# Supporting Homeland Defense: Training for Chemical Casualty Management

COL James Romano, MS, USA†
COL Charles Hurst, MC, USA††
COL Jonathan Newmark, MC, USAR†††

*The need for training in the medical management of chemical casualties has never been greater than now. The U.S. Army Medical Research Institute of Chemical Defense (USAMRICD) conducts what the General Accounting Office (GAO) has termed the "gold standard" of training in this area for medical professionals both military and civilian. The training products and initiatives of the USAMRICD are surveyed and future directions enumerated.*

## Introduction

The USAMRICD is the Army's lead laboratory for the development of medical countermeasures to chemical warfare agents (CWA). It is also the Army's primary training site for the medical management of chemical casualties. It functions as a subordinate command of the U.S. Army Medical Research and Materiel Command, Fort Detrick, MD. The USAMRICD was established in response to extensive use of CWA on the battlefields of Europe during World War I. The Army Medical Department (AMEDD) was given the responsibility for designing protective equipment against CWAs by the War Department in 1915. By 1922, the Medical Department's mission in this area was vested in the Medical Research Division of the Gas Defense Service, Edgewood Arsenal, MD. This division was charged with studying the pharmacological action of CWAs, developing the best possible methods of treating "gas" casualties, and disseminating this information among the officers of the Medical Corps. It was later redesignated as the U.S. Army Biomedical Laboratory in the early 1960s.

On 1 July 1979, the U.S. Army Biomedical Laboratory (formerly the Medical Research Division) became a part of the Office of The Surgeon General and the U.S. Army Medical Research and Development Command, known today as the U.S. Army Medical Research and Materiel Command. Although formal command relation-ships with the Chemical Systems Laboratory and the U.S. Army Materiel Development and Readiness Command were discontinued, close support characterized the relationship after the Biomedical Laboratory embarked on a mission in support of the AMEDD's research, development, testing, and evaluation program for medical defense against chemical agents. On 11 May 1981, the U.S. Army Biomedical Laboratory was redesignated as the USAMRICD.

## Anthology of the Training Program

In 1973, the Biomedical Laboratory initiated a training program in the medical management of chemical casualties. That program has undergone several key transformations until it resembles the present course(s) offered at the USAMRICD.

Training and consultation in the area of chemical casualty care falls under the auspices of the Chemical Casualty Care Division (CCCD), USAMRICD. The CCCD has responsibility for instruction in the principles of medical and field management of chemical casualties to military and, by extension, to civilian health care professionals. It executes this mission through several means, including both resident and nonresident courses and distance learning initiatives. The Chief, CCCD, plans, directs, and facilitates coordination between intramural programs and extramural commands, agencies, organizations, and authorities concerning all aspects of chemical casualty care in routine and field combat operations. The CCCD also advises the nation's Improved Response Program, the research arm of the Domestic Preparedness Program established by the Nunn-Lugar-Domenici amendment of 1995. The CCCD also furnishes support to organizations providing crisis and consequence management, including the State Department's Foreign

Emergency Support Team, the Department of Justice's Domestic Emergency Support Team, and the Army's Chemical-Biological Rapid Response Team. Additionally, the CCCD advises other government organizations, including the U.S. Marine Corps' Chemical and Biological Incident Response Force through its Reachback Team, the Army's Special Augmentation Response Teams-Nuclear/Biological/Chemical (NBC), the U.S. Army Reserve Command, the Special Operations Command, and Restoration of Operations, an Advanced Concepts Technology Demonstration sponsored by PACOM and led by the Defense Threat Reduction Agency. As stated earlier, the CCCD executes its mission through several forms of training, both resident and nonresident. Let us examine these courses.

**The Courses**

The primary training vehicle is the Medical Management of Chemical and Biological Casualties Course (MCBC) (AMEDD Center and School Course No. 6H-F26). This six-and-one-half day course is normally presented 8 times a year at the USAMRICD and the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID). It is the direct evolutionary descendant of the original Medical Management of Chemical Casualties Course that began in 1973. It serves as the "prototype" for all other course offerings. The course is conducted jointly by the USAMRICD and the USAMRIID. The MCBC Course is designed for physicians, nurses and other medical professionals. Classroom, laboratory, and field instruction focuses on pathophysiology, diagnosis, and treatment of chemical and biological casualties. There is no fee for participating; however, advance registration is required and space is limited (Figure 1).

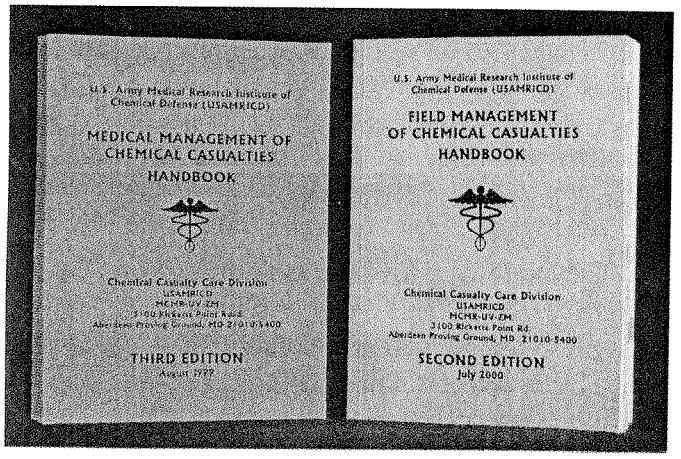


*Fig 1. Medical Management of Chemical Casualties and Field Management of Chemical Casualties Handbook.*

Classroom discussion includes the history and current threat of chemical and biological agent use, the characteristics of threat agents, the pathophysiology and treatment of agent exposure, and principles of field management of threat agent casualties.

In the laboratory, attendees gain valuable, hands-on experience by participating in the resuscitation of a laboratory animal exposed to a nerve agent stimulant. (This laboratory, of course, is conducted in accordance with the "Guide for the Care and Use of Laboratory Animals of the Institute of Laboratory Animal Resources, National Research Council" (Figure 2).

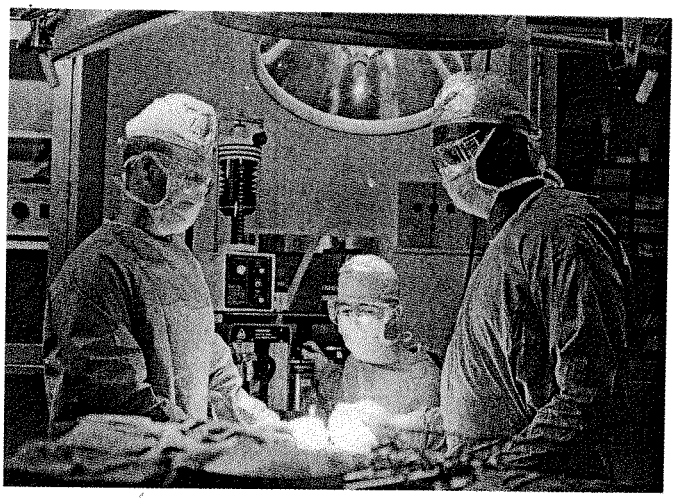

*Fig 2. Laboratory exercise.*

In the field, attendees practice the principles of personal protection, triage, treatment, and decontamination of chemical casualties. During this exercise, attendees learn the capabilities and limitations of mission oriented protective posture when treating casualties in a contaminated environment ( Figure 3 ).

The USAMRIID instructors at Fort Detrick give biological instruction, and USAMRICD instructors at the Edgewood Area of Aberdeen Proving Ground, MD, give chemical instruction. Application for this course is via the Army Training Requirements and Resources System. Requests for attendance should be made through your training branch. The course is also available via several distance-learning products, including satellite broadcast,

*Fig 3. Sponge decontamination.*

video teleconference, and videotape series. The course is approved postgraduate education for physicians and nurses, and is approved military education for entry on the Officer Record Brief.

A newer offering, the 5-day Field Management of Chemical and Biological Casualties Course (FCBC), is normally presented four times per year at the USAMRICD. Occasionally, iterations are requested and paid for by the Reserve Components to train members of Weapons of Mass Destruction Civil Support teams under the National Guard, among many others. The FCBC is designed for medical and chemical noncommissioned officers, Chemical and Medical Service Corps officers, and civilian first responders. Classroom instruction and laboratory and field exercises prepare graduates to become trainers in the first echelon management of chemical and biological agent casualties. Instruction focuses on emergency treatment, triage, and decontamination and evacuation of casualties (Figure 4).

Classroom discussion includes the current global threat of chemical and biological agent use, the characteristics and effects of threat agents, recognition and emergency treatment of agent exposure, and principles of triage and decontamination of chemical and biological agent casualties. Small group exercises reinforce these casualty management principles. A limited block of instruction on the pre-hospital management of biological casualties, given by USAMRIID instructors, forms part of the FCBC.

*Fig 4. Field training exercise.*

As with the MCBC, in the laboratory, attendees gain valuable, hands-on experience by participating in the resuscitation of a laboratory animal exposed to a nerve agent simulant.

During 2 days of field training, attendees establish a casualty decontamination site and use the site during scenario-based exercises to manage litter and ambulatory casualties. Using this site, attendees practice principles of personal protection, agent detection, triage, emergency treatment, and decontamination of chemical casualties.

For information on either of the courses, contact the CCCD, USAMRICD at DSN 584-2230/3393, commercial (410) 436-2230/3393, DSN FAX 584-3086, commercial (410) 436-3086, e-mail: **ccc@apg.amedd.army.mil,** or write to: CCCD (MCMR-UV-ZM), USAMRICD, 3100 Ricketts Point Road, Aberdeen Proving Ground, MD 21010-5400.

The third major (live) course offering is the MCBC Exportable Course. This 3-day version of the MCBC has been presented at various locations, both continental Untied States and outside the continental United States, for each of the last several years. Demand for this course is such that it must be planned approximately 18 months in advance. As an example of productivity, the total number of students taught (with live training) in 1999 was 2,516 and in 2000 was 1,636.

## Studies Emphasizing the Importance of MCBC

Over its 28 years of existence, interest in, and support of, the specialized medical management of chemical casualties training has waxed and waned as would be reflected by student attendance totals from 1981 through 2000. Nevertheless, since 1987 or thereabouts, there has been a succession of studies supporting the resourcing and enhancement of the training. A brief summary and description of these studies is provided in the table. The changes implemented as a result of these studies, while not reaching the total medical force, have significantly enhanced the quality and availability of the training. The GAO report on chemical and biological training in 2001 recognized MCBC as the "gold standard" of instruction in this field in the U.S. (see table, page 50).

To address the concerns in all of the above studies, the Medical Command's training guidance for FY 02 will require that 30% of physicians, physician's assistants, and Nurse Corps, and Profession Filler System complete the MCBC.

## Recent Innovations and Future Directions

As mentioned earlier, in recent years a number of developments increased the availability of medical chemical/biological training. These include: satellite broadcasts, videotapes, an enhanced Website, and CD-ROMs. Let us look at each in turn.

*Satellite Broadcasts.* The USAMRICD presented its first satellite broadcast in April 1999. It resulted in the training of upwards of 40,000. The 3-day program was written and presented by the CCCD and produced and directed by the U.S. Food and Drug Administration (FDA). Among the awards garnered by the broadcast were a bronze award in the 1999 Annual International Mercury awards competition, finalist awards in the New York Festivals and the Aegis Awards programs, the Communicator Award program's Crystal Award of Excellence in Distance Learning Program Award for Healthcare/Telemedicine, presented by the United States Distance Learning Association. A second satellite broadcast, also called "Medical Response to Chemical Warfare and Terrorism" was presented worldwide on three successive days, 5-7 December 2000. Over 5,000 health professionals worldwide received continuing professional education credit for this course, and over 60,000 watched all or part of the course, making it one of the largest continuing medical education events in history. The course has been submitted for several media awards and is still playing video streaming on the World Wide Web. This telecast was granted continuing medical education credit by the American Medical Association under the auspices of the AMEDD Center and School at Fort Sam Houston, TX.

In the wake of the terror attacks of 11 September 2001, The Surgeon General of the Army mandated a new satellite course covering the essentials of both chemical and biological casualty care. The USAMRICD and USAMRIID, in conjunction with the U.S. Department of Veterans' Affairs and the FDA, prepared this new video course in just 7 weeks and broadcast it 28-30 November 2001 to over 8,000 registered students across the United States and Canada. Note the increased exposure of this training when made available through satellite broadcast as compared to the 1999 and 2000 figures for the live training.

*Videotape, Medical Management of Chemical, and Biological Casualties Course.* During 2000, these videotapes of lectures from the Medical Management of Chemical and Biological Casualties Course were professionally edited and prepared for distribution. This video course was also granted continuing medical education credit by the American Medical Association under the auspices of the AMEDD Center and School. This product is now available for distribution both inside and outside the Department of Defense (DOD) and represents yet another way of making course content available outside our scheduled courses.

*CCCD CD-ROM.* This product is now available and is being distributed to all graduates of our in-house courses. It includes a complete mini course, "Fundamentals of Medical Management of Chemical Casualties" lecture series, including full graphics of our in-house presentations, plus access to all of our key references. This CD-ROM contains eight interactive patient scenarios with video clips, as well as over 80 minutes of educational video footage. The CD-ROM is mass-produced at minimal cost and is intended not only as a refresher for our graduates, but also as an educational resource to military installations and other organizations

| Date | Performing Organization | Type of Document | Finding/Recommendation |
|---|---|---|---|
| 1987 | DA-IG | | DOD needs to improve medical readiness for military operations in an NBC environment. Medical MCBC Course is best available doctrinal training. |
| 1987 | DA-IG | | DOD needs to improve medical readiness for medical support of demilitarization operations. |
| 1992 | GAO | GAO/NSIAD-92-175 | Identified problems with Army Medical NBC medical preparedness during the Gulf War. |
| 1993 | GAO | GAO/NSIAD-93-189 | Training in treatment and management of NBC contaminated casualties For U.S. Navy medical personnel needed improvement. |
| 1993 | GAO | GAO/NSIAD-94-58 | Training in treatment and management of NBC contaminated casualties for U.S. Air Force medical personnel needed improvement. |
| 1995 | ASD(HA) | DODI-1322-24 | Defines essential military skills for readiness to include NBC specialty training. Emphasizes requirement for comprehensive training so that can provide essential medical support during military operations in support of CINCs. Includes CB in both military and medical task training. Sets requirements for interval for training. Also "establish a tracking and reporting mechanism to assess the status of medical readiness training." Defines health care/provider personnel. |
| 1996 | GAO | GAO/NSIAD-96-103 | Very critical of DOD efforts to protect troops from the effects of biological and chemical agents despite awareness of problems identified during the Persian Gulf War. Medical NBC preparedness explicitly addressed. |
| 1998 | GAO | GAO/NSIAD-98-68 | Follow-on to 1996 Report. DOD and Congress have acted to provide greater protection for U.S. forces but "DOD needs to decide on major policy and doctrine issues, improve, and increase its capability to detect toxic agents, provide forces with improved and sufficient number of individual protective equipment, and deal with problems of collective protection and decontamination." |
| 1999 | ASD(HA) | | Implements Section 1107 of Title 10, U.S. Code and Executive Order 13139 requirements that "the DOD to provide ongoing training and health risk communication on the requirements of using an investigational new drug in support of a military operation to all military personnel, including those in leadership positions, during chemical and biological warfare defense training and other training as appropriate." |
| 2000 | GAO | GAO-01-27 | Emphasizes integration of CB defense training using realistic wartime scenarios. |
| 2001 | GAO | GAO-02-38 | DOD needs to establish medical CB training as a priority (MCBC is most comprehensive training available). |

*Table. Studies and Documents Supporting MCBC's Essentiality and Materiality with Respect to Medical NBC Readiness*

where it is highly unlikely that we will ever present a course in person.

*The Website* ***http://ccc.apgea.army.mil***. This Website was developed in 1999 in preparation for the first satellite broadcast described above. It was also developed to assist in the enhancement of other distance learning products. During 2000, the CCCD Website has undergone continuous quality control and improvement. It now includes a complete slide set from the MCBC, for which continuing medical education credit is being sought. It also includes complete texts of our basic references and field manuals, allowing the customer 24-hour access to our key information resources. Registration for continuing professional education credit for the satellite course is available via this Website. We monitor the average daily usage of the Website on a monthly basis. The number of daily hits on this Website has risen from 2,300 per day before September to approximately 22,000 per day in October and November 2001. We also monitor search strings, search engines, and downloads as part of the ongoing review of course materials.

*The Future.* Three trends that result in continuous modification of course content and delivery. These are: (1) critiques and evaluations by the attendees; (2) improvements in diagnostic capabilities, preventive countermeasures or treatments that are occurring constantly; and (3) new technological advances in the ability to present the information effectively and to disseminate the information to a wide audience.

*Critiques.* Attendees at the MCBC and FCBC courses, through their critiques, have inspired many worthwhile improvements to both courses. The FCBC, in particular, has seen its field training go through several iterations to reach its present state, in which students learn to operate a field decontamination site through crawl, walk, and run phases. Student critiques were among the strongest factors pushing the staff to establish a block of instruction on chemical terrorism as far back as 1998, the relevance of which has only increased in the intervening years.

*Improvements in Medical Countermeasures.* The Medical Chemical Defense Research Program has an active research, development, and acquisition program bringing more than a half dozen products to full fielding in the last dozen years or so. These products include diagnostic devices, pretreatments and protective ointments, decontaminants and therapeutics. Moreover, these products have, in nearly every case, received full FDA approval for their intended use. This active acquisition program has necessitated periodic changes to classroom pedagogy as well as to the field training exercises.

The interaction between the clinical end-users of the three military medical services, who make up most of the MCBC and FCBC student group, and the Institute's scientific staff forms a crucial link in keeping the research program relevant and focused upon the clinical needs of the military medical services.

*Technology and Training.* The achievability of distance learning has changed radically in the last few years. Distance learning for the MCBC includes CD-ROMs, web-based training, and satellite broadcasts. In the future, although there is presently no standardized instrumentation system that can realistically portray all facets of NBC effects, the Army will soon have the capability to provide virtual simulation for many aspects of NBC environments. The applications of these virtual simulations to medical training are limitless and have been widely recognized at the Uniformed Services University of the Health Sciences and elsewhere in military medicine. With particular reference to chemical casualty care, where actual experience in caring for these syndromes will be minimal, this sort of simulation as a training aid is of special import.

## Summary

The need for training in the medical management of chemical casualties has never been greater. The USAMRICD conducts what the GAO has termed the "gold standard" of training in this area for medical professionals both military and civilian. The training products and initiatives of the USAMRICD were described. It has become evident that there is increased interest in these products. Initiatives designed to increase availability and enhance the quality of training were also presented. Finally, the impact of student critiques, improvements in medical countermeasures, and educational technology on the training programs was also described.

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## AUTHORS:


†Medical Service Corps, U.S. Army. Colonel Romano is the Commander, U.S. Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD.

††Medical Corps, U.S. Army. Colonel Hurst is the Chief, Chemical Casualty Care Division, U.S. Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD and is also the Consultant to the Army Surgeon General for the Medical Management of Chemical Casualties.

†††Medical Corps, U.S. Army Reserve. Colonel Newmark is the Chief of Operations, Chemical Casualty Care Division, U.S. Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD and is also Adjunct Associate Professor of Neurology, Uniformed Services University of the Health Sciences.