



INTERNATIONAL MEDICAL CORPS

Chemical, Biological, and Radiation Threats A Guide for Aid Workers v.1.0 GRANTEE'S FINAL RESULTS REPORT TO OFDA

Organization: International Medical Corps	Date: September 17, 2003
Mailing Address: 1919 Santa Monica Blvd., Suite 300 Los Angeles, CA 90404	HQ Contact: Stephen Tomlin Telephone : +1(310) 826-7800 Fax: +1(310) 442-6622 Email: stomlin@imcworldwide.org

Program title: Production and Distribution of an Interactive Multimedia Training CD-ROM for Mass Casualty Incident Responders to Weapons of Mass Destruction

OFDA Grant No: HAD-G-00-03-00087-00

Audience: The management and field staff of international NGOs preparing for humanitarian interventions in Iraq

Disaster/Hazard: Weapons of mass destruction, and chemical or biological incidents affecting large populations therefrom.

Period of Activity: February 10 – April 15, 2003

Results:
Ö - Multi-media training course developed per educational objectives stated in original proposal.
Ö - 1,084 copies of CD-ROM directly distributed to at least 111 organizations in more than 125 domestic and overseas destinations by FedEx courier service.



A. Summary:

In response to the growing concern over the potential for impact of chemical, biological, radiological, nuclear and high yield explosives (CBRNE) on humanitarian response operations in Iraq, International Medical Corps (IMC) forged an alliance with UCLA's Center for International Emergency Medicine (CIEM) to develop and distribute an interactive multi-media CD-ROM-based Mass Casualty Incident (MCI) Responder Training Program that targeted the management and field staff of international humanitarian organizations anticipating humanitarian interventions in Iraq.

The educational objectives of the multi-media training CD-ROM were:

1. To ensure that field staff are familiar with the acute consequences of a CBRNE incident;
2. To protect the health of field staff in the event of a CBRNE incident;
3. To review field triage principles in the context of a CBRNE incident;
4. To review the initial management of CBRNE victims;
5. To delineate the ways in which a CBRNE incident impacts traditional NGO operational priorities;
6. To ensure adequate understanding of the role humanitarian agencies can play in their response to a CBRNE attack, along with those of other agencies.
7. To stimulate contingency planning and coordination of interagency responses to a CBRNE incident;

Following the development of appropriate content, the filming of interviews with appropriate specialists, a master CD-ROM was produced from which more than 1,000 copies were duplicated and distributed free of charge to more than 100 NGOS, NGO membership organizations, news networks and other interested parties – in the United States, Europe, Australia, Japan, Jordan, Kuwait and Turkey.

B. Project Rationale

The fact that that international humanitarian agencies were not widely oriented to the consequences of CBRNE threats to either their staffs or the populations they seek to serve was a strategic issue in the international NGO community anticipating activities in Iraq following on from any war prosecuted by the U.S. and its Coalition partners. This strategic issue was the fundamental rationale for the project.

Prior to the publication of the IMC CD-ROM, the international humanitarian community had not invested in nor disseminated any information to begin to inform its field-staffs' actions in or around a "hot zone". Humanitarian agencies were unable to provide any protection to their front line staff. Moreover, they were unable to either plan or provide for the support of exposed displaced populations in a rational manner. Furthermore, they were unaware of critical issues relating to decontamination, hazard control,

quarantine etc. and there were few, if any, NGO medical staff deployed who could readily recognize and diagnose the clinical consequences of exposure to a weaponized agent such as anthrax, plague or brucellosis, let alone who could appreciate the urgent need for a heightened system of epidemiological surveillance.

Following the anthrax-tainted letters at the heart of a post-September 11 outbreak of biological terrorism, efforts towards developing resources for domestic CBRNE incident preparedness and response had received significant attention here in the U.S. However, all resulting guidelines, educational materials and protocols took an infrastructure-rich context for granted with a sophisticated “911” emergency management system as their fulcrum. No materials examined an incident within the context of a pre-existing humanitarian crisis or in an under-developed environment and there was nothing that nearly approximated the CDC’s *Famine-Affected, Refugee, and Displaced Populations: Recommendations for Public Health Issues*¹ as a common framework to inform the planning and response of international humanitarian agencies.

C. The IMC/CIEM Interactive Multimedia Training CD

Building upon an existing interactive multimedia medical education instrument already developed by CIEM that focused on multiple aspects of bio-terrorism, an IMC/CIEM team rushed develop a training CD that targeted NGO field-staff in a field setting who could be faced with a large internally displaced population resulting from a CBRN incident. The selected program platform for the multi-media content presentation provided built-in flexibility for a wide range of users – it could be used by a generalist a priori, as well as by a medical professional seeking specialized information. The only prerequisite was a laptop computer with a CD drive – the multi-media tool (L3i Cube Interface) was included on the CD, along with copies of both the Adobe Acrobat Reader and QuickTime software programs. To the extent possible, care was taken to accommodate speakers of English as a second language in the all of the project’s text and video origination.

A coherent content curriculum was developed around the subject of CBRN from the perspective of NGOs working in complex emergencies that informs staff welfare as well as program priorities. It was expanded to include context-specific threats, including the public health issues associated with burning oil wells and depleted uranium, as well a comprehensive Iraq-specific algorithm for the diagnosis and treatment of exposure to an unknown agent. The contents was broken out into three principle areas that served as heads under which information was organized. Through these, the content could be viewed chapter-by-chapter in sequence, or easily accessed through either detailed menus or a search engine, as follows:

1) Threats, which addresses the issues of prevention, treatment, and containment of CBR illnesses and injuries since chemical, biological and radiation threats place aid workers and the populations they serve at risk.

¹ (MMWR 1992, 41 No.RR-13)

2) Personal Safety, which outlines a step-by-step guide for personal protection before, during, and after a chemical, biological or radiation threat exposure since personal safety is a concern for all aid workers.

3) Operational Issues, which addresses how an organization's operations may be affected by a CBR threat, and, equally, the extent to which coordination and simple public health measures can mitigate the impact of chemical, biological and radiation events upon the population it serves.

Functional menus take the viewer through any of these content areas. They are all presented with clearly organized sub-menus that reflect the sub-topics that fall under the three principle heads. In addition, the comprehensive search engine enhances the accessibility of information relevant to each individual user.

The CD-ROM was classified *Version 1.0* on publication April 2, 2003. Updated versions can be readily produced. The primary text content is contained on 180 *VidEx* slides prepared on L3i's *VidEx Builder*. It is a novel tool that converts passive linear video into a dynamic interactive lecture presentation format. The slides can be easily amended or expanded with additional information. Similarly, further documents can be added to the CD's multi-media platform in Adobe Acrobat format.

[For a full listing of the CD-ROM's contents, see Appendix 1.]

D. Content Development

In addition to familiarizing themselves with the available literature, the CIEM editors, often working with a videographer, interviewed more than 40 specialist physicians, public health experts, scientists, and disaster relief specialists from a wide range of specialist institutions and geographical locations in the U.S. to gather both material and video footage for the CD. Given the intended context for the training tool, they included a former-UN weapons inspector familiar with Iraq, scientists working with the Centers for Disease Control and Prevention and its Unit for Bio-Emergency Preparedness and Response, former-Department of Defense personnel, and public health officials who responded to the needs of Kurdish populations following the use of chemical agents by the Iraqi regime in 1991.

Through InterAction and the web-based Aid Workers' Forum, a large number of NGO staffs worldwide were circularized by e-mail with a brief description of the project's intent and a request for what issues and questions they would want answered if faced with a large population displaced by a CBRN event, based on their experiences as a practitioners/project managers/public health specialists in the field. The response, however, was disappointing with less than 15 messages that were substantive, although the activity itself led to a significant number of requests for copies of the finished product, including from Australia, Belgium, Canada, Switzerland, Japan, and the UK.

Additionally, the CIEM production team attended two roundtables organized by IMC to discuss the public health consequences of CBRN events within the operational context of NGOs. Public health specialists from the US Department of Health and Human Services (DHHS) and the US Agency for International Development (USAID) attended the first, and international NGO practitioners attended the

second. Both were extremely informative to the project, although the second was not well attended. The CIEM production team also traveled to Atlanta, San Francisco, and Philadelphia.

The project's effective translation of such a complex subject area as CBRN into prescriptive and detailed content areas for relief workers that were both integrated and appropriate for the intended "NGO" audience and all of its diverse interests and aptitudes, was a significant project achievement in itself. The broad scope of the resulting content curriculum will serve to positively inform the frameworks of any future activities around CBRN preparedness and response. A printable copy of the curriculum was included on the CD.

The Andrew W. Mellon Foundation contributed to some of the initial background research costs.

[For a complete listing of the experts who were consulted, see Appendix 3.]

E. CD Distribution

IMC directly distributed 1,084 copies of the CD-ROM to more than 111 organizations in more than 125 domestic and overseas destinations by FedEx courier service. These numbers include multiple copies that were provided to membership organizations in the U.S and Europe for further distribution, as well as to INGO coordinating bodies in Ankara, Amman, and Kuwait City. All NGOs that had been awarded grants by OFDA received multiple copies at both field and headquarters levels. IMC made the CDs available worldwide at no charge for either the product or the mailing. The CD's label and cover sleeve themselves each carried a notice that the CD-ROM could be freely duplicated for educational purposes.

In the interests of information sharing and dissemination, the content curriculum and the algorithm for the diagnosis and treatment of exposures to unknown agents were posted to the IMC website at <<http://www.imcworldwide.org/cbr/index.html>> prior to publication, as well as shared with the UK's RedR and MERLIN. The curriculum was also utilized by IMC trainers who provided orientations to CBRN issues to NGO field staff anticipating interventions in Iraq at JNEPI forums in Amman and Kuwait City.

Further distribution of the CD-ROM itself via streaming video on the web did not proceed as originally envisaged at project inception due to the large video file sizes contained on the CD-ROM. While the entire training guide was produced in a format that was conducive to conversion for delivery through the worldwide web, each one of the video files would have required specialized compression that was not anticipated in either the project timeline or the project production budget.

The Andrew W. Mellon Foundation contributed to some of the distribution costs.

[For a complete listing of primary recipients, see Appendix 2.]

F. Project Timeline

Despite the fact that the project did not begin until February 10, the CD-ROM was fully researched, compiled, duplicated and ready for distribution by April 9, within only 9 weeks of project start-up. However, within the context of the war in Iraq and the potential CBRN threat, this was already too late –

by then, IMC and other NGO teams had already begun assessment and supply activities in Iraq's southern region.

G. USAID Acknowledgement

A USAID logo was not attached to the product. Since it was intended for international NGOs at time of intense and divisive debate within the NGO community, the editors felt that there would be a greater chance of the product's assimilation into mainstream NGO operational planning if the logo was omitted.

However, both the printed label of the CD and of its printed sleeve carried a printed acknowledgement of the support from OFDA that made its production possible:

With support from the Office of U.S. Foreign Disaster Assistance and the Andrew W. Mellon Foundation

Chemical, Biological, and Radiation Threats

A Guide for Aid Workers

Content Curriculum

I. THREATS

A. Chemical

1. Introduction

- a) What is a chemical weapon?
- b) Important features of chemical weapons
- c) Chemical versus biological weapons
- d) What makes a chemical weapon effective?
- e) Chemical agent properties
- f) Chemical weapon dispersal systems
- g) How are chemical agents classified?

2. Classes of Chemical Agents

- a) Nerve Agents
 - (1) What are nerve agents?
 - (2) Nerve agent health effects
 - (3) Nerve agent treatment
- b) Blister Agents
 - (1) What are blister agents?
 - (2) Blister agent health effects
 - (3) Blister agent treatment
 - (4) Mustard agent summary
- c) Choking Agents
 - (1) What are choking agents?
 - (2) Choking agent health effects
 - (3) Choking agent treatment
 - (4) Phosgene summary
- d) Blood Agents
 - (1) What are blood agents?
 - (2) Blood agent health effects
 - (3) Blood agent treatment
 - (4) Cyanide and other blood agents

- e) Other Agents
 - (1) Incapacitating agents
 - (2) Tearing agents
 - (3) Vomiting agents
- f) Industrial Hazards
 - (1) What are industrial chemical threats
 - (2) The risks of burning oil wells
 - (3) Industrial chemical reference

3. Protection

- a) Preparing for a chemical warfare attack
- b) Detection devices
- c) Personal protective equipment

4. Treatment

- a) Decontamination
- b) Liquids used for decontamination
- c) Decontamination zones
- d) Care facility requirements
- e) Antidotes

B. Biological

1. Introduction

- a) Why would anyone use a biological weapon?
- b) Classification of biological weapons
- c) Person to person spread

2. Types of Biological Agents

- a) Anthrax
 - (1) What is anthrax?
 - (2) Skin anthrax
 - (3) Anthrax of the lungs
 - (4) How is anthrax diagnosed?
 - (5) Can anthrax be spread person to person?
 - (6) Treatment of anthrax
 - (7) Prevention of anthrax
 - (8) Printable anthrax summary
- b) Smallpox
 - (1) What is smallpox?
 - (2) What are the symptoms of smallpox?
 - (3) How is smallpox diagnosed?
 - (4) Distinguishing smallpox from other infectious rashes
 - (5) The smallpox vaccine

- (6) Treatment of smallpox
- (7) Containing an smallpox outbreak
- (8) Printable smallpox summary

- c) Ebola & the Hemorrhagic Fever Viruses
 - (1) What are the hemorrhagic fever viruses?
 - (2) Symptoms of the hemorrhagic fevers
 - (3) Diagnosing the hemorrhagic fevers
 - (4) Treatment of the hemorrhagic fevers
 - (5) Containing a hemorrhagic fever outbreak
 - (6) Printable hemorrhagic fever summary
- d) Plague
 - (1) What is plague?
 - (2) How is plague spread?
 - (3) Types of plague
 - (4) Treatment of plague
 - (5) Containing an outbreak of plague
 - (6) Printable plague summary
- e) Botulism
 - (1) What is botulism?
 - (2) The symptoms of botulism
 - (3) How is botulism diagnosed?
 - (4) Treatment of botulism
 - (5) Printable botulism summary
- f) Tularemia
 - (1) What is tularemia?
 - (2) The symptoms of tularemia
 - (3) How is tularemia diagnosed?
 - (4) Treatment of tularemia
 - (5) Printable tularemia summary
- g) Other Agents
 - (1) Category B and C agents
 - (2) What is ricin?
 - (3) What is brucellosis?

C. Radiation

1. **Introduction**

- a) What is radiation?
- b) What are sources of radiation?
- c) How is radiation measured?
- d) What does radioactive half-life mean?
- e) What does radioactive contamination mean?

2. Classification

- a) Types of radiation
- b) Nuclear weapons overview
- c) Nuclear weapons damage predictions
- d) What is a dirty bomb?
- e) What is depleted uranium?

3. Health Effects

- a) How does radiation harm you?
- b) How does radiation affect pregnancy?
- c) Major radiation accidents
- d) Acute radiation syndrome

4. Protection

- a) Protecting against radiation Injury
- b) What to do after a radiological or nuclear explosion
- c) Radiation detection
- d) Use of potassium iodide

5. Treatment

- a) What can I do to help myself and others?
- b) Decontamination
- c) Treatment of acute radiation syndrome
- d) Internal contamination treatment
- e) Treatment priorities
- f) Psychological effects of radiation exposure
- g) Radiation threat instruction sheet

D. Unknown Threat

- a) Detecting an outbreak of disease
- b) An approach to the unknown threat
- c) Printable version of a threat algorithm

E. Threats: By Region

- a) Iraq
- b) Middle East
- c) Asia
- d) Africa
- e) Europe
- f) Americas

II. PERSONAL SAFETY

A. Pre-deployment

- a) Resources for risk assessment
- b) Emergency and security plans
- c) Vaccinations for biological threats
- d) Medications for CBR threats
- e) Supplies for CBR threats

B. First Actions

- a) Avoiding exposure
- b) Decontamination
- c) Medical treatment
- d) Avoiding secondary spread

C. Basic Needs

- a) Water
- b) Can I drink the water?
- c) Water purification

D. Sanitation

- a) Waste disposal
- b) Dealing with the dead

E. Food/Nutrition

- a) Emergency food supplies

F. Shelter

- a) Planning a safe room

G. Health

- a) Health consequences of CBR exposure
- b) Delayed illness
- c) Post-exposure prophylaxis
- d) Long term effects

H. Coordination

- a) Reporting the event
- b) Incident report form

III. OPERATIONAL ISSUES

A. Preparation

- a) Sample CBR training curriculum

B. Planning for CBR-at-risk Environments

- a) Risk assessment
- b) Surveillance
- c) Collaboration with information sources
- d) Emergency response and security plan
- e) Building local response capacity
- f) Supplies for a CBR-at-risk Environment

C. First Actions

- a) Staff Protection Principles
- b) Staff Decontamination
- c) CBR Threat Assessment and Verification
- d) When to Evacuate Field Staff

D. Basic Needs

- 1. Water
 - a) Water quantity requirements
 - b) Water quality and storage

E. Standard Sanitation Operating Procedures

- 1. CBR contaminated waste
 - a) What are the hazards of incineration?
 - b) What to do with dead bodies?

F. Standard Food Operating Procedures

- a) How does a CBR threat effect food supply?
- b) Are standard food security measures adequate?
- c) Can food be decontaminated?

G. Shelter & Site Planning

- a) CBR threat impact on site and shelter selection

H. Health

1. Standard Health Assessment
2. Guidelines for Outbreak Control
3. CBR Event Monitoring and Investigation
4. CBR Disease Control Measures
5. Standard Health Services Operations
6. CBR Specific Laboratory Needs
7. Diagnosis and Treatment Protocols
8. Supplementing the standard WHO Health Kit
9. Psychosocial needs of CBR affected individuals
 - a) WHO Mental Health Assessment Tool

I. Coordination

1. Standard coordination issues
2. Operational coordination
3. NGO and military communication
4. CBR information resources
5. Logistics in a CBR-at-risk areas

Chemical, Biological, and Radiation Threats A Guide for Aid Workers CD Distribution

A total of 1,084 copies of *Chemical, Biological, and Radiation Threats: A Guide for Aid Workers* were distributed by IMC to 111 different organizations, along with a covering note encouraging them to freely duplicate further copies, as needed. These numbers include multiple copies that were provided to membership organizations for secondary distribution to their members, notably from Brussels, Geneva, London, New York, and Washington DC, as well as provided to INGO forums in Ankara, Amman, and Kuwait City.

Organization	CDs
ABC Television	2
ABT Associates	2
Action Against Hunger-USA	1
ADRA International HQ	1
Air Serv International	10
American Friends Service Committee HQ	1
American Red Cross HQ	10
American Refugee Committee International HQ	1
Arab Medicare Inc.	1
Associated Press	3
BBC	1
Baptist World Alliance	1
Bread for the World	1
Brother's Brother Foundation	1
Bureau of Population, Refugees and Migration	1
CARE USA	21
CARE Australia	5
Catholic Relief Services	14
Center for Humanitarian Cooperation	11
CBS News	7
CNBC	1
Chicago Tribune	10
Christian Children's Fund DC Office	1
Christian Reformed World Relief Committee US	1
Christian Science Monitor	2
Church World Service	11
CHF International	1
CNN	3
Columbia University, School of Public Health	1
Concern Worldwide	3
Congressional Hunger Center	1
Community Housing Foundation	10

Danish Refugee Council	1
Department for International Development (UK)	5
Doctors of the World USA	1
Doctors Without Borders (MSF/F/H/B)	20
The Economist	1
Episcopal Relief and Developmental HQ	1
Feinstein International Famine Center	3
FEMA	1
Fox News	2
Food for the Hungry HQ	1
Goal USA Fund	1
Heart to Heart International	1
Hebrew Immigrant Aid Society NY Office	1
Humboldt University	1
InterAction	103
International Committee of the Red Cross	5
International Council of Voluntary Agencies	100
International Medical Corps DC Office	20
International Medical Corps Kuwait Office	50
International Medical Corps Jordan Office	50
International Medical Corps Turkey Office	25
International Medical Corps UK	50
International Relief and Development	1
International Relief Teams	1
International Rescue Committee	25
Islamic American Relief Agency	10
Japanese Ministry of Foreign Affairs (JICA)	5
KCBS-TV	1
KCOP-TV	1
KNBC	1
Los Angeles Times	2
Lutheran World Relief	11
Map International	1
Marine Corps University, Quantico	6
Mercy Corps	21
Melbourne University	5
Monterey Institute of Institutional Studies	12
National Peace Corps Association	1
National Public Radio	3
NBC News	3
New York Times	4
Newsweek	2
Northwest Medical Teams	10
Operational USA	1
Overseas Development Institute	1
Oxfam America	2
Partners for Development	1
PDA & HP	1
Physicians for Human Rights	2
Project Concern International	1
Project HOPE	1
Refugees International	2
Reuters	1

Save the Children (US)	25
Save the Children (UK)	2
Save the Children (Canada)	2
Secretariat of International Peace Cooperation HQ	1
Steering Committee for Humanitarian Response	21
Humanitarian Times	10
Relief International	10
Salvation Army World Services Office	1
The Sphere Project	10
UCLA	30
U.S. Fund for UNICEF DC Office	1
United Jewish Communities DC Office	1
United Methodist Committee on Relief	2
UNHCR/New York	1
UNICEF	5
UN Office for the Coordination of Humanitarian Affairs	103
US News & World Report	1
USA Today	1
USA for UNHCR	1
USAID/DCHA	1
Office of US Foreign Disaster Assistance	62
Voice of America	1
Washington Post	2
World Concern	10
World Education	1
World Emergency Relief	1
World Relief HQ	2
World Health Organization	23
World Vision International	31

Chemical, Biological, and Radiation Threats
A Guide for Aid Workers
Content Specialists

IMC/CIEM consulted with the following experts in developing the content of the CD-ROM:

Gary Ackerman	Center for Non Proliferation, Monterey Institute for International Studies
Dr. Donald Barceloux	UCLA School of Medicine
Tim Bartrand	Drexel University
Dr. Richard Brennan	International Rescue Committee
Brooke Buddemeier	Radiological Assistance Program, US Department of Energy
Dr. Frederick Burkle	John Hopkins University
Dr. Jerrold T. Bushberg	Director of Health Physics, University of California, Davis
Dr. Barbara Lopes Cardozo	Centers for Disease Control and Prevention, International Emergency and Refugee Health Branch
Eric Croddy	Center for Non Proliferation, Monterey Institute of International Studies
Dr. Alina H. Dorian	UCLA Center for International Emergency Medicine
Dr. Janet Gilsdorf	Center for Non Proliferation, Monterey Institute for International Studies
Dr. Michael Greenberg	Drexel University
Lawrence Grimm	UCLA Health Physics
Dr. Charles N. Haas	Drexel University
Heather Huffman	UCLA School of Medicine
Captain. Joe Hughart	Agency for Toxic Substances and Disease Registry
Michelle Jennings	Office of US Foreign Disaster Assistance
Dr. Neil Joyce	International Medical Corps
Dr. Dennis D. Juranek	Division of Parasitic Diseases, Centers for Disease Control and Prevention
Dr. Alex Kaplan	UCLA School of Medicine
Dr. Dan Katz	UCLA School of Medicine
Michelle Kelly NP	Humboldt State University
Dr. Jay Lee	UCLA School of Medicine
Dr. Scott Lillibridge	Center for Biosecurity, University of Texas

Dr. Craig H. Llewellyn	Uniformed Services University of Health Sciences
Dr. Lynne McCullough	Emergency Medicine Residency Program, UCLA
Dr. Greg Moran	UCLA School of Medicine
Dr. Jerry Mothershead	US Navy Surgeon General's Office
Dr. Eric Noji	Deputy Surgeon General, US Public Health Service
Dr. David Pegues	UCLA School of Medicine
Dr. Richard Pilch	Center for Non-Proliferation, Monterey Institute of International Studies
Dr. David Presser	UCLA School of Medicine
Dr. Eric Savitsky	UCLA School of Medicine
Dr. Andy Shen	UCLA School of Medicine
Dr. Jeremy Sobel	Foodborne and Diarrheal Diseases Branch, Centers for Disease Control and Prevention
Stephen Tomlin	International Medical Corps
Dr. Scott Votey	UCLA School of Medicine
Dr. Ryan Wells	UCLA School of Medicine
H. Roy Williams	The Center for Humanitarian Cooperation
Dr. Raymond Zilinskas	Center for Non-Proliferation, Monterey Institute of International Studies

Chemical, Biological, and Radiation Threats A Guide for Aid Workers Picture Credits

In addition to the original footage shot by the project videographer and the field footage from the IMC archives, the following are gratefully acknowledged for their images:

Chemical Threats:

Tokyo subway sarin attack video. *Source: Unknown*

Miotic pupils. *Source: Eric Savitsky M.D., Scott Votey M.D.*

Eye irritation. *Source: US Army Medical Research, Institute of Chemical Defense, Medical Management of Chemical Casualties*

Soldiers blinded by mustard gas. *Source: Imperial War Museum*

Skin irritation on hand. *Source: Johns Hopkins University School of Medicine Dermatlas*

Skin blistering caused by mustard gas. *Source: Supreme Defense Council, Iran*

Sloughing skin on patient's back. *Source: Johns Hopkins University School of Medicine Dermatlas*

Biological Threats:

Transmission electron micrograph of *Bacillus anthracis*. *Source: Centers for Disease Control and Prevention (CDC)/Dr. Sherif Zaki/Elizabeth White*

An electron micrograph of spores from the Sterne strain of *Bacillus anthracis* bacteria. *Source: Centers for Disease Control and Prevention (CDC)/Laura Rose. Photo Credit: Janice Car.*

Anthrax skin lesion on neck of man. *Source: Centers for Disease Control and Prevention. (CDC)*

Anthrax skin lesion on face of man. *Source: Centers for Disease and Prevention (CDC)*

Anthrax progression. *Source: Dr. Gregory Moran*

Smallpox virus micrograph. *Source: Dr. F.A. Murphy, School of Veterinary Medicine, University of California, Davis*

Man with smallpox. Smallpox has been eliminated thanks to vaccines. *Source: Centers for Disease Control and Prevention (CDC)/NIP/Barbara Rice*

Smallpox progression photos. *Source: World Health Organization (WHO)*

Components of a smallpox vaccination kit including the diluent, a vial of Dryvax® smallpox vaccine, and a bifurcated needle. Vaccinia (smallpox) vaccine, derived from calf lymph, and currently licensed in the United States, is a lyophilized, live-virus preparation of infectious vaccinia virus. It does not contain smallpox (variola) virus. *Source: Centers for Disease Control and Prevention (CDC). Photo Credit: James Gathany*

Transmission electron micrograph of Ebola virus. *Source: Centers for Disease Control and Prevention (CDC)/C.Goldsmith*

Marburg virus micrograph. *Source: Dr. F.A. Murphy, School of Veterinary Medicine, University of California, Davis*

Two Zairian nurses wear protective clothing while changing the bedding in an Ebola VHF isolation ward, Kikwit, Zaire, 1995. *Source: Centers for Disease Control and Prevention (CDC)/Ethleen Lloyd*

A Zairian nurse prepares to enter the isolation ward during the Ebola VHF outbreak in Kikwit, Zaire, 1995.

Source: Centers for Disease Control and Prevention (CDC)

This plague patient is displaying a swollen, ruptured inguinal lymph node, or buboe. (After the incubation period of 2-6 days, symptoms of the plague appear including severe malaise, headache, shaking chills, fever, and pain and swelling, or adenopathy, in the affected regional lymph nodes, also known as buboes.) *Source: Centers for Disease Control and Prevention (CDC).*

Clostridium botulinum growing on egg yolk agar showing the lipase reaction after 72 hours of incubation. (*C. botulinum* is a strictly anaerobic bacterium that when grown on egg yolk agar, its colonies will exhibit a lipase reaction, described as the shiny area around each colony.) *Source: Centers for Disease Control and Prevention (CDC)/Courtesy of Larry Stauffer, Oregon State Public Health Laboratory.*

Clostridium botulinum spores stained with Malachite Green Stain. (The endospores of *C. botulinum* when stained using the Malachite Green staining method will appear as green spheres, while the bacilli themselves will turn purple in color.) *Source: Centers for Disease Control and Prevention (CDC)/Courtesy of Larry Stauffer, Oregon State Public Health Laboratory. Creation Date (2002).*

Radiation Threats:

Photo of Three Mile Island Nuclear Power Plant. *Source: US Department of Energy.*

Medical Personnel Cutting Patient's Clothes. *Source: Emergency Department Management of Radiation Casualties Power Point Presentation Prepared by: Radiological Emergency Medical Preparedness and Management Subcommittee of the National Health Physics Society Ad Hoc Committee on Homeland Security. McLean, VA, March 2003. Courtesy of Dr. Jerrold Bushberg.*

Care Provider Measures Radiation on a Colleague's Hand Using Radiation Device. *Source: Emergency Department Management of Radiation Casualties Power Point Presentation Prepared by: Radiological Emergency Medical Preparedness and Management Subcommittee of the National Health Physics Society Ad Hoc Committee on Homeland Security. McLean, VA, March 2003. Courtesy of Dr. Jerrold Bushberg.*

Operational Issues:

Stankovic refugee camp video, Macedonia, 1999, Michael Holt. *Source: International Medical Corps Archives*

Irrigation video, Afghanistan video, 2002, Julie Jiang. *Source: International Medical Corps Archives.*

Field Video Footage (Water Segment). *Source: The Sphere Project: Humanitarian Charter and Minimum Standards in Disaster Response*