WTC Medical Monitoring and Treatment Program: Comprehensive Health Care Response in Aftermath of Disaster

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ABSTRACT

The attack on the World Trade Center (WTC) on September 11th, 2001 exposed thousands of individuals to an unprecedented mix of chemicals, combustion products and micronized building materials.

Clinicians at the Mount Sinai Irving Selikoff Center for Occupational and Environmental Medicine, in partnership with affected stakeholder organizations, developed a medical screening program to evaluate the health status of workers and volunteers who spent time at the WTC site and thus sustained exposure in the aftermath of September 11th. Standardized questionnaires were adapted for use in this unique population and all clinicians underwent training to ensure comparability.

The WTC Worker and Volunteer Medical Screening Program (MSP) received federal funding in April 2002 and examinations began in July 2002. The MSP and the follow up medical monitoring program has successfully recruited nearly 22,000 responders, and serves as a model for the rapid development of a medical screening program to assess the health of populations exposed to environmental hazards as a result of natural and man-made disasters.

The MSP constitutes a successful screening program for WTC responders. We discuss the challenges that confronted the program; the absence of a prior model for the rapid development of a program to evaluate results from mixed chemical exposures; little documentation of the size of the exposed population or of who might have been exposed; and uncertainty about both the nature and potential severity of immediate and long-term health effects. ***Mt Sinai J Med 75:67–75, 2008.*** © *2008 Mount Sinai School of Medicine*

Key Words: World Trade Center, screening, exposure, responders, workers, occupational.

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The attack on the World Trade Center (WTC) on September 11, 2001 exposed thousands of individuals to an unprecedented mix of aerosolized chemicals, combustion products and micronized building materials. For many, exposures began on September 11th, 2001 and continued in the weeks and months thereafter while they toiled in rescue and recovery work; others arrived later but also risked exposure due to fires, which burned into December 2001, and resuspension of settled dust. There was an overwhelming response from thousands of workers and volunteers to provide needed rescue and recovery operations. Those who responded included traditional first responders, such as firefighters, law enforcement officers and emergency service workers, and others who conducted a range of job tasks. See Table 1 for sample job titles. Owing to the overwhelming scale of the disaster, conditions at the site were hazardous and essentially unregulated, particularly in the first

Published online in Wiley InterScience (www.interscience.wiley.com).
DOI:10.1002/msj.20022

Table 1. *Job Functions of World Trade Center Responders.*

Traditional
Emergency service workers
Federal disaster responders
Firefighters
Law enforcement
Urban search and rescue (USAR)
Nontraditional Workers
Building cleaners
Building trades
Civil service workers
Communication workers
Counselors
Engineers
Environmental assessment workers
Media
Mortuary workers
Nonemergency health care workers
Pastoral care
Public officials
Sanitation workers
Transport workers
Utility workers
Veterinarians
Volunteers

days after September 11th. Few systematic rosters were maintained of those working in and around the site; respiratory protection was not always available[1] and, even when available, was not suitable for the prevailing conditions.[1]

Given the magnitude of the tower collapses and continuing fires, it was evident that many people were at risk for significant exposures to WTC dust, products of combustion, and debris. The potential for exposure was significant for all those individuals present at the time of the building collapse, especially for those caught "in the dust cloud", as well as for other workers who arrived at the site later on September 11th or in the subsequent days and weeks. Additionally, responders were exposed to a myriad of events and sights known to induce psychological trauma.

Although there are models for acute and mental health care of traditional responders involved in disaster response,[2,3] there is far less information in the literature on postdisaster medical monitoring and treatment for traditional and nontraditional responders with exposures to an array of toxic materials such as the complex mix of contaminants released after the 9/11 attacks. This paper describes the establishment of a comprehensive program to identify and provide medical monitoring and treatment to a heterogeneous group of traditional and nontraditional responders involved in rescue, recovery, clean up and restoration of services in the aftermath of the attacks on the WTC.

INITIAL MEDICAL CONCERN AND RESPONSE

The attack on and the collapse of the WTC towers and the fires at the site that continued for several months generated considerable concern among a variety of medical specialists that health consequences could result in individuals exposed at the site. In the immediate aftermath of September 11th, concerns focused on acute health conditions, such as musculoskeletal injuries, and acute respiratory conditions, such as reactive airways disease, associated with dust and fume exposure and the psychological implications from the disaster exposures. In addition to early, acute health concerns,[4] there were concerns regarding the particular vulnerability of the great number of "nontraditional" disaster responders without prior training in disaster response. Many of these responders constituted a vulnerable population from a health and safety perspective. There was also heightened concern of the risk for chronic and late emerging conditions related to WTC exposures.

The Mount Sinai Irving J. Selikoff Center for Occupational and Environmental Medicine (COEM) began evaluating individuals with WTC exposures within weeks of the tragedy. The Selikoff Center is a university-based occupational health center of excellence that had been supported by the New York State Department of Health for nearly 20 years prior to 9/11.[4] It has vast experience in examining workers exposed to asbestos, lead, silica, and other industrial pollutants. On the basis of anecdotal clinical reports from various sources, and because of the limited information about the nature of exposures and their health effects, officials from the National Institute for Occupational Safety and Health (NIOSH) initiated regular conference calls to facilitate communication among health care providers on "the front lines" of caring for responders. This initiated a best practice model in which initial clinical observations from providers treating similarly exposed populations were shared, with the goal of identifying possible disease trends and sharing diagnostic treatment modalities.

During the same time period, similar concerns began to emerge from discussions with local union representatives, who were disturbed by the health conditions among their constituents. During the fall of 2001, the unions, partnering with COEM physicians and others, raised awareness among locally and

DOI:10.1002/MSJ

nationally elected officials and agency representatives of the need for health monitoring of WTC exposed individuals. Union representatives and others having direct contact with responders recognized that there was a very broad spectrum of tasks and jobs required to mount an effective rescue and recovery operation. Not only were individuals working directly on "the pile" exposed, but so were thousands of others who worked to restore essential services around the WTC site. In addition, building cleaners and those carting and sorting through debris, were at potential risk of developing health problems.

There was an evident need for a medical monitoring program that could meet the needs of the diverse WTC responder population. In early 2002, federal funding was committed to establish and conduct a medical monitoring program for WTC rescue and recovery workers not from the fire department of New York (FDNY). FDNY responders [firefighters, fire officers, and the FDNY/Emergency Medical Service (EMS) workers] were excluded from the program since they had access to an equivalent program that had been rapidly implemented–enabled by a robust preexisting clinical and data management infrastructure–by the FDNY in September 2001 through the department's Bureau of Health Services. This was expanded to include volunteer FDNY and FDNY EMS retirees through federal funds in December 2001. In April 2002, the Center of Disease Control and Prevention (CDC), through NIOSH, awarded funding to the Mount Sinai COEM for program planning to establish the WTC Worker and Volunteer Medical Screening Program (WVMSP). The contractors were instructed, however, that the source of funding (Federal Emergency Management Agency, FEMA) precluded the provision of treatment as well as data collection for scientific purposes: funding was limited strictly to the provision of medical monitoring examinations. An intensive 3-month program design, planning, and implementation period commenced in April 2002.

CONSTRUCTING THE MOUNT SINAI COEM WTC SCREENING PROGRAM

There was little precedent for setting up a health monitoring program of this scale for such a heterogeneous group of exposed individuals. Surveillance programs for occupational exposures have traditionally been designed to follow health outcomes related to a single known exposure among a well described cohort.[5–9] The creation of the screening program for WTC responders posed several challenges:[1] There was limited data on both exposures and health consequences in the initial aftermath of the disaster;[2] there was no single entity to coordinate identification, recruitment and scheduling of responders from a wide range of worksites; and[3] there was no systematic roster that had been kept of those who had responded. Thus, not only did program design and implementation proceed simultaneously, but the establishment of the program required the creation of a new model of postdisaster surveillance–one that provided examinations to meet the clinical needs of a broad mix of responders, who were linked by exposure and by concern about potential and unknowable future health effects.

The Occupational Safety and Health Administration (OSHA) defines medical screening as "a method for detecting disease or body dysfunction before an individual would normally seek medical care. Screening tests are usually administered to individuals without current symptoms, but who may be at high risk for certain adverse health outcomes"[10] due to occupational exposures. OSHA also dictates standard requirements (including types of examinations, frequency of examination and exposure tests) for screening of workers with exposure to certain single toxic agents.[11] There are no specific guidelines for addressing multiple exposures outside of hazardous materials, nor are there guidelines for civilian responders in postdisaster monitoring. There are, however, some publications in the medical literature addressing the guiding principles and objectives of occupational screening. Halperin *et al.* state that "the goals of screening are assumed to be 1) the early detection of disease and therapy of disease; 2) the evaluation of adequacy of exposure control and other means of primary prevention; 3) the detection of previously unrecognized health effects suspected on the basis of toxicologic and other studies; and 4) the suitable job placement".[12] Notably, these goals were structured with the standard occupational work site in mind.

In the unique setting of the WTC disaster response, there were numerous factors that contributed to the "atypical" work environment. There was a tremendous urgency of working conditions. There was a loss of communication due to damage to telephone systems, and no ability to communicate at the site except by direct vocalization (i.e. two-way radios did not function). There was the uncertainty about the status and safety of family members, friends, and colleagues. There were concerns about ongoing structural instability, fires and explosions, and concern that another attack was imminent, and that there were potential exposures to unknown substances. There was the presence of multiple authorities from local, state, and the federal government who gave conflicting information. Access to the WTC site in the early days was uncontrolled

DOI:10.1002/MSJ

and there was lack of standardized training requirements. Workers and volunteers responded, working for extended work shifts and sleeping onsite. The availability of appropriate safety supplies was initially limited. These factors made application of preexisting occupational medical surveillance programs difficult, if not inappropriate, to a disaster worker population.

Programmatic structure and implementation are less defined in the literature than the overt goals of screening. Baker and Matte delineated steps for design and implementation of a program, as summarized in Table 2.[13,14] Their design highlights the importance of developing an examination protocol that is focused and standardized with respect to exposure assessment, examination administration, and data collection. These principles were applied to the design of the MSP.

The MSP was envisioned as a multifaceted medical program to address outcomes and exposures that were ill defined for an overwhelmingly large heterogeneous population. There were clear goals for the MSP, which included:

- Identification of individuals who had sustained exposures of the WTC site during rescue and recovery operations (including restoration and provision of vital services and removal of debris)
- Provision of clinical assessments for exposed individuals to identify persistent WTC-related medical conditions, using a consortium of clinical sites in the NY/NJ area that had known expertise in occupational health surveillance
- Provision of coordinated referral for follow-up clinical care for affected individuals
- Education of individuals about their exposures and the associated health risks, as well as advice on available benefit and entitlement programs
- Establishment of a "baseline" clinical status for individuals exposed at or near "Ground Zero" for the purpose of comparison with future clinical assessments, particularly for diseases with longer latency (In contrast to the FDNY Bureau of Health Services, there was no pre-WTC exposure health monitoring information for the majority of anticipated participants in the MSP.)

Table 2. *Steps in Designing and Implementing an Occupational Health Surveillance Program.*

Assessment of workplace hazards
Identification of target organ toxicities for each hazard
Selection of test for each "screenable" health effect
Development of action criteria
Standardization of data collection process
Performance of testing
Interpretation of test results
Test confirmation
Determination of work status
Notification
Diagnostic evaluation
Evaluation and control of exposure
Record keeping
(From Baker and Matte)

Rapid Program Development

Given the short time period within which the program had to be developed, multiple critical components of the program had to be developed simultaneously. They included the following:

- identification of a group of experts to assist in development of examination content and protocols;
- development of an examination protocol and standardized instruments;
- establishment of exposure-based eligibility criteria.

An Executive Steering Committee (ESC) was convened to oversee aspects of program planning and policy development. Representatives from organized labor, employer groups, all clinical consortium centers, and experts from multiple fields, including occupational medicine, pulmonary medicine, psychiatry, epidemiology, industrial hygiene, and health education served on the ESC and guided the development of the program. The ESC provided a forum for responder representatives to participate in all aspects of the program, from initial cohort identification and development of eligibility criteria. It provided program guidance on aspects of the protocol and feedback on its effectiveness in reaching stakeholders. Through monthly meetings with program leadership from each participating center, the ESC was able to be informed of issues confronting responders.

To facilitate rapid development of the program, four core areas were identified as essential elements of the "screening program": (1) outreach and exposure assessment; (2) administration; (3) medical evaluation; and (4) data management. Three working groups were convened to develop protocols for the program: medical; exposure assessment; and outreach/education.

Outreach and Exposure Assessment

The outreach/education and exposure working groups communicated frequently to determine methods to identify the types of workers involved in rescue, recovery, restoration of services, and cleanup, as well as means to identify the most heavily exposed potential participants. While many unions and employers had some records of who participated in rescue and recovery operations, there was

DOI:10.1002/MSJ

no comprehensive database of those involved, nor, in most cases, accurate employment records. Additionally, there was overlap between those exposed in the line of duty and those exposed as a result of volunteer activities: in the postdisaster days, responders frequently worked for extremely long hours, with many employees continuing to work in a volunteer capacity after their official shift was over. Many also slept in the vicinity of the disaster. In addition, in the early days, as countless individuals simply arrived to volunteer their services, their presence was not always "officially" recorded.

One of the critical questions facing the screening program working groups was the uncertainty about the demand for clinical evaluations among exposed responders. The actual number of responders who would be eligible for the non-FDNY program was unclear when the program began, estimates ranged from 15,000 to 30,000–40,000 workers and volunteers. Because there were inherent limits on the number of participants who could ultimately be accommodated in the program, exposure based eligibility criteria were adopted to ensure that individuals with the greatest potential need, i.e. greatest exposures, could participate in the program. Over time, as the clinical activities of the screening program began and outreach activities were underway, these criteria were revised to accommodate individuals who had arrived later in the month of September or had fewer total hours of WTC exposures. All changes to eligibility criteria were approved by the ESC. The final eligibility criteria for participation in the screening program defined two categories of eligible individuals as follows:[1] the responder must have operated as a rescue, recovery, debris-cleanup or related support services worker, and/or volunteer who was located in lower Manhattan (south of Canal Street) and/or the Staten Island Landfill and/or the barge loading piers for a minimum duration of 4 hr on September 11th–14th, 2001 OR at least 24 hr in the month of September OR at least 80 hr for the months of September, October, November, and December combined;[2] the responder was an employee of the Office of the Chief Medical Examiner (OCME) or other morgue worker who was involved in the examination and processing of human remains OR the responder was a worker in the Port Authority Trans-Hudson Corporation tunnel for a minimum duration of 24 hr between September 11th, 2001 and July 1st, 2002 OR the responder was a vehicle-maintenance worker within the requisite time frames who was exposed to WTC debris while retrieving, driving, cleaning, repairing, and maintaining contaminated vehicles.

Eligibility interviews were conducted by a trilingual phone bank that fielded 138,982 calls during the course of the screening program. The phone bank also became a clearinghouse for referrals to programs that offered some assistance to callers who were deemed ineligible for the MSP.

An outreach unit was established and staffed by personnel experienced in occupational health and familiar with key organizations, primarily labor unions. An intensive outreach campaign was conducted that included development of written recruitment/outreach materials, participation in hundreds of meetings with unions and other responder organizations, public service announcements in English and Spanish, and an extensive media campaign and other strategies to increase awareness of the program throughout responder communities. Outreach staff worked directly with leadership from nearly 70 unions, which were pivotal in identifying responders, to customize outreach activities based on the unions' experiences in communicating with their members. In some instances speakers were provided at union meetings. Other strategies included providing articles for union newsletters, sending letters from the union president directly to members, assisting with telephone messages to members from union leadership, recording messages to be played on hold buttons at union headquarters, and going to work locations with union leadership to inform workers about the program.

Educational materials were developed for workers to inform them of potential hazards both at the WTC site and in their current and previous occupations, and were distributed during the exposure assessment interview. A detailed interviewer-administered exposure assessment instrument was developed to obtain pre- and post-September 11th related duties. Information about locations at or around the WTC site, Staten Island landfill or barges carrying debris was collected, along with dates of services and hours worked. Because specific exposure data is absent, time spent and location at the WTC site served as surrogates for overall exposure.

Administration

On the basis of specific advice from NIOSH, Mount Sinai developed a clinical consortium of regional partners, with long standing occupational health expertise, which would conduct examinations at geographic locations most convenient to responders. Consortium partners included: the Bellevue/NYU Occupational and Environmental Medicine Clinic, State University of New York at Stony Brook/Long Island Occupational and Environmental Health Center, the Center for the Biology of Natural Systems at Queens College in N.Y., and the Clinical Center of

DOI:10.1002/MSJ

the Environmental and Occupational Health Services Institute at UMDNJ–Robert Wood Johnson Medical School in New Jersey. For those responders and volunteers who came from outside the NY/NJ region, clinical services were coordinated nationally by the Association of Occupational and Environmental Clinics. The lead physician at each of the clinical consortium sites was a member of the ESC and served on the medical working group.

Medical Evaluation

The medical working group (MWG) was established to develop the clinical protocol for a standardized occupational health screening examination intended to assess both physical and mental health. During the protocol development, it was recognized that information should be collected for a research database to underpin scientific assessment of the full impact of the disaster. The primary goal of the MSP however, was provision of clinical services and this was given priority when clinical protocols conflicted with the collection of research data.

Many elements of the clinical screening evaluation were modeled on asbestos screening examinations that had been performed at the Mount Sinai Irving J. Selikoff COEM for more than 30 years.[15,16] The clinical screening examination consisted of physical and mental health questionnaires, a standardized physical examination, pre- and postbronchodilator spirometry, complete blood count, blood chemistries, urinalysis and chest radiograph (see Table 3). Serum banking was performed at some clinical sites. Examination results were discussed with each patient in a face-to-face consultation with a physician at the end of the overall evaluation. All participants received mailed, written summaries of their evaluation. Referrals for further evaluation and treatment of physical and mental health conditions were also provided to participants, if indicated.

Self-administered and interviewer-administered physical and mental health questionnaires were developed using adaptations of standardized instruments whenever possible. For the physical health questionnaires, standardized questions were incorporated when feasible from the Bronchial Symptoms Questionnaire, European Community Respiratory Health Survey, NHANES III surveys, NIOSH Health Hazard Evaluations, and Sino-Nasal Outcome Test.[17–19,22,23] The self-administered mental health questionnaire was a combination of several standardized questionnaires, including the General Health Questionaire-28, Post-Traumatic Stress Disorder Symptom Checklist, Patient Health Questionnaire, CAGE Questionnaire, and Sheehan Disability Scale.[20,21,24–26] Participants who met threshold criteria for possible mental health impairment based on their questionnaire responses were referred for a clinical mental health evaluation. Additionally, any patients who acknowledged suicidal ideation or substantial disability, or those who requested to speak to a mental health professional, were referred for clinical evaluation that day. A critical feature of the screening program was the integration of the mental health component with the physical health program. The self-administered physical and mental health questionnaires were distributed together, in an effort to decrease stigma attached to the completion of mental health questions. Furthermore, the clinical mental health evaluation was considered an equal element of the overall clinical component, with mental health services provided at the same time as the physical health evaluation.

All clinicians participating in the screening program underwent standardized training at in-person training sessions with experts in interviewing techniques and specialists in the evaluation of the nasopharynx and in interpretation of spirometry results. For clinicians who were evaluating responders outside the NY/NJ area, a training video was developed, consisting of taped lectures and demonstrations by these experts. In addition, all pulmonary function tests given via the NY/NJ consortium were performed using the same type of spirometer and all technicians were trained by the same experts in

Table 3. *Clinical Components of Screening Examination.*

Self-Administered Questionnaires
I. Self-Administered Mental Health questionnaire (17–21)
II. Self-Administered Physical Health questionnaire (14–16,22,23)
Interviewer-Administered Questionnaires
III. Interview Administered Medical questionnaire, IAMQ (14–16,22,23)
IV. Exposure Assessment Questionnaire
Examination
V. Physical Examination
Diagnostic Tests
VI. Pulmonary Function Test–EasyOne ® Spirometer (24,25)
VII. Labs (Blood Count, Blood Chemistries and urinalysis)
VIII. Chest Radiograph
Examination Results
IX. Physician Exit Interview (Immediate Letter–"Urgent Letter" for notification of abnormal laboratory or chest radiograph)
X. Written Summary of Results (Final letter)

DOI:10.1002/MSJ

administering the test.[27] Emphasis was also placed on obtaining NIOSH certificates for pulmonary technicians. These training sessions were a critical aspect of staff development and training and ensured uniformity of testing within the program as a whole.[28] It also provided training for referral for further care of conditions felt to be WTC-related.

Almost 12,000 responders participated in the medical screening program between July 2002 and July 2004, including 650 individuals seen outside the NY/NJ region. Nearly 9,000 individuals were seen at Mount Sinai alone. Additional funding was obtained in July 2004 to continue to monitor the physical and mental health of the WTC responders. Since then over 12,000 additional responders have received initial monitoring examinations, increasing the total cohort size to approximately 22,000 responders.

Data Management Core Functions

The Data Management core was responsible for developing databases and entering data gathered within the screening program. However, insufficient funds were provided for data cleaning and data analysis.

Establishment of the Health Effects Treatment Program

As noted previously, the federal funding for the MSP was allotted for screening procedures and mental health services only, with no federal funding designated for clinical diagnostic services or treatment. The development and implementation of the WTC treatment program is beyond the scope of this discussion, however it should be noted that medical monitoring initiates medical responsibility to ensure that workers receive appropriate medical attention. From the outset, responders seen in the WTC WVMSP were able to receive needed mental health treatment at some clinical sites through separate federal and philanthropic funding.[29] Additionally, concomitant with the establishment of the MSP, program leaders began to seek funds to establish a treatment program for WTC responders. Philanthropic funding was solicited in early 2002 for appropriate treatment and support of responders suffering from physical, personal and socioeconomic repercussions of WTC exposure. Funding was received from a number of benefactors, enabling the inauguration of the WTC Health Effects Treatment Program (HETP) in January 2003.[30] A program for treatment of mental health conditions arising from or aggravated by the WTC disaster also received philanthropic funding in 2002 and the program began in 2003.[29] Federal funding for physical and mental health treatment services was provided in November 2006 to the WTC Medical Monitoring Program, which has subsequently been renamed the WTC Medical Monitoring and Treatment Program (MMTP).

DISCUSSION

The events of September 11th, 2001 were unprecedented not only in terms of national security, but also from a public health perspective. Despite its extensive network of hospitals and thousands of physicians, New York City was not immediately equipped to address the potential health risks to the thousands of responders who arrived at the WTC site in the days, weeks and months following the collapse of the towers. Given the unique nature of the events and subsequent hazards, there were no models upon which to structure the WTC Medical Screening/Monitoring Program (MS/MP).

The factors that make the WTC MS/MP unique among health monitoring programs include the following:

- provision of free, confidential, comprehensive, and highly standardized medical and mental health screening examinations for a highly heterogeneous group of citizens who responded to a disaster with exposures of unknown health consequences;
- Rapid development of a concomitant physical and mental health treatment program;

Utilization of a bio-psychosocial model of care, addressing the physical, mental health, and socioeconomic well being of the responders, with screening for psychological, social, and physical problems incorporated into the same clinical evaluation.

In order to accomplish the formidable task of providing comprehensive screening, monitoring and eventually treatment for the WTC responders, several critical features were essential to the program's success:

- Reliance on the preexisting infrastructure of the New York State Occupational Health Clinic Network—a unique system of Centers of Excellence in Occupational Health that had been in existence for nearly 20 years.
- Involvement and inclusion of responder representatives and other program constituents in the development, evaluation and governance of the program from its inception.
- Use of a comprehensive bio-psychosocial model to ensure that the breadth of responders' needs was addressed.

DOI:10.1002/MSJ

- Implementation of a constant feedback loop from clinicians, modeled on systems that track sentinel health events.

CONCLUSION

The horrific events of September 11th, 2001 provided the impetus for policy makers to review and strengthen procedures involving national security and other related issues. Public Health advocates must also use this event as a catalyst to examine disaster response. A large number of lessons have been learned as a result of this program that addressed health consequences suffered by thousands of WTC responders.

The overarching lesson is that postdisaster health screening, monitoring and treatment must be adapted to fit the needs of the population and hazards likely to be involved in future disasters.

Future disaster response programs should at a minimum provide the following:

- identification of physical and mental health disease in individuals;
- identification of socioeconomic needs of individuals;
- identification of disease patterns and socioeconomic need patterns among the constituent group;
- identification of resources for affected individuals to ensure the delivery of appropriate physical and mental health care;
- identification of resources for affected individuals to ensure that their basic economic needs are met

These programs will be most effective if they:

- Achieve early identification of the affected group
- Utilize a "community organizer" approach by involving the constituent population in the development, implementation and evaluation of the program
- Accommodate the heterogeneous nature of the American workforce. These accommodations must include evaluation of proper communication tools including variables such as language comprehension and literacy. Additional factors include knowledge of occupational health protections and general access to medical care.

In every disaster, hundreds and even thousands of civic-minded people immediately rush to the site to help. It is incumbent on us to ensure the health and well-being of these men and women by providing protection during their work and to provide medical monitoring where necessary, treatment upon conclusion of the work. The WTC MSP and MMTP provides a model for a program that has met these challenges.

We would like to acknowledge the contributions and support of the following individuals and organizations: J Howard, S Baron, M Galvin, R Fleming, V Sharma, C Katz, R Smith, S Markowitz, D Harrison, R Oxman, E Call, American Red Cross Liberty Fund, The September 11th Recovery Program, The Bear Stearns Charitable Foundation, The September 11th Fund, The Robin Hood Foundation Relief Fund, and many others.

ACKNOWLEDGMENTS

This work was supported by the Centers for Disease Control and Prevention and the National Institute for Occupational Safety and Health, grant C200-2002-00384 (Screening Program), grant 5U10 OH008232-04 (DCC), and grant 3U10 OH008225 (CC).

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DOI:10.1002/MSJ