Injuries and Illnesses Treated at the World Trade Center, 14 September–20 November 2001

Kara R. Perritt, MS;[1] Winifred L. Boal, MPH;[2] The Helix Group Inc.[3]

1. Division of Safety Research, National Institute for Occupational Safety and Health, Morgantown, West Virginia USA
2. Division of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health, Cincinnati, Ohio USA
3. The Helix Group, Camp Springs, Maryland USA

Correspondence:
Kara R. Perritt, MS
Chief, Special Studies Team
Surveillance and Field Investigations Branch
Division of Safety Research
National Institute for Occupational Safety and Health
1095 Willowdale Road, M/S 1808
Morgantown, WV 26505 USA
E-mail: kperritt@cdc.gov

Keywords: attacks; Disaster Medical Assistance Teams (DMATs); illnesses; injuries; primary medical care; safety; severity; terrorist; World Trade Center

Abbreviations:
DMAT = Disaster Medical Assistance Team
NIOSH = National Institute for Occupational Safety and Health
NYCDOH = New York City Department of Health
OEP = Office of Emergency Preparedness
OIICS = Occupational Injury and Illness Classification System
WTC = World Trade Center
US = United States
USPHS = United States Public Health Service

Received: 26 October 2004
Accepted: 13 December 2004
Revised: 23 December 2004

Web publication: 03 May 2005

Abstract

Introduction: In response to the 11 September 2001 terrorist attacks on the World Trade Center (WTC), the United States Public Health Service (USPHS) deployed Disaster Medical Assistance Teams (DMATs) and the Commissioned Corps to provide on-site, primary medical care to anyone who presented. Patients included rescue and recovery workers, other responders, and some members of the general public.

Objective: A descriptive analysis of WTC-USPHS patient records was conducted in order to better understand the short-term impact of the WTC site on the safety and health of individuals who were at or near the site from 14 September–20 November 2001.

Methods: The Patient Treatment Record forms that were completed for each patient visit to these USPHS stations over the 10-week deployment period were reviewed.

Results: Patient visits numbered 9,349, with visits peaking during Week 2 (21–27 September). More than one-quarter of the visits were due to traumatic injuries not including eye injuries (n = 2,716; 29%). Respiratory problems comprised more than one-fifth of the complaints (n = 2,011; 22%). Eye problems were the third most frequent complaint (n = 1,120; 12%). With respect to the triage class, the majority of visits fell into the lowest category of severity (n = 6,237; 67%).

Conclusion: USPHS visits probably were skewed to milder complaints when compared to analyses of employer medical department reports or hospital cases; however, given the close proximity of the USPHS stations to the damage, analysis of the USPHS forms provides a more complete picture of the safety and health impact on those who were at or near the WTC site.

Perritt KR, Boal WL, The Helix Group: Injuries and illnesses treated at the World Trade Center, 14 September–20 November 2001. ***Prehosp Disast Med*** **2005;20(3):177–183.**

Introduction

On 11 September 2001, and for months following the terrorist attacks on the World Trade Center (WTC), rescue and recovery workers, other responders, and the nearby general public were exposed to numerous hazards including air contamination, safety hazards, and psychological stress.[1–10] In response, the United States (US) Public Health Service's (USPHS's) Disaster Medical Assistance Teams (DMATs) and Commissioned Corps were deployed to the WTC site to provide emergency primary medical care to anyone requiring attention. At any one time from 14 September through 20 November 2001, up to a maximum of five USPHS stations provided care.[11] Team members at these stations included physicians, registered nurses, paramedics, pharmacists, mental health experts, administrators, and other professionals.[12] In addition to medical care, the WTC-USPHS staff offered preventive care such as providing non-medical supplies, distributing personal protective equipment (PPE), and performing respirator fit testing. Patients who presented to the USPHS stations included firefighters, police officers, construction workers,

volunteers, and other responders. Some members of the general public, such as nearby residents and others who had access to the restricted site, also were treated.

For each patient visit, two separate forms were completed. The first form, designed specifically for the WTC site response, was the New York City Department of Health (NYCDOH) Rescue Team Injury/Illness Surveillance Patient Record Form (hereafter referred to as the NYCDOH Form). The second form was the standard US Department of Health and Human Services National Disaster Medical System Patient Treatment Record OPHS-T-3 (hereafter the USPHS Form). After a patient was released or transferred from a USPHS station, the two forms were separated, with all of the NYCDOH Forms eventually archived in New York City and all the USPHS Forms archived in Washington, DC. This study presents findings from the processing of the USPHS Form data abstracted for the period from 14 September through 20 November 2001.

Methods

Following project approval by the National Institute for Occupational Safety and Health (NIOSH) institutional review board, the Office of Emergency Preparedness (OEP), which at the time was under the Office of Public Health and Science within the US Department of Health and Human Services, provided NIOSH with the original, one-page, hand-written USPHS forms that had been completed during the 10-week WTC-USPHS station deployment. After a unique identifying form number was assigned to each form, the reported information was entered verbatim into Microsoft Access (Redmond, Washington USA). Prior to final data processing, all mechanisms by which an individual patient could be identified were removed.

Data collected on the USPHS form, which was completed by USPHS staff and the patient, included date, time, facility location, patient name, contact information (address and phone number), gender, age, and narrative text for chief medical complaint, diagnosis, and treatment. The form also included a five-level triage classification system for USPHS staff use. The five triage levels were dead, birth, green (low severity), yellow (moderate severity), and red (high severity).

Using the narrative text data, injuries and illnesses were coded according to the Occupational Injury and Illness Classification System (OIICS) developed by the US Department of Labor, Bureau of Labor Statistics.[13] Physicians, who worked under contract for NIOSH and were trained in OIICS, coded each USPHS form with two OIICS variables: "nature of injury or illness" to describe the physical characteristics of the injury or illness and "part of body affected." Per OIICS guidelines, if more than one injury or illness was reported, the coding was based on the more severe outcome. When two or more outcomes of equal severity were reported, a code for multiple effects was selected. Follow-up visits and after-effects were coded to the initial injury or illness. Visits that could not be coded using OIICS were classified into the following categories: (1) PPE request; (2) supply request; (3) wellness check-up; (4) counseling/support; (5) preventive tetanus vaccination; (6) request for vitamins or prescription refills; (7) suture removal; (8) search and rescue dogs; or (9) unclassifiable (too little information provided).

Characteristic	n	(%)*
Gender		
Male	7,332	(78.4)
Female	902	(9.6)
Unknown	1,115	(11.9)
Age (years)		
<18	6	(0.1)
18–25	489	(5.2)
26–35	2,252	(24.1)
36–45	2,853	(30.5)
46–55	1,423	(15.2)
>55	394	(4.2)
Unknown	1,932	(20.7)
Triage Class		
Low Severity	6,237	(66.7)
Moderate Severity	149	(1.6)
High Severity	22	(0.2)
Death	0	(0.0)
Birth	0	(0.0)
Unknown	2,941	(31.5)
Transferred to Hospital		
Yes	116	(1.2)
No	9,233	(98.8)
Total Visits	**9,349**	**(100.0)**

Perritt © 2005 Prehospital and Disaster Medicine

Table 1—Characteristics of patients treated at World Trade Center USPHS stations, 14 September–20 November 2001 (*Percentages may not total 100 due to rounding; USPHS = United States Public Health Service; n = number)

Results

A total of 9,349 USPHS forms were abstracted, each representing a separate USPHS visit. The general characteristics of these patient visits are listed in Table 1. The majority of patients were male (n = 7,332; 78%). Patient ages ranged from early teens (n = 6 patients <18 years) to seniors (n = 11 patients >70 years), with an average of 39 years.

As an indicator of injury or illness severity, frequencies of the classification of the patients into the five levels of

triage also are listed in Table 1. Among the 22 patients with the highest triage severity classification (0.2%), 13 (59%) were for illnesses including heart problems, chest pain, stroke, and respiratory problems; five (23%) involved traumatic injuries such as carbon monoxide poisonings, abrasions, needlesticks, electrical injuries, and first or second degree burns; and four (18%) had other miscellaneous problems. Of the 149 patients with a moderate level of severity (1.6%), 58 (39%) had traumatic injuries; 43 (29%) had respiratory problems; eight (5%) complained of digestive system problems; six (4%) had headaches; and 34 (23%) had other miscellaneous complaints, including cardiovascular problems, loss of consciousness, convulsions, and/or dizziness. For the 6,237 patients classified into the lowest severity category (66.7%), 1,984 (32%) had traumatic injuries; 1,658 (27%) had respiratory problems; 714 (11%) had eye complaints; 497 (8%) complained of headaches or migraines; 277 (4%) had skin complaints; 114 (2%) had infectious and parasitic diseases; 491 (8%) were for other miscellaneous complaints; and 502 (8%) could not be classified. Among the 2,941 visits without a triage classification (31.5%), 976 (33%) had relatively minor symptoms including eye irritations, cold and allergy complaints, and headaches; 419 (14%) needed personal protective equipment (PPE), supplies, or had other problems that could not be classified using the OIICS; and 94 (3%) had skin complaints. The remaining 1,452 visits that could not be assigned a triage category (49%) were for other miscellaneous ailments. Although most USPHS patients were treated and released on-site, 116 forms (1%) indicated that the patient was transferred to a hospital emergency department. These included 67 (58%) for traumatic injuries, 22 (19%) for cardiovascular problems, 13 (11%) for respiratory problems, four (3%) for gastrointestinal problems, and 10 (9%) for other miscellaneous outcomes.

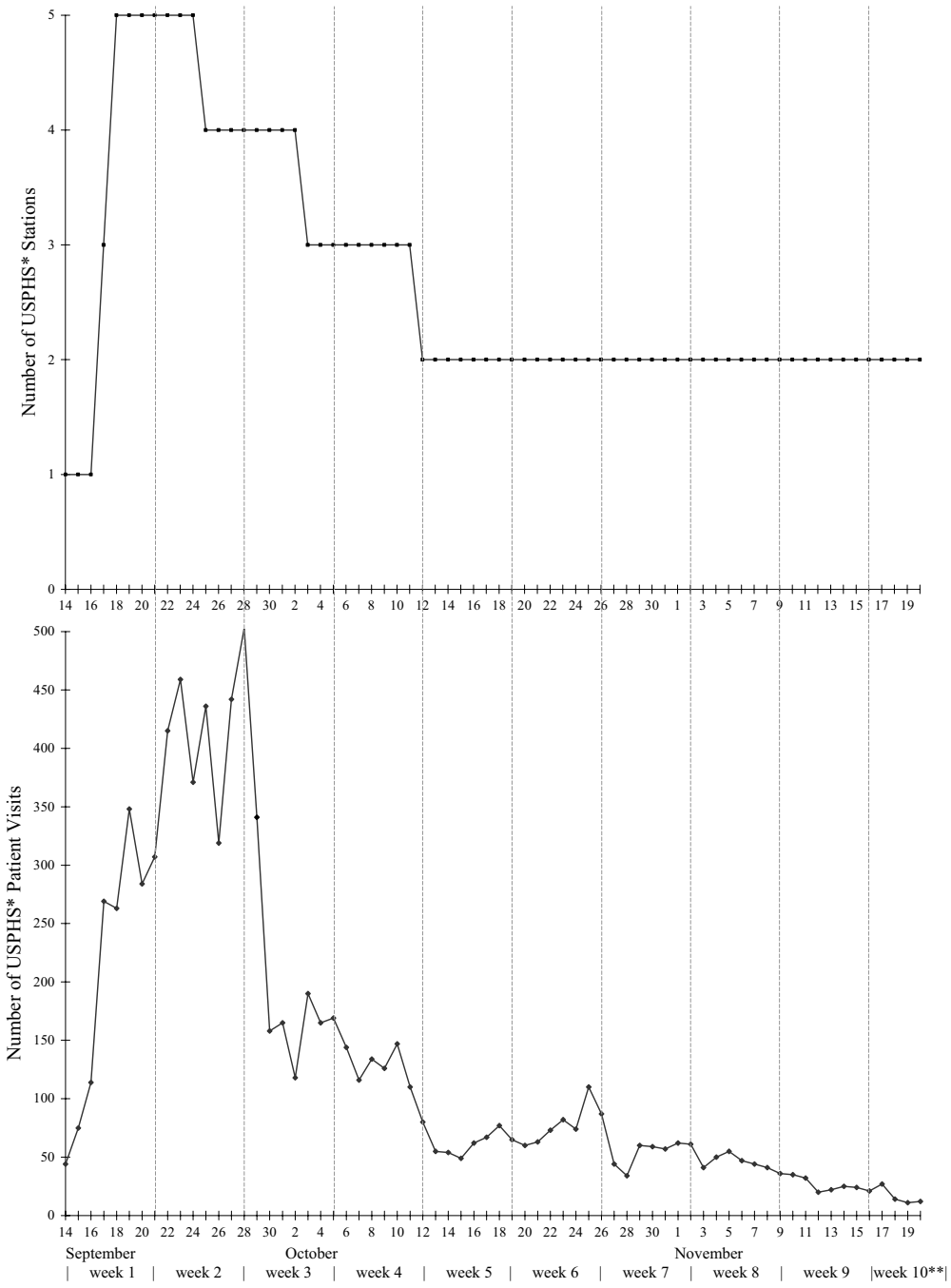
For the 10 weeks that the USPHS stations were operating, the number of daily visits as well as the number of stations in operation each day is illustrated in Figure 1. The number of patient visits peaked during the second week following the event (21–27 September), and then, decreased during the subsequent weeks. The sharp decline in the number of visits that occurred around 30 September did not coincide with reductions in the number of USPHS stations. This sharp decline in visits preceded both the reduction from four to three operating stations (2–3 October) and the reduction from three to two stations (11– 12 October). Furthermore, the number of visits continued to decline from 12 October to 20 November, the time when the last two stations were operating.

In general, when the nature of the USPHS visits was analyzed in broad injury and illness categories, the temporal pattern shown in Figure 1 prevailed; the frequency of patient visits within each category declined after the second week. When comparing the first four weeks to the last four weeks, there were three main differences among the broad categories. First, the broad category of "systemic diseases or disorders" accounted for a lower percentage of visits during the early period (20%) than during the latter period (39%). In both time periods within this broad cate-

Nature of Injury or Illness Category	n	(%)*
Traumatic injuries and disorders, except the eye	2,716	(29.1)
Cuts, lacerations, abrasions, contusions	1,130	(12.1)
Soreness, pain, hurt, except the back	424	(4.5)
Burns	253	(2.7)
Injuries to muscles, tendons, ligaments, and joints	204	(2.2)
Blisters	130	(1.4)
Punctures	93	(1.0)
Back pain	73	(0.8)
Foreign bodies	63	(0.7)
Fractures	31	(0.3)
Crushes	27	(0.3)
Other	288	(3.1)
Respiratory	2,011	(21.5)
Acute infections	674	(7.2)
Upper respiratory complaints[a]	604	(6.5)
Chronic obstructive pulmonary disease and allied conditions	295	(3.2)
Allergic rhinitis	69	(0.7)
Other	369	(3.9)
Eye	1,120	(12.0)
Traumatic injuries and disorders	294	(3.1)
Other ailments and illnesses	826	(8.8)
Nervous system and sense organs, except the eye	860	(9.2)
Headache, including migraine	761	(8.1)
Ear	59	(0.6)
Other	40	(0.4)
Digestive	481	(5.1)
Gastric and esophageal complaints[b]	271	(2.9)
Toothache, other dental, jaw pain	80	(0.9)
Diarrhea	52	(0.6)
Nausea and vomiting	30	(0.3)
Other	48	(0.5)
Skin	467	(5.0)
Dermatitis	139	(1.5)
Infections	114	(1.2)
Chapped, dry skin	61	(0.7)
Chafed/irritated skin	21	(0.2)
Other	132	(1.4)
Psychological stress	78	(0.8)
Other injury or illness	696	(7.4)
Not classifiable as an injury or illness	920	(9.8)
Total	9,349	(100.0)

Perritt © 2005 Prehospital and Disaster Medicine

Table 2—Distributions by the nature of injury or illness among World Trade Center United States Public Health Service patients, 14 September–20 November 2001 (*Percentages may not sum to percentage totals due to rounding; [a]Nasal and sinus congestion, rhinitis, irritation, epistaxis, pharyngitis, laryngitis; [b]Gastroesophageal reflux disease, heartburn, acid reflux, indigestion, upset stomach, stomach or abdominal pain/discomfort, gastritis)



Perritt © 2005 Prehospital and Disaster Medicine

Figure 1—Daily number of World Trade Center United States Public Health Service stations in operation and daily patient visits, 14 September-20 November 2001 (*United States Public Health Service; **Short week consisting of five days)

gory, acute respiratory infections, which included the common cold, made up the largest proportion, comprising 5% of all visits during the first four weeks and 12% of all visits during the last four weeks. Second, the broad category of "symptoms, signs, and ill-defined conditions" accounted for a larger proportion of all visits during the first four weeks (34%) than during the last four weeks (22%). Third, complaints that were not classifiable as an injury or illness, mainly requests for supplies, comprised 12% of visits during the first four weeks and <1% during the last four weeks.

Distributions by frequencies of the nature of injury or illness codes among the 9,349 USPHS visits are listed in Table 2. Traumatic injuries and disorders other than those involving the eye were the most common, accounting for more than one-quarter of the complaints (n = 2,716; 29%). Two hundred, fifty-three of these visits (9%) were for burns, 107 (42%) of which were due to accidents while using blowtorches, welding, or soldering equipment. Respiratory problems was the second most common category (n = 2,011; 22%). Of these, acute respiratory infections and upper respiratory complaints were the most frequent, accounting for 1,278 (64%) of all respiratory complaints. Eye problems, including irritation, dryness, and dust or foreign body in the eye, were the third most frequent complaints (n = 1,120; 12%). Slightly more than one-quarter of the eye complaints (n = 294; 26%) were classified as traumatic injuries, of which 162 (55%) were attributable to a foreign body in the eye.

A total of 920 (10%) visits could not be classified using the OIICS codes (Table 2). Of these visits, 45 (4.9%) had too little information to reliably code. The remaining 875 (95%) were for the following: PPE, such as respirators, eye protection, hard hats, gloves, and earplugs (n = 440; 50%); supplies, such as shampoo, toothbrush, cleansers, sunscreen, clothing, flashlights, batteries, blankets, and water (n = 285; 33%); wellness check-ups, such as blood pressure, glucose, and tuberculosis tests (n = 49; 6%); counseling/support (n = 40; 5%); preventive tetanus vaccinations with no mention of an injury (n = 29; 3%); suture removal (n = 17; 2%); requests for vitamins or a prescription refill (n = 13; 1%); and care of search and rescue dogs (n = 2; <1%).

The distributions of the 3,010 traumatic injuries (including those to the eye) by affected body part indicated that more than two-thirds were to the lower or upper extremities (n = 2,127; 71%). Of the injuries to the extremities, almost three-quarters involved the hands and feet (n = 1,554; 73%). About half of all the traumatic injuries were due to surface wounds, such as abrasions or bruises (n = 946; 31%), and open wounds, such as cuts, lacerations, and punctures (n = 622; 21%).

Discussion

The relative accessibility of the USPHS stations and the willingness of staff to treat both minor and serious ailments may be factors that encouraged patients preferentially to seek treatment at the USPHS stations. Furthermore, it has been suggested that Fire Department of New York City rescue workers under-reported minor injuries to their management in order to remain on the job at the WTC site;[14] if so, these workers, and others in similar situations, may have sought treatment at USPHS stations where they could remain anonymous.

Other factors likely contributed to the relatively high number of USPHS visits classified in the lowest severity category. If the more severe injuries and illnesses were sustained in the first few days following the attacks, then the fact that USPHS stations did not become operational until the fourth day may have increased the proportion of minor complaints treated. Two other potential factors could be that those with more serious conditions sought treatment elsewhere and, as the response effort became prolonged, those with minor medical complaints or other non-urgent needs became aware of and took advantage of USPHS services.

Since sharp declines in the number of visits over time did not directly coincide with reductions in operating USPHS stations, other factors, such as improved conditions and/or fewer individuals on-site, must have contributed to the declines in the number of visits. Also, it was not surprising, given the time of year (late fall and early winter), that the subcategory of acute respiratory infections, which included the common cold, showed a temporal increase in the proportion of visits.

Findings from evaluations of the data from the NYC-DOH Form, the companion form completed concurrently with the USPHS form, were published by Berríos-Torres *et al*.[15] In comparing the Berríos-Torres *et al* study to this report, the primary difference is the number of patient records reviewed for the similar four-week period of 14 September through 11 October 2001 (6,732 vs. 4,623 for Berríos-Torres *et al*). This difference is due to the Berríos-Torres *et al* study's focus on rescue workers, which indicates that their study excluded approximately a third (n = 2,109) of the total USPHS patients during that time period. Additional comparisons, though complicated by a different scope and reference period, are informative. In general, findings from the two companion data sets are similar. For example, the majority of patients were male (78% vs. 89% for Berríos-Torres *et al*); the mean patient age was 39 years; the majority of USPHS visits were classified in the lowest category of severity (67% vs. 61% Berríos-Torres *et al*); and the three leading complaints were traumatic injuries (generally recorded as musculoskeletal conditions in Berríos-Torres *et al*), respiratory ailments, and eye conditions. These similarities indicate that, although the frequency of USPHS visits declined over time, the general distributions found during the first four intense weeks of rescue and recovery operations were similar to those found throughout the 10-week USPHS station deployment. Furthermore, it appears that the general demographic and treatment characteristics for the subset of WTC rescue worker patients were similar to those for all USPHS patients.

A comparison between the distributions of traumatic injuries among WTC-USPHS patients and rescuers in another domestic terrorist event, the Oklahoma City bombing, shows both similarities and differences.[16] For example, the percentage of burns and fractures were similar, but a higher percentage of traumatic injuries among Oklahoma City rescue workers were due to strains/sprains

(injuries to muscles, tendons, ligaments, and joints) (7% vs. 21% for Oklahoma City) and foreign bodies in the eye (5% vs. 15% for Oklahoma City). The USPHS patients had a higher percentage (42%) of cuts, lacerations, abrasions, contusions, punctures, and crushes than did the Oklahoma City rescuers (27%). These comparisons should be viewed with caution given that Dellinger *et al* concentrated on Oklahoma City rescue workers, while this report covers all USPHS patients, approximately a third of whom were not rescue workers. Direct comparisons between these two studies are further complicated by differences in the coding scheme, the magnitude of the damage, and the nature and length of the on-site response.

Other studies have reported respiratory[2,9,13,15,17–23] and eye[13,15,18,19,24] ailments among workers and residents at or near the WTC site. In addition, the fine particulate matter released during the collapse has been reported to cause respiratory tract hyper-responsiveness in mice.[25] Consistent with this, respiratory and eye ailments comprised the second and third most common complaints among WTC-USPHS patients.

The psychological impact of this terrible event undoubtedly was high.[2,9,14,18,19,26] Although mental health experts were available at USPHS stations, relatively few of the patients were treated for emotional needs. It is not known whether those who were in need went without treatment, experienced a delay in the onset of symptoms, or sought treatment elsewhere—mental health services were available to WTC responders through the USNS Comfort[27] and the American Red Cross facilities,[28] and other special arrangements for mental health treatment were made for the local population.[9,19]

A number of investigators have suggested a connection between disasters and an increase in hypertension and cardiovascular disease due to stress.[29–36] Without a comparison group and additional information, it was difficult to determine whether the requests for blood pressure monitoring and the diagnoses of hypertension, ischemic heart disease, and stroke among WTC-USPHS patients, many of whom were classified as moderate or highly severe cases and/or were transferred to a hospital, were part of this phenomenon, but further investigation into the possibility of these effects will be of value.

Limitations

The primary limitation to this study relates to data quality issues, specifically missing information and illegible entries. Patients and USPHS staff often did not complete the demographic fields on the treatment forms. Even if the form was completed, the handwriting often was illegible. This situation was probably inevitable given the time pressures in providing care to a large number of patients under disaster circumstances. However, this missing information greatly hampered our ability to reliably code and report on the injuries and illnesses experienced. Also, since patients could choose to remain anonymous, multiple visits by the same individual patient could not be identified and the course of a particular ailment over multiple visits could not be tracked. Furthermore, although the USPHS form was not designed to collect detailed information on the circumstances surrounding an injury or illness, such information would have enabled identification of contributing factors.

Another limitation was the lack of information on a patient's occupation, industry, or work activity. In fact, it was impossible to distinguish between USPHS patients who were WTC site workers from those who were nearby residents or other members of the public. Even if such a distinction was possible, without a daily census of WTC site workers, it was not possible to: (1) generate occupational injury or illness rates; or (2) determine whether declines in the number of USPHS visits over time were due to an improvement in working conditions and/or to fewer workers on the site.

Conclusions

The USPHS visits were probably skewed to milder complaints as compared to hospital cases or ailments reported to employer medical departments; however, given the close proximity of the stations to the damage, analyses of the USPHS visits do provide a more complete picture of the safety and health impact on those who were at or near the WTC site. This is true especially for milder, although still significant, respiratory, eye, headache, gastroesophageal, and traumatic injury complaints. Emergency planners may be able to use this information from the WTC tragedy as they prepare for future events.

References

1. Spadafora R: Firefighter safety and health issues at the World Trade Center site. *Am J Ind Med* 2002;42:532–538.
2. Levin S, Herbert R, Skloot G, *et al*: Health effects of World Trade Center site workers. *Am J Ind Med* 2002;42:545–547.
3. Lioy PJ, Weisel CP, Millette JR, *et al*: Characterization of the dust/smoke aerosol that settled east of the World Trade Center (WTC) in lower Manhattan after the collapse of the WTC 11 September 2001. *Environ Health Perspect* 2002;110:703–714.
4. McGee JK, Chen LC, Cohen MD, *et al*: Chemical analysis of World Trade Center fine particulate matter for use in toxicologic assessment. *Environ Health Perspect* 2003;111:972–980.
5. Offenberg JH, Eisenreich SJ, Chen LC, *et al*: Persistent organic pollutants in the dusts that settled across lower Manhattan after September 11, 2001. *Environ Sci Technol* 2003;37:502–508.
6. Centers for Disease Control and Prevention: Occupational exposures to air contaminants at the World Trade Center disaster site—New York, September–October, 2001. *MMWR* 2002;51:453–456.
7. Wallingford KM, Snyder EM: Occupational exposures during the World Trade Center disaster response. *Toxicol Ind Health* 2001;17:247–253.
8. Centers for Disease Control and Prevention: Potential exposures to airborne and settled surface dust in residential areas of lower Manhattan following the collapse of the World Trade Center—New York City, 04 November–11 December 2001. *MMWR* 2003;52:131–136.
9. Holtz TH, Leighton J, Balter S, *et al*: The public health response to the World Trade Center disaster. In: Levy BS, Sidel VW, (eds): *Terrorism and Public Health: A Balanced Approach to Strengthening Systems and Protecting People*. New York: Oxford University Press, 2003, pp 19–48.

10. Occupational Safety and Health Administration: Chao launches partnership to protect WTC site workers. OSHA National News Release. 20 November 2001. Available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=NEWS_RELEASES&p_id=35. Accessed 12 October 2003.
11. Department of Health and Human Services: US Public Health Service Office of Emergency Preparedness Emergency Operations Center—situation reports #1-#74 (SITREPs). Available at http://ndms.dhhs.gov/activations/Terror_Events_SEP2001/terror_events_sep2001.html. Accessed 13 October 2003.
12. US Public Health Service Disaster Medical Assistance Team (PHS-1 DMAT) website. Available at http://oep.osophs.dhhs.gov/dmat/. Accessed 08 October 2003.
13. Bureau of Labor Statistics: Occupational Injury and Illness Classification Manual. December 1992. Available at http://www.bls.gov/iif/oshoiics.htm. Accessed 03 June 2003.
14. Centers for Disease Control and Prevention: Injuries and illnesses among New York City Fire Department rescue workers after responding to the World Trade Center attacks. *MMWR* 2002;51 (Special issue):1–5.
15. Berríos-Torres SI, Greenko JA, Phillips M, *et al*: World Trade Center rescue worker injury and illness surveillance, New York, 2001. *Am J Prev Med* 2003;25:79–87.
16. Dellinger AM, Waxweiler RJ, Mallonee S: Injuries to rescue workers following the Oklahoma City bombing. *Am J Ind Med* 1997;31:727–732.
17. Centers for Disease Control and Prevention: Self-reported increase in asthma severity after the September 11 attacks on the World Trade Center—Manhattan, New York, 2001. *MMWR* 2002;51:781–784.
18. Centers for Disease Control and Prevention: Impact of September 11 attacks on workers in the vicinity of the World Trade Center—New York City. *MMWR* 2002;51 (Special issue):8–10.
19. Centers for Disease Control and Prevention: Community needs assessment of lower Manhattan residents following the World Trade Center attacks—Manhattan, New York City, 2001. *MMWR* 2002;51 (Special issue):10–13.
20. Banauch GI, Alleyne D, Sanchez R, *et al*: Persistent hyperreactivity and reactive airway dysfunction in firefighters at the World Trade Center. *Am J Respir Crit Care Med* 2003;168:54–62.
21. Malievskaya E, Rosenberg N, Markowitz S: Assessing the health of immigrant workers near ground zero: Preliminary results of the World Trade Center Day Laborer Medical Monitoring Project. *Am J Ind Med* 2002; 42:548–549.
22. Prezant DJ, Weiden M, Banauch GI, *et al*: Cough and bronchial responsiveness in firefighters at the World Trade Center site. *N Engl J Med* 2002; 347:806–815.
23. Rom WN, Weiden M, Garcia R, *et al*: Acute eosinophilic pneumonia in a New York City firefighter exposed to World Trade Center dust. *Am J Respir Crit Care Med* 2002;166:797–800.
24. Kurup SK, Que ET, Kauffmann Jokl DH: The World Trade Center disaster: A brief on-site report from ground zero. *Arch Ophthalmol* 2002;120: 395–396.
25. Gavett SH, Haykal-Coates N, Highfill JW, *et al*: World Trade Center fine particulate matter causes respiratory tract hyperresponsiveness in mice. *Environ Health Perspect* 2003;111:981–991.
26. Schuster MA, Stein BD, Jaycox LH, *et al:* A national survey of stress reactions after the September 11, 2001 terrorist attacks. *N Engl J Med* 2001; 345:1507–1512.
27. National Naval Medical Center: Service during Sept. 11: Comfort receives humanitarian medal for NYC mission. The Journal. August 21, 2003. Available at http://www.dcmilitary.com/navy/journal/8_33/local_news/24728-1.html. Accessed 25 May 2004.
28. American Red Cross: Red Cross nurses treat an injured city. In the News. 27 September 2001. Available at http://www.redcross.org/news/ds/0109wtc/010927nurses.html. Accessed 25 May 2004.
29. Clayer JR, Bookless-Pratz C, Harris RL: Some health consequences of a natural disaster. *Med J Australia* 1985;143:182–184.
30. Kario K, Matsuo T, Shimada K, Pickering TG: Factors associated with the occurrence and magnitude of earthquake-induced increases in blood pressure. *Am J Med* 2001;111:379–384.
31. Kario K, McEwen BS, Pickering TG: Disasters and the heart: A review of the effects of earthquake-induced stress on cardiovascular disease. *Hypertens Res* 2003;26:355–367.
32. Lipsky SI, Pickering TG, Gerin W: World Trade Center disaster effect on blood pressure. *Blood Press Monit* 2002;7:249.
33. Logue JN, Hansen H: A case-control study of hypertensive women in a post-disaster community: Wyoming Valley, Pennsylvania. *J Human Stress* 1980;6:28–34.
34. Minami J, Kawano Y, Ishimitsu T, *et al*: Effect of the Hanshin-Awaji earthquake on home blood pressure in patients with essential hypertension. *Am J Hypertens* 1997;10:222–225.
35. Pickering TG: Terror strikes the heart—September 11, 2001. *J Clin Hypertens* 2002;4:58–60.
36. Stalnikowicz R: Acute psychosocial stress and cardiovascular events. *Am J Emerg Med* 2002;20:488–491.