.D.

Logistical Issues – Bed Management, Use of Non-hospital Location and Staffing:
Moderators – Willis Navarro, M.D. and Cullen Case, Jr., CEM
Subject Matter Experts – CAPT Clare Helminiak, M.D., M.P.H. and C. Norman Coleman, M.D.

Provision of Medical Care – Early and Late Care
Moderators – Nelson Chao, M.D. and Daniel Weisdorf, M.D.
Subject Matter Experts – CAPT Judith Bader, M.D. and John Perentesis, M.D.

12:00 noon – 1:00 p.m. Breakout Workshop Session
1:00 – 1:15 p.m. Break
1:15 – 2:15 p.m. Breakout Workshop Session
2:15 – 2:30 p.m. Break
2:30 – 3:30 p.m. Breakout Workshop Session
3:30 – 4:00 p.m. Break
4:00 – 5:00 p.m. Report Workshop Findings to Group
5:00 – 5:15 p.m. Closing Comments
To ensure balance, independence, objectivity and scientific rigor in all of its educational activities the organizers require all CME activity planners and faculty to disclosure their relevant financial relationships to the audience. Any relationship that is disclosed has been resolved to ensure it is fair and balanced and free of commercial bias.

**Speakers:**

RADM Ann R. Knebel, R.N., DNSc, FAAN
Carl Curling, Sc.D.
CAPT Clare Helminiak, M.D., M.P.H.
C. Norman Coleman, M.D.
Willis Navarro, M.D.
Sally Phillips, Ph.D., R.N.

**Planning Committee Members:**

Cullen Case, Jr., CEM
Nelson J. Chao, M.D.
Dennis L. Confer, M.D.
Richard Hatchett, M.D.
Robert Krawisz, M.B.A.
David Weinstock, M.D.
Daniel Weisdorf, M.D.

**Subject Matter Experts:**

Judith L. Bader, M.D., USPHS
John Hick, M.D.
John Perentesis, M.D.
Program Overview

Program Description:
Attendees will be able to review possible mass casualty scenarios involving radiological terrorism. Experts will outline current threats to the United States; planning for patient distribution from the disaster area to local, regional and distant medical centers; expectations of centers based on their proximity to the incident; and an overview of the altered standards of care anticipated after a mass casualty incident.

Attendees will participate in multiple breakout sessions, guided by subject matter experts, to identify ongoing gaps in knowledge and planning. These sessions will focus on:

- Altered standards of care and their application at individual centers
- Hospital-specific logistical issues such as staffing, supplies and bed management
- Standardized approaches for medical care, contrasting the difference between initial and late care needs

Educational Objectives:
1. Understand the current radiological or nuclear threat to the United States.
2. Describe the response to an incident from the disaster area through to the local receiving hospitals.
3. Understand the necessary resources and the associated logistical and staff-related complications.
4. Understand the concept of altered standards of care and what that means to a treating hospital during a disaster.

Target Audience:
Hematologists, oncologists, other physicians, physician’s assistants, nursing staff, medical support staff, emergency managers, and appropriate federal agency staff.

Accreditation and Designation of Credit:
This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the Medical College of Wisconsin and the National Marrow Donor Program (NMDP). The Medical College of Wisconsin is accredited by the ACCME to provide continuing medical education for physicians.

The Medical College of Wisconsin designates this educational activity for a maximum of 7.0 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Disclosure Policy:
It is the policy of the Medical College of Wisconsin Office of Continuing Medical Education to ensure balance, independence, objectivity and scientific rigor in all of its sponsored educational activities. All faculty participating in sponsored programs are expected to disclose to the program audience any real or apparent conflict of interest related to the content of their presentation.

*Slides approved for release will be available on www.ritn.net following the conference.
References Worth Your Attention

1. Planning Guidance for Response to a Nuclear Detonation
   (http://hps.org/hsc/documents/Planning_Guidance_for_Response_to_a_Nuclear_Detonation_FINAL.pdf) – (overview of response considerations for an improvised nuclear device detonation including public health and public safety agencies particularly)

2. Medical Response to a Radiological/Nuclear Event: Integrated Plan from DHHS-ASPR
   (http://download.journals.elsevierhealth.com/pdfs/journals/0196-0644/PIIS0196064407018999.pdf) - (overview document that details governmental plans and resources)


4. Altered Standards of Care in Mass Casualty Events from the Agency for Healthcare Research and Quality, DHHS (http://www.ahrq.gov/research/altstand/altstand.pdf) - (introductory discussion to the topic of adjusted standards of care and issue generation)


6. Mass Medical Care with Scarce Resources from the Agency for Healthcare Research and Quality, DHHS (http://www.ahrq.gov/research/mce/mceguide.pdf) - (core document for adjusted standard of care planning – divided into functional sections including operational guidance for EMS and hospital planning and background information on ethical framework, legal issues, and a pandemic scenario analysis)


10. About the Medical Reserve Corps (http://www.medicalreservecorps.gov/About) - (information for healthcare providers that may wish to pre-register to facilitate volunteering during a crisis)


Biographies
Planning Committee, Speakers & Subject Matter Experts

Judith L. Bader, M.D., USPHS
Dr. Bader currently serves as the Senior Medical Advisor to the Assistant Secretary for Preparedness and Response, Department of Health and Human Services, for radiological and nuclear preparedness issues. Her board certifications include Radiation Oncology, Pediatrics and Pediatric Oncology. She is a Captain in the U.S. Public Health Service assigned to the National Cancer Institute Office of Communications and Education with a part time detail in the NCI Radiation Research Branch. Dr Bader is currently the Managing Editor of the Radiation Event Medical Management (REMM) web portal. Dr Bader formerly served in the NCI Radiation Oncology Branch as the Senior Investigator. She is the Founding Medical Director of two Radiation Oncology private practices in Maryland. She graduated from Yale University Medical School following undergraduate studies at Stanford University.

Cullen Case, Jr., CEM
Mr. Case is the Emergency Preparedness Manager for the National Marrow Donor Program (NMDP) and the Program Manager of the Radiation Injury Treatment Network (RITN). In his role for the NMDP he is responsible for crisis management, business continuity planning and response for the organization headquarters and its 20 remote facilities, the physical security of the headquarters, and exercising/testing of all related plans. As the RITN program manager Mr. Case oversees the design of projects related to contingency planning that support the needs of casualties who may be considered transplant candidates from a mass casualty incident resulting in marrow toxic injuries. Mr. Case’s management experience ranges from serving as a Major in the U.S. Army, to managing production facilities in Silicon Valley and teaching software applications to engineers. While serving in the U.S. Army he managed disaster response and recovery operations for Hurricanes Bertha (’96), Fran (’96), and Mitch (’98). The International Association of Emergency Managers (IAEM) recognizes Cullen as a Certified Emergency Manager (CEM®), he is also a Stanford Certified Project Manager (SCPM).

Nelson J. Chao, M.D.
Dr. Chao is Professor of Medicine and Immunology and Chief of the Division of Cellular Therapy/BMT at Duke University. He received his undergraduate degree from Harvard University, MD from Yale University and his post-graduate training at Stanford University. He then joined the faculty at Stanford University. He was the Associate Director of Stem Cell Transplantation at Stanford University prior to moving to Duke University in 1996. He obtained his MBA from the Fuqua School of Business at Duke University in 2000. He is the author of over 100 peer-reviewed papers, 25 book chapters and one book. He is also a co-founder of Stemco Biomedical, a startup biotechnology company in Research Triangle Park.

C. Norman Coleman, M.D.
Dr. Coleman graduated from the University of Vermont with a B.A. in mathematics, then graduated from Yale University School of Medicine in 1970. He completed his internship
and residency in internal medicine at the University of California in San Francisco, and medical oncology at the NCI and radiation oncology at Stanford. Board certified in internal medicine, medical oncology and radiation oncology, Dr. Coleman was a tenured faculty member at the Stanford University School of Medicine before joining Harvard Medical School in 1985 as Fuller-American Cancer Society Professor and Chairman, Joint Center for Radiation Therapy. In 1999, he came to the NCI and became director of the new Radiation Oncology Sciences Program that he created to coordinate all radiation oncology activities. He served as chief of the Radiation Oncology Branch from 1999-2004 and is now an adjunct member of ROB. He serves the the NCI as associate director of the Radiation Research Program (in DCTD), and special advisor to the director of the NCI. Since 2004 he has been Senior Medical Advisor and chief of the CBRN Team in the Office of Mass Casualty Planning Preparedness and Emergency Operations (OPEO), Office of Public Health Emergency Assistant Secretary for Preparedness and Response (ASPR), HHS. He has written extensively in his field and has won numerous awards including the 2005 ASTRO Gold Medal.

**Dennis L. Confer, M.D., Chief Medical Officer**

Dr. Confer has over 23 years of experience in the medical field as an academic hematologist/oncologist and hematopoietic cell transplantation (HCT) physician. He is Chief Medical Officer (CMO) of NMDP and Clinical Professor of Medicine at the University of Minnesota. As CMO, Dr. Confer overseas several NMDP departments including donor medical services, donor advocacy, and the CIBMTR Minneapolis office. Dr. Confer’s experience as a practicing transplant physician includes 13 years at the University of Minnesota and 8 years as Director of Bone Marrow Transplantation with the University of Oklahoma Health Sciences Center. He is the co-principal investigator for the Blood and Marrow Transplant Clinical Trials Network data coordinating center. He has led the NMDP Phase II study of PBSC transplants and is experienced with FDA regulatory matters. He has been the author or co-author on 6 book chapters and over 60 publications.

**Carl Curling, Sc.D.**

Dr. Curling is a Research Staff Member, Strategy, Forces and Resources Division for the Institute for Defense Analyses. He is responsible for the performance and management of tasks associated with estimating casualties and medical requirements associated with the use of Chemical, Biological, Radiological or Nuclear (CBRN) weapons. Dr. Curling also performs and supports other analyses as required, to include the definition of the civilian user community’s desired CBRN Human Response Model Attributes; analysis of requirements and management of medical CBRN education in the US military; and analysis of the medical requirements to respond to nuclear attacks against OCONUS military installations.

**Richard Hatchett, M.D.**

Dr. Hatchett joined the Office of the Director at NIH in July 2005 as Associate Director for Radiation Countermeasures Research and Emergency Preparedness. He received his medical degree from Vanderbilt University and completed postgraduate training in internal medicine at New York Weill Cornell Medical Center and medical oncology at
Duke University Medical Center. Prior to joining the Division, he served as Senior Medical Advisor in the DHHS Office of Public Health Emergency Preparedness.

**Captain Clare Helminiak, M.D., M.P.H.**

Captain Helminiak was selected by Acting Surgeon General Stephen Galson as the Chief Professional Officer for the Medical Category effective 1 June, 2009. As Chief Medical Officer, CAPT Helminiak is responsible for providing leadership and coordination of Public Health Service (PHS) medical professional affairs for the Office of the Surgeon General and the Department of Health and Human Services (HHS). CAPT Helminiak will provide guidance and advice to the Surgeon General and the Physician’s Professional Advisory Committee (PPAC) on matters such as recruitment, retention, career development, and readiness of PHS medical officers.

CAPT Helminiak is the Deputy Director for Medical Surge in the Office of Preparedness and Emergency Operations (OPEO), a component of the Office of the Assistant Secretary for Preparedness and Response (ASPR). She is responsible for directing and coordinating medical surge through the supervision of three programs, the National Disaster Medical System (NDMS), the Hospital Preparedness Program (HPP), and the Emergency Care Coordination Center (ECCC). NDMS augments the Nation’s medical response capability with specialized medical, veterinary and mortuary team capabilities. HPP enhances the preparedness and response of hospitals and health care systems. The ECCC improves the resiliency, efficiency, and capacity of daily hospital emergency medical care. All three programs support the leading role of ASPR in coordinating all-hazards preparedness and response activities between HHS, other Federal departments and agencies, and State, local, and Tribal officials.

**John Hick, M.D.**

At the Minnesota Department of Health, Dr. Hick is the Medical Director for the Office of Emergency Preparedness and for Hospital Bioterrorism Preparedness. He is also the Associate Medical Director for Emergency Medical Services and Medical Director for Emergency Preparedness at Hennepin County Medical Center. He is founder and current chair of the Minneapolis/St. Paul Metropolitan Hospital Compact, a 27-hospital mutual aid and planning group that coordinates the regional disaster response of 29 hospitals in the Minneapolis/St. Paul and surrounding metropolitan area.

**Rear Admiral Ann R. Knebel, R.N., DNSc, FAAN**

Rear Admiral Knebel is the Deputy Director for Preparedness Planning in the Office of the Assistant Secretary for Preparedness and Response (ASPR), United States Department of Health and Human Services. In this capacity, she serves as a principal to the Deputy Assistant Secretary and the Assistant Secretary on emergency preparedness planning, operational readiness, mass casualty support, and the planning elements of the Secretary's Operations Center. She is responsible for the development of programs to enhance integrated preparedness across the local/state/regional/Tribal and Federal tiers of response in supporting the ASPR goals of community preparedness, partnerships, and enhancing Federal response capability. In the six years RADM Knebel has worked for ASPR (formerly OPHEP), she has been instrumental in advancing various preparedness
planning and surge capacity initiatives. Highlights include: developing publications that have had a national impact on preparedness such as a handbook on medical surge capacity and capability and planning guidance on allocation of scarce resources. She assisted the Greek Ministry of Health to prepare for the 2004 Summer Olympics and served a 9-month detail with the New York City Office of Emergency Management to develop bioterrorism plans. During the 2005 and 2008 hurricane seasons RADM Knebel served as the plans section chief on the HHS Emergency Management Group, helping to plan the Federal public health and medical response and recovery. RADM Knebel serves on expert panels that influence international approaches to preparedness such as a World Health Organization-sponsored virtual advisory group on mass gathering preparedness.

Robert Krawisz, M.B.A.
Robert Krawisz is the Associate Executive Director of the American Society for Blood and Marrow Transplantation and is a member of the RITN Executive Committee and the Conference Committee. Mr. Krawisz has over 30 years of management experience, including involvement in the coordination of numerous conferences.

Willis Navarro, M.D.
Dr. Navarro is the medical director for transplant services at the National Marrow Donor Program. His role is to provide medical oversight for the recipient side of the equation (as opposed to the donor side). He is also responsible for providing medical support for research projects in BMT such as outcomes research. Dr. Navarro transitioned to this non-profit from 3 years at Genentech working on oncology drug development and a decade in academia as a BMT transplant physician.

John Perentesis, M.D.
Dr. Perentesis received his medical degree from the University of Michigan and pursued pediatric and hematology / oncology training at the University of Minnesota Medical School. After completion of his postdoctoral training, he was a member of the faculty of the University of Minnesota Cancer Center and led the Pediatric Advanced Therapies Program. He has substantial experience in pediatric developmental therapeutics, leading laboratory programs in the development of recombinant therapeutics and pharmacogenetics, and in the development and execution of Phase I & II pediatric anticancer drug clinical research studies. His laboratory has developed novel anticancer drugs and discovered genes important in the growth of normal and malignant cells. He is also member of the Steering Committee for the new national NIH-funded Pediatric Phase I / Pilot Consortium.

Sally Phillips, Ph.D., R.N.
Dr. Phillips currently serves as the Director of the Agency for Healthcare Research and Quality (AHRQ)’s Public Emergency Preparedness Program. She joined the staff of AHRQ’s Center for Primary Care, Prevention, and Clinical Partnerships in September 2001 as a Senior Nurse Scholar. She managed a portfolio that ranged from her primary area of bioterrorism to multidisciplinary education for safety and related health care workforce initiatives. Prior to joining the AHRQ staff, Dr. Phillips was a Robert Wood Johnson Health Policy Fellow and Health Policy Analyst for Senator Tom Harkin for two
years. She brought a wealth of expertise in the area of multidisciplinary education, patient safety legislative initiatives, and curriculum with health professions education to her role at AHRQ. Dr. Phillips joined the AHRQ staff in September 2002 as the Director of the Bioterrorism Preparedness Research Program, now the Public Health Emergency Preparedness Program. She is an accomplished author, consultant, and speaker on public health and medical preparedness and response research initiatives. Dr. Phillips holds a Ph.D. from Case Western Reserve University in Cleveland, OH.

David Weinstock, M.D.
Dr. Weinstock received his medical degree from George Washington University School of Medicine in 1997. He subsequently completed his residency in Internal Medicine at New York Hospital/Cornell, and his fellowship in Medical Oncology and Infectious Diseases at Memorial Sloan-Kettering Cancer Center. He joined the staff of Dana-Farber Cancer Institute and Brigham and Women's Hospital in 2008, where he is a medical oncologist and laboratory investigator in Hematologic Neoplasia. His research focuses on the relationship between DNA repair and the development of hematologic neoplasms.

Daniel Weisdorf, M.D.
Dr. Daniel Weisdorf is Professor of Medicine and Director of the Adult Blood and Marrow Transplant Program at the University of Minnesota. Dr. Weisdorf received his M.D. in 1975 from the Chicago Medical School and received Internal Medicine training at Michael Reese Hospital in Chicago. He was a Fellow at the University of Minnesota in Hematology and Medical Oncology and is Board certified in both disciplines. Dr. Weisdorf’s clinical and research interests are in application of blood and marrow transplant therapies for hematologic malignancies as well as extensive study of the clinical complications of transplantation including opportunistic infections and graft versus host disease (GVHD). He serves as the Scientific Director of the National Marrow Donor Program and chairs the Acute Leukemia Committee of the International Bone Marrow Transplant Registry/Autologous Bone Marrow Transplant Registry and is the University of Minnesota Principal Investigator on the NIH-sponsored Bone Marrow Transplantation Clinical Trials Network.
Conference Planning Committee

Nelson Chao, M.D.
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Thank you REMM.
The RITN Executive Committee greatly appreciates the National Library of Medicine - Radiation Event Medical Management (REMM) team for providing conference participants with a USB flash drive containing a complete copy of the REMM website, current as of February 2009.

Join the REMM ListServ at http://remm.nlm.gov/email.htm to get important file updates for this valuable resource!

The USB drive welcome page also offers users the opportunity to register for the REMM ListServ to be notified about updates (signing up for the Listserv requires an Internet connection).

REMM system requirements
- System: Windows, Mac, or Linux
- Browser: IE Version 5.5 or higher, Netscape, Firefox, or Safari (Mac)
- Javascript: Enabled
- View Images: Allowed
- Pop-ups: Allowed from REMM Web-site
- Cookies: N/A
- Screen resolution: Best viewed at 1024 x 768 pixels

Software that may be needed:
- Adobe Acrobat Reader
- PowerPoint®
- WinZip
- Media Player
- Flash Player
Opening Remarks

RADM Ann R. Knebel, RN, DNSc, FAAN
HHS - ASPR
Office of the Assistant Secretary for Preparedness and Response (ASPR)

RADM Ann Knebel, RN, DNSc, FAAN
Deputy Director, Preparedness Planning

VISION: A Nation prepared

MISSION: Lead the Nation in preventing, preparing for, and responding to the adverse health effects of public health emergencies and disasters
Office of the Assistant Secretary for Preparedness and Response

ASPR

Office of Resource Planning and Evaluation
Office of Medicine, Science, and Public Health
Office of Policy, Strategic Planning, and Communications

Biomedical Advanced Research and Development Authority
Office of Preparedness and Emergency Operations

Our goal is a robust enterprise-wide capability with a focus on regional response

Federal Response: A Regional Approach

NIH  BARDA  FDA  CDC  State  Local/Tribal Communities  Patient

Research and Development  Licensing  Stockpile Storage Maintenance  Deployment, Utilization and Surveillance & Detection

Enhancing Preparedness and Response

ASPR
Coordination
National Response Framework: Organization

Doctrine, organization, roles and responsibilities, response actions and planning requirements that guide national response

- **Core Document**
  - Emergency Support Function Annexes
    - Mechanisms to group and provide Federal resources and capabilities to support State and local responders
  - Support Annexes
    - Essential supporting aspects of the Federal response common to all incidents
  - Incident Annexes
    - Incident-specific applications of the Framework
  - Partner Guides
    - Next level of detail in response actions tailored to the actionable entity

The Spectrum of Care & Phased Deployment

Acronyms
- NDMS = National Disaster Medical System
- PHS = U.S. Public Health Service

 Volunteers
- NDMS
- PHS Rapid Deployment Force
- Department of Veterans Affairs
- Medical Reserve Corps
- PHS Mental Health Team
- Strategic National Stockpile
- PHS Applied Public Health Team

- Food / Water Safety
- Drug / Blood Safety
- Basic First Aid
- Outpatient Care
- Emergency Departments
- ICU / Trauma Critical Care
- Hospital Inpatient Care
- Nursing Home Care
- Pre-hospital Care
- Mental Health
- Delivery of Medical Countermeasures
- Health Surveillance
### National Planning Scenarios - Consequences

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Consequences</th>
<th>Structural Damage</th>
<th>Evacuated/Displaced</th>
<th>Contamination</th>
<th>Multiple Events?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improvised Nuclear Device</td>
<td>96,000 - 228,574</td>
<td>100,000</td>
<td>Minimal</td>
<td>None</td>
<td>NO</td>
</tr>
<tr>
<td>2. Aerosol Anthrax</td>
<td>12,000</td>
<td>200,000 exposures</td>
<td>Minimal</td>
<td>None</td>
<td>No</td>
</tr>
<tr>
<td>3. Pandemic Influenza</td>
<td>208,000 - 1,000,000</td>
<td>860,500 - 9,000,000</td>
<td>None</td>
<td>Isolate Exposures</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Foreign Animal Disease</td>
<td>5,000</td>
<td>28,383</td>
<td>None</td>
<td>Hours</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Blister Agent</td>
<td>150</td>
<td>70,000</td>
<td>Minimal</td>
<td>Structural</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Food Contamination</td>
<td>350</td>
<td>1,000</td>
<td>50% of bldgs in area</td>
<td>Yes</td>
<td>100,000</td>
</tr>
<tr>
<td>7. Nuclear Chemical</td>
<td>5,750</td>
<td>300</td>
<td>Minimal</td>
<td>30,000</td>
<td>YES</td>
</tr>
<tr>
<td>8. Chlorine Tank Explosion</td>
<td>17,000</td>
<td>110,000</td>
<td>Exposed areas</td>
<td>At Site</td>
<td>YES</td>
</tr>
<tr>
<td>9. Major Earthquake</td>
<td>1,400</td>
<td>18,000</td>
<td>1.15 million bldgs</td>
<td>Some</td>
<td>YES</td>
</tr>
<tr>
<td>10. Major Hurricane</td>
<td>1,000</td>
<td>5,000</td>
<td>5,000</td>
<td>Some</td>
<td>YES</td>
</tr>
<tr>
<td>11. Radiological Dispersal</td>
<td>100</td>
<td>270</td>
<td>36 Blocks each</td>
<td>At Site</td>
<td>YES</td>
</tr>
<tr>
<td>12. Improvised Explosions</td>
<td>100</td>
<td>450</td>
<td>Structures affected by blast and fire</td>
<td>None</td>
<td>YES</td>
</tr>
<tr>
<td>13. Pandemic Influenza</td>
<td>500</td>
<td>900</td>
<td>None</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>14. Foreign Animal Disease</td>
<td>None</td>
<td>None</td>
<td>Lost livestock</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>15. Cyber</td>
<td>None</td>
<td>None</td>
<td>Cyber</td>
<td>None</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Playbooks

- **Immediate Phase: 0-12 Hours Post Detonation**
  - **Trigger:** Detonation of an Improvised Explosive Device, Radiological Material Realized
  - **U.S. Goals / Strategy:** Maximize Survivors, Deploy Resources, prevent additional radiological exposures and prevent additional potential threats.

<table>
<thead>
<tr>
<th>Briefing Papers / Decision Papers</th>
<th>Actions / Issues</th>
<th>Coordinating / Support Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision Paper 1</td>
<td>Declare a Public Health Emergency</td>
<td>SEC HHS</td>
</tr>
<tr>
<td></td>
<td>Activate the HHS Emergency Management Group</td>
<td>SEC HHS/ASPR</td>
</tr>
<tr>
<td>Briefing Paper 3</td>
<td>Communicate with relevant agencies to determine size and scope of damage.</td>
<td>ASPR</td>
</tr>
<tr>
<td></td>
<td>IMAA/C - weather and possible plume information.</td>
<td>DOE, DHS, IMAAC, CDC, state and local officials</td>
</tr>
<tr>
<td></td>
<td>CDC - Activate the Advisory-Team (aka &quot;The A-Team&quot;).</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.1: The RTR system for a nuclear detonation response: theoretical zones in a 10 KT nuclear explosion at surface level.
Preparedness planning- delays imbalance & response aims to correct it

For IND- imbalance will vary greatly by location and time after the event!
Summary

- ASPR has engaged the enterprise to address the complex response to a nuclear event.
- Preparedness planning and policy implementation can reduce gap.
- Highest standard of care possible under the circumstances.
Threat Scenario Overview

Carl A. Curling, Sc.D.
Institute for Defense Analyses
Threat Scenario Overview  
Carl A. Curling, Sc.D., Institute for Defense Analyses  

This presentation provides an estimate of the scale and type of medical requirements that will be needed to respond to a nuclear weapon detonation. The scenario is set up as a 10KT surface detonation in a large US city. This results in about 125,000 prompt fatalities, and about 200,000 persons with prompt moderate to severe injuries. The fallout radiation will add more than 100,000 persons with radiation doses above 5 Gy, and more than one million persons who are advised to evacuate. All told, there may be as many as 400,000 persons will require inpatient medical care. IF we can deliver medical care on that scale, we can save as many as 100,000 persons who otherwise might die.

Estimating Medical Requirements for a 10KT Nuclear Detonation

- Define a nuclear weapon scenario
- Estimate the population exposure
- Estimate the medical impact on the population
- Estimate the medical requirement to mitigate the impact
National Disaster Medical System

CAPT Clare Helminiak, M.D., M.P.H.
HHS-ASPR
National Disaster Medical System
CAPT Clare Helminiak, M.D., M.P.H., HHS-ASPR

This overview presentation will describe the National Disaster Medical System (NDMS) and its role in the response to a WMD incident. This overview presentation will cover the history of the NDMS, its available resources, how it will be implemented in response to a national disaster (in particular the logistics of patient delivery from the disaster area to local and distant healthcare centers) as well as examples of its prior use.
Preparedness for Radiation/Nuclear Incidents

May 18, 2009

Office of the Assistant Secretary for Preparedness and Response (ASPR)

Mission

Lead the nation in preventing, preparing for, and responding to the adverse health effects of public health emergencies and disasters.

Vision

A nation prepared to prevent, respond to, and reduce the adverse health effects of public health emergencies and disasters.
Pandemic and All-Hazards Preparedness Act

- Creates the Office of the Assistant Secretary for Preparedness and Response to serve as the HHS office which coordinates all Departmental preparedness and response activities.
  - Responsible for all ESF#8 functions
- Transfer of the National Disaster Medical System on January 1, 2007
- Created the Biomedical Advanced Research and Development Authority (BARDA)
Playbooks and References

- Playbooks for
  - Radiation Dispersal Device
  - Improvised Nuclear Device
- CDC Website
- Radiation Event Medical Management (REMM)
  - Website for clinicians
  - www.remm.nlm.gov
- AHRQ: Allocation of Scare Resources
- NIOSH
  - Population monitoring in radiation emergencies: a guide for state and local public health planners
United States Department of Health & Human Services
Office of the Assistant Secretary for Preparedness and Response (ASPR)

Expertise required for comprehensive medical response to radiation event

- Molecular & cellular biology
- Tissue & organ biology
- Damage repair & inflammation
- Medical countermeasure
- Medical management
- NIAID, BARDA, DOD
- REMM (NLM/HHS)
- Rad LN

Response system

- Triage
- Transportation
- Fatality management
- Medical expert care
- Long term management
- Epidemiology
- Radiation Injury Treatment Network (RITN); & NDMS
- PAGs for site restoration
- Local, regional and national through Regional Emergency Coordinators

MEDMAP

Emergency Support Functions (ESFs)

- #1. Transportation
  Department of Transportation
- #2. Communications
  National Communications System
- #3. Public Works and Engineering
  Department of Defense/U.S. Army Corps of Engineers
- #4. Fire fighting
  Department of Agriculture/Forest Service
- #5. Emergency Management
  Federal Emergency Management Agency
- #6. Mass Care, Housing & Human Services
  American Red Cross
- #7. Resource Support
  General Services Administration
- #8. Public Health and Medical Services
  Department of Health and Human Services
- #9. Urban Search and Rescue
  Federal Emergency Management Agency
- #10. Oil and Hazardous Materials
  Environmental Protection Agency
- #11. Agriculture & Natural Resources
  Department of Agriculture/Food and Nutrition Service
- #12. Energy—Department of Energy
- #13 – Public Safety & Security
- #14 – Long-term Community Recovery and Mitigation
- # 15 - External Affairs
### NRF and ESF #8: Responsibilities

<table>
<thead>
<tr>
<th>Public Health</th>
<th>Acute Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, water safety</td>
<td>Victims</td>
</tr>
<tr>
<td>Health surveillance</td>
<td>Responders</td>
</tr>
<tr>
<td>Vector control</td>
<td>Casualty evacuation</td>
</tr>
<tr>
<td>Drug and blood safety</td>
<td></td>
</tr>
<tr>
<td>Worker safety</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Care</th>
<th>In-patient Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special needs populations</td>
<td>Victims</td>
</tr>
<tr>
<td>Community outreach</td>
<td>Displaced hospital patients</td>
</tr>
<tr>
<td>Nursing home residents</td>
<td></td>
</tr>
<tr>
<td>Mental health</td>
<td></td>
</tr>
</tbody>
</table>

**Cross-cutting responsibilities:**
- Medical equipment and supplies
- Public information
- Victim identification
- Mortuary services
- Animal health

### ESF#8 Response Resources

**Part-time**
- NDMS
  - Field Teams (6000 members)
    - 50 DMATs
    - 11 DMORTs
    - 4 NMRTs
    - 3 IMSuRTs
  - Definitive Care
    - 1500 participating hospitals
- Burn bed monitoring
- Radiation Injury Treatment Network

**Volunteers**
- Medical Reserve Corps
  - ~160,000 members
  - ~700 teams
- ESARVHP
  - ~133,000 members
- Full-time
- USPHS
  - 5 RDFs
  - 5 APHTs
  - 5 MHTs
  - Tier 3—1000 officers
- Federal Medical Stations
  - 7000 bed capability
A Nationwide Medical Response System to:

- Supplement state and local medical resources during disasters or major emergencies
- Provide backup medical support to the military/VA medical care systems during an overseas conventional conflict

A public / private sector partnership
HHS   DHS   DOD   VA

3 Major Components of NDMS

Medical Response
Lead HHS

- DMAT
- NVRT
- IMSURT
- DMORT

Patient Evacuation
Lead DoD

- DoD Aeromedical Evacuation
  Primarily Fixed Wing

Definitive Care
Lead DoD/VA

- DoD/VA Federal Coordinating Centers
NDMS Response Teams

- Disaster Medical Assistance Teams
- National Medical Response Teams / WMD
- Burn Specialty Teams
- Pediatric Specialty Teams
- Crush Medicine Team
- International Medical / SURical Teams
- Mental Health Teams
- National Veterinary Response Teams
- Disaster Mortuary Operational Response Teams
- Disaster Portable Morgue Unit Logistics Team
- Family Assistance Center Team
- National Pharmacy Response Teams
- National Nurse Response Teams
Patient Decontamination
**Patient Evacuation**

**Lead Responsibility - DOD**

- Provide Patient Movement from the Disaster Area
- Utilize All Types of Transportation
- Primarily Relies on Aeromedical

**Patient Movement**
NDMS Definitive Medical Care

**Lead Responsibility - DOD/VA**

- Federal Coordinating Centers (FCCs)
- Concentrated in Major Metropolitan Areas
- Air Access
- Available Hospital Support
- Patient Reception and Distribution Capabilities
The Spectrum of Care & Phased Deployment

The Spectrum of Care & Phased Deployment

Preparedness programs

- Hospital Preparedness Program
  - Grants
    - 62 grantees
    - Focus on
      » Surge Capacity
      » Communications
      » Alternate facilities
      » Hospital collaborations
      » Exercises
  - ESAR-VHP
    - 40 States
- Public Health Emergency Preparedness Program
  - CRI
Top Off 4: Lessons Observed

- Lab capacity
  - Currently
    - Radiobioassay
    - Biodosimetry
  - Require
    - Radiobioassay
    - Biodosimetry
    - Hematology Surge
  - Radiation Laboratory Network (R-LN)-proposed
    - Similar to HHS/CDC Laboratory Response Network

Questions
2008 Contract Awards

In 2008 BARDA awarded seven contracts totaling more than $19 million to accelerate the development of therapeutics to treat various hematologic, vascular and bone marrow injuries involved with ARS, including neutropenia.

<table>
<thead>
<tr>
<th>Awardee</th>
<th>Base Contract Funding Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University of Pittsburgh, Pittsburgh, PA</td>
<td>$2.72 million</td>
</tr>
<tr>
<td>The University of Illinois, Chicago</td>
<td>$0.35 million</td>
</tr>
<tr>
<td>Neumedicines, La Crescenta, CA</td>
<td>$3.08 million</td>
</tr>
<tr>
<td>Cleveland BioLabs, Buffalo, NY</td>
<td>$3.38 million</td>
</tr>
<tr>
<td>Fred Hutchinson Cancer Research Center, Seattle, WA</td>
<td>$3.03 million</td>
</tr>
<tr>
<td>Cellerant Therapeutics, San Carlos, CA</td>
<td>$3.36 million</td>
</tr>
<tr>
<td>University of Rochester, Rochester, NY</td>
<td>$3.17 million</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$19 Million</strong></td>
</tr>
</tbody>
</table>

2009 BARDA Offerings

- Broad Agency Announcement BAA-BARDA-09-36: This BAA, which closed April 17, targets advanced research and development of biodosimetry capabilities.
- BAA-BARDA-09-34: Issued on March 4, targets several areas including:
  - Radiological and Nuclear Threat Countermeasures
  - Clinical Diagnostic Tools
- BARDA foresees additional solicitations (RFPs or BAAs) to address other systems and organs affected in ARS.
Medical Response Expectations
After a Nuclear Detonation

C. Norman Coleman, M.D.
HHS-ASPR
Medical Response Expectations after a nuclear detonation

C. Norman Coleman, Susan Coller Monarez, Ann Knebel, Office of Preparedness and Planning, Office of Preparedness and Emergency Operations, ASPR, HHS (Opinions are of authors and not HHS or USG).

Ongoing efforts organized by the Homeland Security Council with broad interagency collaboration are defining the overall scenario resulting from a nuclear detonation. The models that are developed help conceptualize an event that allows for planning but it is critical to recognize that these are only planning models so that the actual number of casualties and resource requirements are not taken as definitive. The recent Planning Guidance for Response to a Nuclear Detonation (http://www.afrii.usuhs.mil/outreach/pdf/planning-guidance.pdf) covers issues such as damage to physical infrastructure, importance of sheltering-in-place, medical RTR (Radiation TRIage-TRTreatmeNT-TRTransport) activities, and impact of the event on the entire nation. The composite model of physical infrastructure damage and radiation is providing a more solid basis for understanding what the medical expectations will be. The medical response will involve resources moving from outside in and for evacuees and victims moving from inside outward recognizing that there will be physical injury without radiation from blast wave and radiation injury without significant physical trauma from the fallout. These latter groups will be those most amenable to effective medical intervention. Concepts embedded within SALT triage are important in that after the initial Sorting, repeated Assessment- Life Saving Intervention-Treatment and Transport- will be done as resources become available.

Key features of the event will be a rapidly evolving situation as radiation dose decreases in proximity to the event and fallout spreads. Medical response will look very different even small distances away from the event as some medical centers will be off-line, others will be overwhelmed with seriously injured victims as well as those concerned with radiation exposure, and others will face potential large number of evacuees. An effective response will require an entire national response with the Radiation Injury Treatment Network being a critical component to managing exposed and potentially exposed people. A key ongoing activity for which RITN is a major participant is the IND Scare Resource Working Group addressing issues such as triage, ethical considerations and resource allocation in a rapidly changing heterogeneous medical environment. This presentation will update information from the various models and planning process in progress and help define the critical need for RITN, biodosimetry and a flexible and adaptable national response.
Medical response challenges following a nuclear detonation

- Goal of Planning and Operations - minimize "scarce resources" situation
- Federal concept of zoned response and RTR response model
- Medical response resources and personnel - ESF #8
- The situation facing the medical responders on scene and at 10, 100 and 1000 miles
- Biodosimetry - assessing exposure - where we are and need to go
- Medical countermeasure deployment - can dual-use drugs be forward deployed more readily?
- New conceptual approach - Resource based decision-making
- A difficult but necessary challenge
Goal of Preparedness and Planning

**To have the right balance of resources when and where needed**

When scarce resource situation exists—temporize and restore balance.

Medical management dilemma: How should response and individual victims/patients be managed in time & place of scare resource setting??

IND: Event Is Extremely Complex
New and better models

- Rapid changes in radiation dose
- Shelter-in-place & evacuation strategies
- Types of injuries and where they will occur
- Dynamic balancing of resources and casualties (scare resources)
### Table 1.1: Relation of wind speed to peak overpressure and distance for a 10 KT explosion; adapted from Glasstone and Dolan (Glasstone and Dolan 1977)

<table>
<thead>
<tr>
<th>Peak Overpressure (psi)</th>
<th>Approximate Distance from Ground Zero (miles)</th>
<th>Maximum Wind Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>0.18</td>
<td>954</td>
</tr>
<tr>
<td>30</td>
<td>0.24</td>
<td>669</td>
</tr>
<tr>
<td>20</td>
<td>0.30</td>
<td>502</td>
</tr>
<tr>
<td>10</td>
<td>0.44</td>
<td>294</td>
</tr>
<tr>
<td>5</td>
<td>0.6</td>
<td>183</td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>70</td>
</tr>
</tbody>
</table>

### Table 1.2: Impacts of peak overpressure of blast; adapted from Glasstone and Department of Defense (DOD) (Glasstone and Dolan 1977; DOD 2001)

<table>
<thead>
<tr>
<th>Peak Overpressure (psi)</th>
<th>Type of Structure</th>
<th>Degree of Damage</th>
<th>Type of Injury to People</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 15-1</td>
<td>Windows</td>
<td>Moderate (broken)</td>
<td>Threshold for eardrum rupture</td>
</tr>
<tr>
<td>3-5</td>
<td>Apartments</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>3-5</td>
<td>Houses</td>
<td>Severe</td>
<td></td>
</tr>
<tr>
<td>6-8</td>
<td>Reinforced concrete building</td>
<td>Severe</td>
<td></td>
</tr>
<tr>
<td>6-8</td>
<td>Massive concrete building</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Personnel shelters</td>
<td>Severe (collapse)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Threshold for severe lung damage</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>50% incidence of fatal lung damage</td>
<td>Severe</td>
<td></td>
</tr>
</tbody>
</table>

---

**Zones of damage- prompt event**

- **Light Damage (LD) Zone**
  - Windows mostly broken, injuries requiring self- or outpatient care

- **Moderate Damage (MD) Zone**
  - Significant building damage and rubble, downed utility poles, overturned automobiles, fires, many serious injuries, greatest lifesaving opportunities

- **No-go (NG) Zone**
  - Buildings completely destroyed, radiation prevents entry into the area; evacuating is and deadly; Rubble up to 30 ft deep

---

Figure 1.1: Representative damage zones for 10 KT nuclear explosion (not to scale; circles are idealized here for planning purposes)
Figure 1.4: Representative dangerous fallout (DF) zone in which an early and direct threat from fallout radioactivity exists. A radiation exposure rate of 10 R/hour is used to delimit this zone.

Dose rate decline over time

Rule of 7 - time increases by 7, radiation declines 10 fold

Table 1.3: Example dose rate decay from early fallout tracked as a function of time after a nuclear explosion; adapted from Glasstone and Dolan (Glasstone and Dolan 1977).

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Dose Rate (R/hour)</th>
<th>Time (hours)</th>
<th>Dose Rate (R/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,000</td>
<td>36</td>
<td>15</td>
</tr>
<tr>
<td>1.5</td>
<td>610</td>
<td>48</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
<td>72</td>
<td>6.2</td>
</tr>
<tr>
<td>3</td>
<td>230</td>
<td>100</td>
<td>4.0</td>
</tr>
<tr>
<td>5</td>
<td>130</td>
<td>200</td>
<td>1.7</td>
</tr>
<tr>
<td>6</td>
<td>100</td>
<td>400</td>
<td>0.69</td>
</tr>
<tr>
<td>70</td>
<td>63</td>
<td>600</td>
<td>0.40</td>
</tr>
<tr>
<td>15</td>
<td>40</td>
<td>800</td>
<td>0.31</td>
</tr>
<tr>
<td>24</td>
<td>23</td>
<td>1,000 (42 days)</td>
<td>0.24</td>
</tr>
</tbody>
</table>
Sheltering-in-place

Any shelter is better than none. These are locale dependent.

Structural, radiation and medical response zones

Figure 4.1: The RTR system for a nuclear detonation response; theoretical zones in a 10 KT nuclear explosion at surface level
**ASPR**

**SALT triage for mass casualty (new!!)**

**Radiation Specific SALT Required!!**

![Diagram of SALT triage process]

- **Step 1 - Sort:**
  - Global Sorting
  - Walk / Purposeful Movement
  - Stil / Clinical Life Threat

- **Step 2 - Assess:**
  - Individual Assessment
  - Breathing
  - µ
  - No
  - Dead
  - Yes
  - Immediate
  - Delayed
  - Minimal
  - Expectant
  - Dead

**Where and how does EC’s METREPOL fit?**

**Variant of DOD DIME**

**ASPR**

**Radiation Specific SALT:**

**SA- LA-LA-LA..TT..LA..TT**

![Diagram of radiation specific SALT]

- **Sort**
- **Assess**
- **Life-saving intervention**
- **Treatment-transport**
- **Triage**
- **Immediate**
- **Delayed**
- **Minimal**
- **Expectant**
- **Dead**

**FOR IND:** There will be serial Assessments, Life-saving interventions as victims are reached or reach increasing levels of expertise and resources. Triage category may change for an individual—either better or worse.
Starfish response concept: Whole “organism” responds immediately

Rad/nuc event here → Immediate communications network → Entire US involved in medical response

NMDP - component of Radiation Injury Treatment Network (RITN)

I – X: FEMA Regions

■ Primary Transplant Centers
► Primary Donor Centers
Δ Cord Blood Banks
● Secondary Transplant Centers

RITN includes NCI Cancer Centers and is growing
Preparedness planning - delays imbalance & response aims to correct it

For IND- imbalance will vary greatly by location and time after the event!

Resource requirements

- ASPR- Blood/Tissue Working Group works with modelers to determine the resources and quantities needed for classes of injury and sums it up.
- Injury matrix will be updated based on newer urban models
- For nuclear detonation resource need is very large.
- Trigger thresholds- will rapidly involve region and entire country (and even international partners)
- Response involves moving resources in, moving people out, using best available substitutions with goal of restoring balance of resource demand and availability.
- Critical issue- what to do when responders find themselves in scarce resource environment and need to make triage decisions?
Toward developing a Triage Tool

<table>
<thead>
<tr>
<th>Condition</th>
<th>Resources needed for optimal treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival with optimal Rx</td>
<td></td>
</tr>
<tr>
<td>Condition- Trauma, burns, radiation</td>
<td></td>
</tr>
<tr>
<td>Survivability with no or very limited intervention</td>
<td></td>
</tr>
<tr>
<td>Survivability possible with optimal treatment</td>
<td></td>
</tr>
</tbody>
</table>

Challenges:

- Putting injuries into a reasonable number of categories
- Determining likely survivability with no or very limited intervention
- Estimating the “best possible” outcome and the resources needed to achieve it
- Placing injury categories/survivability into intervention, based on the resources available at the time and place of the encounter
- Realizing that this an IND is a very dynamic setting where balance of resources will change rapidly and be time and place dependent

---

### Table 4. Summary of Recommendation

Principles to guide allocation of scarce resources in a public health emergency:

1. Principles guiding allocation decisions should include maximizing survival to hospital discharge, maximizing the number of life-years saved, and maximizing individuals' chances to live through each of life's stages.
2. If it seems likely that there will be a severe shortage of providers of a key service and that personnel will recover in time to be useful, it is ethically permissible to incorporate considerations of instrumental value into prioritization considerations.

Creating a fair process of decision making:

3. The public should be engaged early in the process of choosing among ethically permissible allocation strategies, both to identify the most acceptable approach and to achieve the greatest possible extent a fair process of decision making.
Choosing an allocation model is huge challenge
Assessing exposure and contamination conceptual approach *in addition to medical history*

<table>
<thead>
<tr>
<th>Event</th>
<th>Radio-bioassay (analyze the radionuclide)</th>
<th>Triage by hematology</th>
<th>“Rapid” biodosimetry (molecular) in development</th>
<th>Cytogenetics (dicentrics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDD, explosive</td>
<td>+ + + +</td>
<td>+</td>
<td>+</td>
<td>+ + +</td>
</tr>
<tr>
<td>RDD, non-explosive</td>
<td>+ + + +</td>
<td>+</td>
<td>+</td>
<td>+ + +</td>
</tr>
<tr>
<td>RED</td>
<td>+</td>
<td>+ +</td>
<td>+</td>
<td>+ + +</td>
</tr>
<tr>
<td>IND</td>
<td>+</td>
<td>+ + + + + + +</td>
<td>+</td>
<td>+ + + + + +</td>
</tr>
<tr>
<td>Concerned citizens or uncertain history</td>
<td>+ + + +</td>
<td>+</td>
<td>+</td>
<td>+ +</td>
</tr>
</tbody>
</table>

**Definition of Medical countermeasures (MCM)**

**PRE**  **RADIATION**  **CLINICAL SYMPTOMS**  **DECORPORATION**  **MITIGATION**  **TREATMENT**  **PROPHYLAXIS/PROTECTION**

**Post-exposure intervention**

Who needs medical intervention?
How quickly can you tell?
What tests are needed and what is feasible in the CONOPS?
Can information impact use of resources/personnel?
Avoid fixating on number of casualties based on 10kT ground burst
Modular approach- is there a certain size incident that has the generic spectrum of injuries so that response would be generally scalable (M x1, Mx2, Mx3, etc)
What tools are critical to individual victim sorting and primary assessment (hematology, biodosimetry, physical dosimetry)
How best to deploy and stockpile dual-use MCMs (those that have a normal day-job).
Emphasis on resilience- while this will be disaster, ability to "bounce back" will be key
Gain acceptance for the critical importance of fairness in triage
Having an effective dialogue with local/regionals
Utilize dynamic “holistic” systems approach- REMS
Recognize that this is difficult but necessary challenge.

This should be expert/consensus based guidance.
Local jurisdictions can decide to use it or not.
Option to guidance is ad hoc decisions by first responders, initial medical triage officers and secondary triage centers.
A systematic approach will enhance fairness and likely relieve tension, anxiety and consequences for responders and decision makers.
Consider all aspects of the response needs to be done in advance- medical, legal, ethical, mental health, etc.
Algorithm based approach- useful tool in the field and also excellent means of gap analysis and response planning. Allows for immediate updating (as is done with REMM).
Goal is “perfect” response for each and every victim.
## Manuscripts

(Provide data, process and decision-making)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Executive summary</td>
</tr>
<tr>
<td>2.</td>
<td>Background- casualty models, requirements</td>
</tr>
<tr>
<td>3.</td>
<td>Outcome of Medical care &amp; <strong>resources</strong> required</td>
</tr>
<tr>
<td>4.</td>
<td>Mental health support needs</td>
</tr>
<tr>
<td>5.</td>
<td>Legal, ethical and moral (add religious?) considerations</td>
</tr>
<tr>
<td>6.</td>
<td>Allocation and conservation of scarce resources-how will this be managed systemically and for triage</td>
</tr>
<tr>
<td>7.</td>
<td>Decision-making tools and algorithms- making a useful tool for on-scene decision making and possibly for triage decisions</td>
</tr>
</tbody>
</table>

Goal is useable tool(s)
Altered Standards of Medical Care
Overview

Sally Phillips, Ph.D., R.N.
HHS-AHRQ
Altered Standards of Medical Care Overview
Sally Phillips, Ph.D., R.N., HHS-AHRQ

This overview will provide attendees with a basic understanding of what Altered Standards of Care are, how they are defined, and how they are implemented during a disaster. Special emphasis will be placed on implementation and legal ramifications.
Altered Standards of Medical Care
Overview

2009 RITN Educational Conference
May 18, 2009

Sally Phillips, RN, PhD
Director, Public Health Emergency Preparedness
AHRQ

Altered Standards of Care
Environment

- What do we call it?
- When do we know we have it?
- Who knows we have it?
- Who knows the plan?
- IS there a plan?
- Who gets care? Who doesn’t?
- How will decisions get made?
- What about those who don’t get care?
- What about the providers making allocation decisions?
Providing Mass Medical Care with Scarce Resources: A Community Planning Guide

Collaboration between AHRQ and ASPR

- Ethical Considerations in Community Disaster Planning
- Assessing the Legal Environment
- Prehospital Care
- Hospital/Acute Care
- Alternative Care Sites
- Palliative Care
- Influenza Pandemic Case Study

Ethical Principles

- Greatest good for greatest number
  - Utilitarian perspective important to consider
- Other principles important to consider
  - Respecting the norms and values of the community
  - Respecting all human beings
  - Determining what is right and fair
Ethical Principles

- Ethical process requires
  - Openness
  - Explicit decisions
  - Transparent reporting
  - Political accountability

- **How is science applied?**

- Difficult choices will have to be made; the better we plan the more ethically sound the choices will be

Legal Issues

- Can the local community declare a disaster?

- Advance planning and issue identification are essential, but not sufficient

- Legal Triage – planners should partner with legal community for planning and during disasters
Scope of Legal Issues

- Changing landscape in emergencies
- Balancing individual and communal interests
- Suspending existing legal requirements
- Interjurisdictional legal coordination
- Medical licensure reciprocity
- Liability and other healthcare worker and volunteer protections
- Property management and control
- Making allocation decisions in real time: legal triage

Prehospital Care
In the event of a Catastrophic MCE, the emergency medical services (EMS) systems will be called on to provide first-responder rescue, assessment, care, and transportation and access to the emergency medical health care system.

What are the unique issues for first responders in this event?

**Protection, role, risk, ethics, values, protocols**

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**RECOMMENDATIONS: EMS PLANNERS**

Plan and implement strategies to maximize to the extent possible:

- Use and availability of EMS personnel- *protection and knowledge of such events*
- Update and reassess protocols, triage priorities, exercise and reevaluate plans and training
- Transport capacity and *capability for event such as this*
- Role of dispatch and Public Safety Answering Points *specific to these events*
RECOMMENDATIONS: EMS PLANNERS

Mutual aid agreements or interstate compacts:
- Address licensure and indemnification matters regarding responders
- Address memoranda of understandings (MOUs) among public, volunteer, and private ambulance services—Unique issues related to such an event for a “sharing environment”
- Coordinate response to potential MCEs—Who is advising on this unique event?

Creativity to Expand Capability

- Use of telehealth strategies to enhance medical response—i.e. triage, expanded scope, new protocols, on site treatment
- Dispatch 911 expanded to use Call Centers, Fire house community information and triage centers
- Expanded scope protocols (drafted but not activated)
- Real time training available with Stockpile
Hospital Care

Planning Assumptions

- Overwhelming demand
- Greatest good
- Resources lacking
- No temporary solution
- Federal level may provide guidance

- Operational implementation is State/local
- State emergency health powers
- Provider liability protection
Coordinated Mass Casualty Care

- Effective incident management critical
- Fully integrated
  - Conduct action planning cycles
  - Anticipate resource needs
  - Project scarcity issues
  - Make timely requests and allocate

Increased system capacity (surge capacity)

Decisionmaking process for resource allocation
- Shift from reactive to proactive strategies
- Administrative vs. clinical changes
### Incremental changes to standard of care

<table>
<thead>
<tr>
<th>Administrative Changes to usual care</th>
<th>Clinical Changes to usual care</th>
</tr>
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<tbody>
<tr>
<td>Triage set up in lobby area</td>
<td>Vital signs checked less regularly</td>
</tr>
<tr>
<td>Meals served by non-clinical staff</td>
<td>Deny care to those presenting to ED with minor symptoms</td>
</tr>
<tr>
<td>Nurse educators pulled to clinical duties</td>
<td>Stable ventilator patients managed on step-down beds</td>
</tr>
<tr>
<td>Disaster documentation forms used</td>
<td>Minimal lab and x-ray testing</td>
</tr>
<tr>
<td></td>
<td>Re-allocate ventilators due to shortage</td>
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</table>

### Need increasingly exceeds resources

### Clarity capacity - implements in a catastrophic event with significant impact on the standard of care

- **Conventional capacity** - care as usual
- **Contingency capacity** - adaptations to medical care spaces, staffing constraints, supply shortages with significant impact on standard of medical care
- **Crisis capacity** - implements in a catastrophic event with significant impact on the standard of care
  - Hick, Barbera, and Kelen article

### Surge is an Emerging Event

- Conventional capacity - care as usual
- Contingency capacity - adaptations to medical care spaces, staffing constraints, supply shortages with significant impact on standard of medical care
- Crisis capacity - implements in a catastrophic event with significant impact on the standard of care

- Hick, Barbera, and Kelen article
State-level Responsibilities

- Recognize resource shortfall
- Request additional resources or facilitate transfer of patients/alternative care site
- Provide supportive policy and decision tools
- Provide liability relief
- Manage the scarce resources in an equitable framework

Hospital Responsibilities

- Plan for administrative adaptations (roles and responsibilities)
- Optimize surge capacity planning
- Practice incident management and work with regional stakeholders
- Decisionmaking process for scarce resource situations
Scarce Clinical Resources

- Process for planning vs. process for response
- Response concept of operations:
  - IMS recognizes situation
  - Clinical care committee
  - Triage plan: *engage clinicians!!!*
  - Decision implementation

Clinical Care Committee

- Multiple institutional stakeholders decide, based on resources and demand:
  - Administrative decisions – primary, secondary, tertiary triage: *Engage Clinicians!!!*
  - Ethical basis –
  - Decision tool(s) to be used:
    - *What are these? Who has them?*
Triage Plan

- Assign triage staff – *who would this be for this event?*
- Review resources and demand
- Use decision tools and clinical judgment to determine which patients will benefit most – *one by one or en mass? Who does this? What science can be applied?*
- Advise “bed czar” or other implementing staff

Implementing Decisions

- “Bed Czar” or other designated staff
- Transition of care support (as needed)
- Behavioral health issues
- Security issues
- Administrative issues
- Palliative care issues
Creativity to Expand Capability

- Burn care where resources are scarce - Network of experts available as team consults throughout a region 24/7 call schedule
- Triage teams set up state wide to go in a ‘swat teams’ to make decisions not left to local providers
- Telehealth support to smaller suburban/rural hospitals unfamiliar or rarely involved in types of vicitims (i.e. children), unfamiliar skin lesions

Alternative Care Sites
Concept of an Alternative Care Site

- Nontraditional location for the provision of health care
- Wide range of potential levels of care:
  - Traditional inpatient care
  - Chronic care
  - Palliative care
  - Home care

**Who would go there in this event?**
*Victims or off loaded patients? Special precautions? How far out is safe?*

Potential Uses of an ACS

- Primary triage of victims
- Offloaded hospital ward patients
- Primary victim care
- Nursing home replacement
- Ambulatory chronic care/shelter
- Quarantine
- Palliative care
- Vaccine/drug distribution center
Potential Alternative Care Sites

- Buildings of opportunity
  - Advantage of preexisting infrastructure support
  - Convention centers, hotels, schools, same-day surgery centers, shuttered hospitals, etc.
- Portable or temporary shelters
  - Flexible but may be costly
- Sites best identified in advance

Factors in Selecting an ACS

- Basic environmental support
  - HVAC, plumbing, lighting, sanitary facilities, etc
- Adequate spaces
  - Patient care, family areas, pharmacy, food prep, mortuary, etc
- Ease in establishing security
- Access: patients/supplies/EMS

Site Selection Tool:
www.ahrq.gov/downloads/pub/biotertools/alttool.xls
Some Issues and Decision Points

- Who is responsible for the advance planning?
- “Ownership” and command and control of site
- Decision to open an alternative care site - unique issues for this event?
- Supplies/equipment
- Staffing
  - ESAR-VHP? Roster specific expertise?
  - Medical Reserve Corps?
  - Specialists in this level of care? Can we cross train? Use HIT?

Some Issues and Decision Points

- Documentation of care
- Communications
- Rules/policies for operation
- Exit strategy
- Exercises
Creativity to Expand Capability

Evacuation and movement of patients/supplies

- Who gets relocated? Victims requiring special care moved to large centers? Providers and other essential clinicians moved to patients? Leave victims in place and evacuate other patients to make room for incoming?

- Essential scarce resources? Move them to patients? Move Patients to them? Who decides who gets these? Basis for decision making on triage of life saving resources?

Palliative Care Issues
Palliative care is care provided by an interdisciplinary team.

- Focused on the relief of suffering
- Support for the best possible quality of life

Catastrophic Mass Casualty Palliative Care

**Palliative Care is:**
- Evidence-based medical treatment
- Vigorous care of pain and symptoms throughout illness
- Care that patients want

**Palliative Care is not:**
- Abandonment
- The same as hospice
- Euthanasia
- Hastening death
The too well
The optimal for treatment
The too sick to survive

Catastrophic MCE

Triage + 1st response

Receiving disease modifying treatment
Existing hospice and PC patients

Prevailing circumstances

Catastrophic MCE and Large Volume

The too sick to survive *
Initially left in place

Then: Transport
Other than active treatment site

* 1. Those exposed who will die over the course of weeks
   2. Already existing palliative care population
   3. Vulnerable population who become palliative care due to scarcity
Creativity to Expand Capability

- Medical Reserve Corps – train and exercise
- Move patient care personnel not needed for this event to ACS for Palliative care
- Homecare pick up care of non-victims left for palliative care
- **Who plans for and identifies the numbers and types of victims of the event who will not receive life sustaining support but will benefit from palliative care? Who coordinates this information? Who makes and augments MCE planning for this unique circumstance?**

Clinical Process Issues

- Symptom management, including sedation near death
- Spirituality/meaningfulness
- Family and provider support – mental health
- Family and provider grief and bereavement
- Event-driven protocols and clinical pathways
- **Fear of this unique event character?**
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Visit the AHRQ Web site:
http://www.ahrq.gov/prep/

Mass Medical Care with Scarce Resources: Community Planning Guide:
http://www.ahrq.gov/research/mce
NMDP Planning and Data Collection

Willis Navarro, M.D.
National Marrow Donor Program
The National Marrow Donor Program (NMDP), entrusted to run the C.W. Bill Young Transplantation Program, is a national and international resource for the facilitation of and research in allogeneic hematopoietic cell transplantation (HCT). In the event of a marrow toxic event, the NMDP has developed plans to fulfill the need for allogeneic HCT for those receiving severely marrow suppressive or ablative but survivable exposure and to capture relevant clinical data for exposed individuals regarding their treatment and outcomes. This session will detail NMDP preparations for such an untoward event and also will outline the data collection procedures employed to insure optimal preparation for future events.

Following this session, the learner will be able to:

- Understand the role of the NMDP in the management of a marrow toxic event:
  - Resource for information
  - Donor search and HLA typing issues
  - Transplant recommendations such as regimen, timing
- Describe the data collection and management following a marrow toxic event
NMDP Background

- Established in 1986
- Based in Minneapolis, MN
- Entrusted to run the CW Bill Young Transplantation Program
- Engaged in
  - Facilitation of HCT
  - Research in HCT
- 655 employees, 495 at the Coordinating Center, 160 in the field

NMDP: Multifaceted Operations

- 24 Departments, including:
  - CIBMTR-Minneapolis and Research Operations
  - BeTheMatch Registry, Recruitment & Community Development
  - Donor Medical Services, Donor Resources
  - BeTheMatch Foundation
  - Search and Transplant Services
  - Information Technology
  - Bioinformatics
    - HapLogic®
  - Office of Patient Advocacy
  - Scientific Services
  - Quality Systems
  - Marketing and Communications
The NMDP Network

- 172 Transplant Centers (43 Int’l)
- 90 Apheresis Centers (7 Int’l)
- 99 Collection Centers (16 Int’l)
- 76 Donor Centers (7 Int’l)
- 10 Recruitment Groups
- 21 Cord Blood Banks (2 Int’l)
- 24 Cooperative Registries
- 2 Sample Repositories
- 26 HLA Typing Laboratories
- Search Tracking and Registry STAR®

NMDP US Network

Enrolled to operate the C.W. Bill Young Cell Transplantation Program, including Be The Match Registry®
NMDP Research Goals

- Partnered with the Medical College of Wisconsin to create the Center for International Blood and Marrow Transplant Research (CIBMTR)
  - Primary: Improve the safety and effectiveness of unrelated allogeneic HCT for donors and recipients
  - Secondary: Improve treatments and outcomes for those exposed to marrow toxic agents including radiation

Research Database

- Comprehensive source of data to study
  - Unrelated allogeneic HCT
  - Marrow toxic injuries
- Investigators may apply for access to the Research Database for research
- Informed consent required to be entered into database
Data Collection Criteria

- Medical data collected at the Transplant Center (TC) on
  - Any recipient whose HCT is facilitated by the NMDP
  - Any individual who is treated at NMDP network TC
    - Treatment may range from supportive care only to transplant
Principles and Assumptions

• Contingency planning at the level of hospital/specialist care
• “First do no harm” in the algorithm
• Assumes primary care/triage has been performed
• Assumes chaos and diverse management plans, thus a major effort will be data collection—to learn for the future

HSCT Will Be A Relatively Rare Event

• Myeloablation
• Available donor
• Acceptable pre-transplant condition
• Potentially irreversible marrow injury
• Salvageable
• Minimal combined injury

Affected population

Marrow injury

Expedited HLA typing

Supportive care

HSCT
Affected Population

- The U.S. government is planning to respond to a 10 kiloton improvised nuclear device (terrorist nuclear bomb)

<table>
<thead>
<tr>
<th>Exposure Level (Gy)</th>
<th># ARS Patients</th>
<th>1 KT IND</th>
<th>10 KT IND</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3 – 15 (Lethal)</td>
<td>18,000</td>
<td>45,000</td>
<td></td>
</tr>
<tr>
<td>5.3 – 8.3</td>
<td>19,500</td>
<td>79,500</td>
<td></td>
</tr>
<tr>
<td>3 - 5.3</td>
<td>33,000</td>
<td>108,900</td>
<td></td>
</tr>
<tr>
<td>1.5 - 3</td>
<td>66,000</td>
<td>70,000</td>
<td></td>
</tr>
</tbody>
</table>

Table provided by Dr. Jamie Waseenko. Abbreviations: KT, kiloton; IND, improvised nuclear device; ARS, acute radiation syndrome. (Hiroshima = 15 KT yield)

Urgent BMT

- Small subset of patients will require transplantation
- Expediting the evaluation of donor(s) is key
- Housing needs for donors and patients
- Expect that altered standards of care will be implemented by the Dept. of Health and Human Services during this time to facilitate treatment
After Irradiation: Who needs a Donor Search?

- Significant marrow injury (~ 2-9Gy)
- Anyone neutropenic within 5-7 days
- Limited trauma
After Irradiation: Who needs a Donor Search?

• Significant marrow injury (~ 2-9Gy)
• Anyone neutropenic within 5-7 days
• Limited trauma
• Early, expedited HLA typing
• Type sibs (if living away from radiation exposure)
• Urgent unrelated donor/cord blood search

After Irradiation: Who needs a transplant?

• Significant marrow injury (estimated 4-9Gy)
• Limited trauma
• No hematologic recovery in 25-30 days
Management of Urgent Donor Searches

• NMDP-contracted HLA laboratories:
  – Currently perform 5-6,000 HLA typings/wk
    • Could be increased to > 10,000 if HLA is prioritized
  – Data is transmitted directly from the labs to NMDP via Internet
  – Use automated matching of adult donors/CBUs to potential transplant recipients

• NMDP-computer systems:
  – Facilitate contact, communication and coordination with the adult donors/CBU banks
  – Are available 24x7 to meet the demands of the increased search load
• HapLogic uses advanced logic to predict high-resolution matches
  – Easier identification of donors and/or CBUs most likely to match patients
  – Reduction in the number of donors called for testing that would be unlikely to match the patient
  – Faster matches for some patients, which may mean getting to transplant sooner resulting in improved survival
How should HCT be performed?

- What regimen for transplant conditioning?
- The main issue is assuring that the allograft is not rejected
  - Non-myeloablative
    - Sufficient immunosuppression to assure engraftment
    - Minimal cytotoxicity to avoid unnecessary toxicity

HSCT for Acute Radiation Syndrome

- Standardized RITN Regimen:
  - Reduced intensity conditioning, based on the Blood and Marrow Transplant Clinical Trials Network (BMT CTN) Protocol 0301

[Diagram showing the regimen, including medications and timing]

Data Collection Protocol

• Incorporated into standard NMDP data collection protocol
• Will feed consistent information for review after an event
• Will track progress of victims
  – Online data entry
  – Real-time feedback of data

Data Elements Collected

<table>
<thead>
<tr>
<th>Time Point</th>
<th>Data Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>At initial evaluation</td>
<td>• Demographic data</td>
</tr>
<tr>
<td></td>
<td>• Pre-existing medical problems</td>
</tr>
<tr>
<td></td>
<td>• Exposure history</td>
</tr>
<tr>
<td></td>
<td>• Blood counts and marrow status</td>
</tr>
<tr>
<td></td>
<td>• Treatment data</td>
</tr>
<tr>
<td>At follow-up time points</td>
<td>• Response to treatment</td>
</tr>
<tr>
<td></td>
<td>• Blood counts</td>
</tr>
<tr>
<td></td>
<td>• Lab/clinical data pertaining to organ injury</td>
</tr>
<tr>
<td></td>
<td>• New malignancy</td>
</tr>
<tr>
<td></td>
<td>• Functional status</td>
</tr>
<tr>
<td></td>
<td>• Additional treatments</td>
</tr>
<tr>
<td></td>
<td>• Other complications following marrow toxic injury</td>
</tr>
<tr>
<td>At time of death</td>
<td>• Primary and contributing causes of death</td>
</tr>
</tbody>
</table>
HSCT for ARS: Experience to Date

- 31 patients have undergone allogeneic HSCT after accidental radiation exposure
- Median survival after transplant ~ 1 month
- All four patients who survived one year reconstituted autologous hematopoiesis
- Graft-versus-host-disease contributed to mortality in >20%


Equipment and Resources

- Available through RITN Website: www.RITN.net
  - Acute Radiation Syndrome treatment guidelines
  - Donor selection criteria
  - Training resources
  - NMDP data collection protocol
  - Pertinent publications
  - Presentations
Acknowledgments

- Dan Weisdorf, MD; Univ of Minnesota
- Dennis Confer, MD; NMDP
- Cullen Case; NMDP
Report of Findings
Reports from Breakout sessions

Workshop Session 1

Altered Standards of Care
Altered Standards of Care

• Are we connected to institutions in our region?
  – Supplies
  – Standards
  – Policy
  – Obligations

Altered Standards of Care

• Who determines what the standards are?
  – Executives/Administrators
  – P&T
  – Group effort
Altered Standards of Care

• Where are the gaps in care?
  – Outpatient-inpatient connections
  – Laboratory
  – Blood bank

• How can we become a regional resource?
  – Phone consultations
  – Just-in-time training
  – Management guidelines
Logistical Issues

- Authority of RITN to increase tabletop involvement to provoke discussion with hospital administration
- Transplant centers have no burn capacity – how can they make a solid connection with local burn centers
Logistical Issues

• How can RITN centers be connected to the SNS for logistical support
• Licensure and liability for medical staff; how does this apply to retired, out of state staff and during altered standards of care situations

Logistical Issues

• NMDP assisting with management of sibling typings (2 pts x 10 siblings quickly becomes difficult to manage manually)
Workshop Session 3

Provision of Medical Care
- Early and Late Care

• How do we surge?
  – Drugs
  – Blood
  – Beds
  – Staff
• SOPs for outpatient care
Provision of Medical Care
- Early and Late Care

• Do we need standards?
  – What is worth delaying
  – Do we need a slightly larger inventory?

• How do we incorporate these ideas into:
  – Hospital management plan
  – Hospital incident response
  – Regional response

• How do we make the national emergency a local response?