

Management

- Provide guidelines and define organizational responsibilities for enforcing PPE use at major disaster sites. Although such guidelines must address the risks responders are willing to take when the potential exists to save lives, they also should reflect the principle that the health and safety of responders should be a primary concern during long-term responses.
- Develop mechanisms to allow rapid and efficient scene control at disaster sites as early as possible during a response.

Acknowledgment

This report was based on data contributed by S Lenhart, MSPH, Div of Surveillance, Hazard Evaluations and Field Studies, National Institute for Occupational Safety and Health, CDC.

Reference

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Impact of September 11 Attacks on Workers in the Vicinity of the World Trade Center — New York City

In January 2002, CDC's National Institute for Occupational Safety and Health received requests for Health Hazard Evaluations from labor unions representing workers employed in buildings in the vicinity of the World Trade Center (WTC). Workers reported persistent physical and mental health symptoms that they associated with exposures from the WTC collapse and ensuing fires. To address these concerns, CDC conducted surveys of workers at four workplaces in New York City (NYC), a high school (high school A) and college (college A) near the WTC site, and a high school (comparison high school B) and college (comparison college B) ≥ 5 miles from the WTC site to determine rates of physical and mental health symptoms. This report summarizes the preliminary results of the employee surveys, which indicated that workers employed near the WTC site had significantly higher rates of physical and mental health symptoms than workers employed ≥ 5 miles from the site. Intervention programs should be tailored to address the needs of these workers, and the effectiveness of these programs should be evaluated. Further assessment is warranted to describe the nature and extent of illness in specific working groups and individual medical follow-up in those with persistent symptoms.

CDC conducted site visits and distributed self-administered questionnaires in January 2002 to staff at high school A (n=224) and comparison high school B (n=155), and in March 2002, to staff at college A (n=374) and comparison college B (n=204). Teaching, administrative, support, and noncontract staff were included in the survey. Respondents were asked about work duties, mental health and physical symptoms after September 11, past medical history, and activities related to events at the time of the WTC terrorist attacks.

Questions about physical symptoms were based on presumed types of exposures and employee concerns. Persons responding affirmatively to "Have you had any of the following symptoms after the WTC disaster on 9/11/01?" were defined as having symptoms. Physical symptoms included eye irritation, nose/throat irritation, cough, shortness of breath, chest tightness, wheezing, nausea, and indigestion. Persistent physical symptoms were defined as either 1) symptoms that existed before September 11 but worsened after September 11, or 2) new symptoms that developed after September 11 and had not improved.

To assess mental health symptoms, the Center for Epidemiologic Studies Depression Scale (1) was used to define symptoms consistent with major depression. The Veteran's Administration post-traumatic stress disorder (PTSD) checklist (2) was used to determine prevalence of PTSD.

Participation rates were 83% for high school A, 84% for high school B, 59% for college A, and 50% for college B. Staff at all four workplaces were similar by age, sex, race, education, and cigarette smoking status.

On September 11, approximately 40% of high school A and 31% of college A staff saw an airplane crash into the WTC; 50% and 44%, respectively, witnessed the WTC collapse. In all four workplaces, 30%–40% of the respondents knew someone who was injured seriously or killed during the disaster. College A reopened for staff on September 26, and high school A staff returned to their building on October 20. Both buildings were within two blocks of the still burning WTC site and adjacent to a barge operation carrying the debris to the landfill site outside Manhattan.

Approximately one fourth (27%) of staff at high school A and college A lost time from work because of physical symptoms experienced after the WTC disaster, compared with 14% at high school B ($p<0.003$) and 16% at college B ($p<0.004$). Compared with staff at high school B and college B, staff at high school A and college A reported a significantly higher prevalence ratio of new physician-diagnosed PTSD after September 11, but rates for allergies, asthma, and depression were not statistically different.

Prevalence of eye irritation, nose/throat irritation, cough, nausea, and shortness of breath was significantly higher ($p \leq 0.05$) for staff at high school A and college A, compared with staff at high school B and college B after September 11 (Table 1). Approximately 4–6 months after the attacks, 5%–30% of employees in high school A and college A had persistent physical symptoms (Table 2); the majority of these symptoms were significantly higher ($p \leq 0.05$) in high school A and college A than in the comparison schools.

Approximately one third (33%) of high school A and 24% of college A respondents reported symptoms consistent with major depression; 23% of high school A and 15% of college A respondents had symptoms consistent with PTSD. Rates for symptoms consistent with depression and PTSD from the

survey were significantly higher in high school A and college A compared with high school B and college B (Table 2).

Reported by: BP Bernard, MD, SL Baron, MD, CA Mueller, MS, RJ Driscoll, PhD, LC Tapp, MD, KM Wallingford, MS, AL Tepper, PhD, National Institute for Occupational Safety and Health, CDC.

Editorial Note: The findings from these surveys indicate that 4–6 months after the September 11 terrorist attacks, workers surveyed near the WTC site had substantial rates of irritative, respiratory, and mental health symptoms and lost work time, compared with similar workers surveyed ≥ 5 miles from the WTC site. These findings indicate how the impact of the WTC attacks extended beyond the WTC site to affect the health of persons working nearby.

TABLE 1. Number and percentage of high school and college staff reporting physical or mental health symptoms after the World Trade Center (WTC) attacks, by symptom — New York City, January and March 2002

Symptom	High school A (in proximity to WTC site) (n=224)		High school B (comparison site) (n=155)		College A (in proximity to WTC site) (n=374)		College B (comparison site) (n=204)		High schools A to B		Colleges A to B	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	PR*	(95% CI) [†]	PR	(95% CI)
Eye irritation	128	(59)	57	(38)	224	(62)	70	(36)	1.6	(1.2–2.0) [§]	1.8	(1.4–2.1) [§]
Nose/throat irritation	136	(65)	57	(39)	219	(62)	72	(37)	1.6	(1.3–2.1) [§]	1.7	(1.4–2.1) [§]
Cough	138	(63)	57	(38)	216	(60)	72	(36)	1.7	(1.3–2.1) [§]	1.7	(1.4–2.0) [§]
Shortness of breath	75	(35)	31	(21)	130	(36)	31	(16)	1.7	(1.2–2.4) [§]	2.3	(1.6–3.3) [§]
Chest tightness	59	(28)	28	(19)	111	(31)	24	(12)	1.5	(1.0–2.2)	2.5	(1.7–3.8) [§]
Wheezing	42	(20)	21	(14)	72	(20)	15	(8)	1.4	(0.9–2.3)	2.6	(1.6–4.5) [§]
Nausea	40	(19)	16	(11)	60	(17)	15	(8)	1.7	(1.0–2.9) [§]	2.2	(1.3–3.8) [§]
Indigestion	65	(30)	32	(22)	97	(27)	42	(21)	1.4	(1.0–2.0)	1.3	(1.0–1.8)
Depression [¶]	72	(34)	28	(18)	85	(24)	34	(17)	1.9	(1.3–2.8) [§]	1.4	(1.0–2.0)
Post-traumatic stress disorder ^{**}	49	(23)	9	(6)	53	(15)	17	(8)	3.8	(1.9–7.5) [§]	1.7	(1.0–2.9) [§]

* Prevalence ratio.

[†] Confidence interval.

[§] Statistically significant ($p \leq 0.05$).

[¶] Defined as a score of ≥ 22 for modified Center for Epidemiologic Studies scale.

^{**} Defined as a person who responded affirmatively (an answer of “moderately,” “quite a bit,” or “extremely”) to questions according to the Diagnostic and Statistical Manual of Mental Disorders-IV criteria (3).

TABLE 2. Number and percentage of high school and college staff reporting persistent physical symptoms* after the World Trade Center (WTC) attacks, by symptom — New York City, January and March 2002

Symptom	High school A (in proximity to WTC site) (n=224)		High school B (comparison site) (n=155)		College A (in proximity to WTC site) (n=374)		College B (comparison site) (n=204)		High schools A to B		Colleges A to B	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	PR [†]	(95% CI) [§]	PR	(95% CI)
Eye irritation	62	(29)	22	(15)	112	(31)	20	(10)	2.0	(1.3– 3.0) [¶]	3.1	(2.0– 4.8) [¶]
Nose/throat irritation	65	(31)	25	(17)	102	(29)	19	(10)	1.8	(1.2– 2.7) [¶]	3.0	(1.9– 4.7) [¶]
Cough	59	(27)	15	(10)	101	(28)	25	(13)	2.7	(1.6– 4.6) [¶]	2.2	(1.5– 3.3) [¶]
Shortness of breath	40	(19)	10	(7)	65	(18)	9	(5)	2.8	(1.4– 5.4) [¶]	4.0	(2.0– 7.8) [¶]
Chest tightness	30	(14)	6	(4)	49	(14)	5	(3)	3.5	(1.5– 8.2) [¶]	5.4	(2.2–13.3) [¶]
Wheezing	24	(11)	4	(3)	37	(10)	5	(3)	4.2	(1.5–11.9) [¶]	4.1	(1.6–10.1) [¶]
Nausea	17	(8)	6	(4)	19	(5)	4	(2)	1.9	(0.8– 4.8)	2.6	(0.9– 7.6)
Indigestion	27	(13)	10	(7)	44	(12)	6	(3)	1.8	(0.9– 3.7)	4.2	(1.8– 9.6) [¶]

* Those reporting “yes” to symptoms after September 11, 2001, and “yes” to either symptom before September 11 with worsening or new onset of symptoms with “no change” or worsening of symptoms. Excludes those with pre-existing symptoms who reported “no change” after September 11.

[†] Prevalence ratio.

[§] Confidence interval.

[¶] Statistically significant ($p \leq 0.05$).

Mucous membrane and respiratory symptoms among the survey participants described in this report, the majority of whom were present during the September 11 attacks, might have resulted initially from exposure to multiple environmental contaminants (e.g., smoke, respirable airborne particles, fine dust, and fire combustion products) generated by the collapse of the towers and ensuing fires. Information is limited concerning health effects associated with complex mixed environmental exposures (e.g., those that occurred during and after the WTC attacks).

Approximately 30% of workers included in this survey reported persistent physical symptoms several months after the initial event. The persistence of symptoms in certain persons might be explained by several factors, including differences in the initial exposure, individual susceptibility, existing medical conditions, and factors related to social support or individual stressors.

The results reported here indicate that many high school and college workers near the WTC site experienced symptoms consistent with PTSD and depression. Proximity to the WTC site also was a significant finding for “probable PTSD” (a slightly different case definition using the same PTSD scale) among NYC residents in a recent web-based epidemiologic study (4).

The findings in this report are subject to at least two limitations. First, responses to extraordinary traumatic events might provoke a range of reactions, and symptoms alone are not adequate to document fully psychologic or physical illness. Second, because of the low response rate for colleges A and B, the percentages and prevalence ratios should be interpreted with caution because of potential participation bias.

Further investigations using full clinical diagnostic assessment might be useful in determining the breadth and scope of illness in persons with persistent symptoms. Because mental health and physical symptoms can persist for extended periods after a disaster, persons who continue to experience symptoms should seek professional assistance. Counseling services should continue to target those who are vulnerable to depression and PTSD, particularly those who have lost family or friends, those who do not have a social network, and those who witnessed the attacks (5,6).

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Community Needs Assessment of Lower Manhattan Residents Following the World Trade Center Attacks — Manhattan, New York City, 2001

On September 11, 2001, terrorists attacked and destroyed the World Trade Center (WTC) in New York City (NYC). An estimated 2,819 persons were reported killed in the attacks; many others were injured (Office of the Chief Medical Examiner, New York City Department of Health and Mental Hygiene [NYCDOHMH], unpublished data, 2002). An estimated 25,000 persons living nearby in lower Manhattan were affected both physically and emotionally. Many persons witnessed the attacks; lost family and friends; were exposed to smoke, dust, and debris; and evacuated their homes. To identify the health-related needs and concerns of persons residing near the attack site, NYCDOHMH, in collaboration with CDC, surveyed persons residing in areas immediately surrounding the WTC site. The primary purpose of the survey was to gather information to set priorities and direct public health interventions. This report summarizes findings from the assessment, which indicate that a large proportion of respondents had physical and psychological symptoms potentially associated with the exposure and needed information to address their health and safety concerns. On the basis of the results of the survey, NYCDOHMH responded to resident concerns, helped reduce exposure to dust and debris, and provided information about mental health resources.

The survey was conducted door-to-door in three residential areas in lower Manhattan: Battery Park City, Southbridge Towers, and Independence Plaza (populations: approximately 8,000, 2,000, and 2,300, respectively) (Figure). These areas represented compact, well-defined neighborhoods comprising approximately 50% of the residential population of lower Manhattan. On the basis of data from the NYC Department



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Injuries and Illnesses Among New York City Fire Department Rescue Workers After Responding to the World Trade Center Attacks

Within minutes of the terrorist attacks on September 11, 2001, the Fire Department of New York City (FDNY) operated a continuous rescue/recovery effort at the World Trade Center (WTC) site. Medical officers of FDNY Bureau of Health Services (FDNY-BHS) responded to provide emergency medical services (see box). The collapse of the WTC towers and several adjacent structures resulted in a vast, physically dangerous disaster zone. The height of the WTC towers produced extraordinary forces during their collapse, pulverizing considerable portions of the buildings' structural components and exposing first responders and civilians to substantial amounts of airborne particulate matter. Fires burned continuously under the debris until mid-December 2001. Because of ongoing fire activity and the large numbers of civilians and rescue workers who were killed during the attacks, approximately 11,000 FDNY firefighters and many emergency medical service (EMS) personnel worked on or directly adjacent to the rubble and incurred substantial exposures (Figure). This report describes morbidity and mortality in FDNY rescue workers during the 11-month period after the WTC attacks and documents a substantial increase in respiratory and stress-related illness compared with the time period before the WTC attacks. These findings demonstrate the need to provide acute and long-term medical monitoring, treatment, and counseling to FDNY rescue workers exposed to this disaster and to solve supply, compliance, and supervision problems so that respiratory protection can be rapidly provided at future disasters.

During the collapse, 343 FDNY rescue workers died and, during the next 24 hours, an additional 240 FDNY rescue workers sought emergency medical treatment. This report includes all reported injuries/illnesses during the 24 hours following the attacks. Traumatic injuries are reported for the

FIGURE. New York City Fire Department rescue workers at the World Trade Center site



AP (Associated Press) photo/Mark Lennihan

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