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special efforts are made to accurately identify the areas unreached by routine vaccination services. This experience emphasizes the need to develop the infrastructure necessary to provide routine vaccination services to these hard-to-reach communities. Third, surveillance must be strengthened as a critical component of accelerated measles control. Improved surveillance is necessary to evaluate the impact of strategies and to monitor the prevalence of susceptible persons in a population. When countries progress from measles-control to measles-elimination activities, surveillance must be sufficiently sensitive to rapidly detect importations of virus. As measles control accelerates and measles-elimination efforts are implemented, the diagnosis of measles will increasingly rely on laboratory confirmation. The establishment of a global measles laboratory network is essential for countries in the outbreak-prevention or measles-elimination stage.

Activities are ongoing to better estimate the global disease burden of measles, the cost and effectiveness of different control and elimination strategies, the interaction between measles elimination and polio eradication, and the benefits of measles eradication for development of health systems. However, these activities should not delay more immediate efforts to reduce the substantial disease burden caused by measles.

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Chronic Interstitial Lung Disease in Nylon Flocking Industry Workers — Rhode Island, 1992–1996

Interstitial lung disease (ILD) occurs infrequently; some cases are attributed to sarcoidosis, pulmonary hemorrhage syndromes, connective tissue diseases, hypersensitivity pneumonitis, drugs, radiation, and mineral dusts (e.g., silica or asbestos). However, most cases of ILD are of uncertain classification or etiology (*1*). This report describes preliminary findings of the investigation in Rhode Island of an outbreak of ILD among workers involved in the manufacture of finely cut nylon (flock) and flocked

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fabric (used for upholstery, clothing, and automobiles); the findings provide evidence of a newly recognized occupational illness.

Description of Index Cases

In November 1994, a 35-year-old textile worker was referred to a university-based occupational health clinic for evaluation of chronic ILD. No workplace exposures were initially identified as causing his illness, and during the following 12 months, he recovered almost completely while remaining out of work and receiving systemic corticosteroids. In January 1996, a 28-year-old man was referred to the clinic for evaluation of biopsy-confirmed ILD, characterized by bronchiolocentric nodular and diffuse interstitial lymphoid infiltrates and mild interstitial fibrosis that met histologic criteria for nonspecific interstitial pneumonia (NSIP) (*2*). Both men worked at the same nylon flocking plant in Rhode Island; further inquiry revealed that at the company's plant in Canada, five cases of ILD had been diagnosed during 1990–1991 (*3*), and two cases had been diagnosed in 1995. In March 1996, at the request of the company and with the cooperation of the workers' union, investigations were undertaken by the Brown University Program in Occupational Medicine and CDC's National Institute for Occupational Safety and Health (NIOSH).

Medical/Epidemiologic Investigation

To identify additional ILD cases among current production workers (n=127) at the Rhode Island plant, all employees with persistent respiratory symptoms were encouraged to undergo full pulmonary function testing, chest radiography, and high resolution computerized chest tomography (HRCT). Those with unexplained restrictive lung function, impaired diffusing capacity, or HRCT findings consistent with ILD were referred for transbronchial or wedge biopsy. A single pulmonary pathologist reviewed all specimens as well as those of the five case-patients in Canada who had biopsies. A case of "flock-worker's lung" was defined as 1) a histologic diagnosis of NSIP (*2*) characterized by bronchiolocentric nodular and diffuse interstitial lymphoid infiltrates and nonuniform alveolar filling by macrophages, with or without interstitial fibrosis; 2) other histologic manifestations of ILD not attributable to another disease; or 3) in the absence of a tissue specimen, a grossly abnormal distribution of cell types on bronchoalveolar lavage (BAL) with restrictive lung function and HRCT findings of either diffuse ground glass opacity or micronodularity.

The study cohort included all current and former production workers employed at the Rhode Island facility on or after June 15, 1990, and who had worked for ≥18 months before September 15, 1996 (n=165).* After working 18 months, cohort members contributed person-years at risk for time subsequently worked from June 15, 1990, through September 15, 1996. General population estimates for age- and sex-specific incidence of pulmonary fibrosis/idiopathic pulmonary fibrosis (PF/IPF) and for sex-specific incidence of all ILD were obtained from an ILD registry for Bernalillo County, New Mexico (*1*)†; using these estimates and weights based on the demo-

*The company's recordkeeping system precluded formation of a larger cohort and necessitated the 18-month employment requirement.

†These data from Bernalillo County represent the only available estimates of background incidence of ILD cases. For the category of "all ILD," only sex-specific rates are available.

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graphics of the study cohort, standardized incidence ratios for PF/IPF[§] and for all ILD were calculated. Ninety-five percent confidence intervals (CIs) for these estimates were derived by exact Poisson calculations.

Among the 165 members of the cohort, seven (4%) were identified with "flock-worker's lung." The mean age for these seven was 41 years (range: 28–57 years); six were men. Two were current smokers, four had discontinued smoking ≥18 months before diagnosis, and one had never smoked. ILD had been diagnosed in these persons in 1992 (one), October 1994 (one), December 1995 (one), and April–September 1996 (four). The median latencies from time of hire to onset of symptoms (gradually progressive dry cough and dyspnea) and from onset of symptoms to time of diagnosis were 6 years (range: 9 months–31 years) and 1 year (range: 4 months–4 years), respectively. Two workers reported worsening symptoms while at work, but no job category or department was associated with illness. Serologic test results (rheumatoid factor, antinuclear antibody, and hypersensitivity pneumonitis precipitins) were normal except for nondiagnostic findings in two workers. Case-patients experienced symptomatic, radiographic, and functional improvement within weeks to months of leaving work; two received corticosteroids, one remained dependent on supplemental oxygen for an additional 3 years, and none have recovered completely.

Tissue obtained from transbronchial (n=2) and wedge (n=4) biopsies demonstrated NSIP in five patients and bronchiolitis obliterans organizing pneumonia (BOOP) in the sixth. All six had nodular lymphoid infiltrates; four had germinal centers. The seventh case was diagnosed based on a BAL finding of 40% eosinophils, moderate restrictive lung function, and grossly abnormal HRCT. All of the biopsies from the five case-patients in Canada revealed NSIP; two also showed dominant areas of diffuse alveolar damage, and three revealed lymphoid nodules with germinal centers. No granulomas (suggesting hypersensitivity pneumonitis) or birefringent particles (suggesting certain pneumoconioses) were observed in any of the histologic specimens.

At the Rhode Island plant, the crude incidences of "flock-worker's lung" and of all ILD (including two cases of talcosis and one case of pulmonary histiocytosis X) were 10.5 cases per 1000 person-years and 15 cases per 1000 person-years, respectively. The standardized incidence ratios for PF/IPF and for all ILD were 258 (95% CI=104–530) and 48 (95% CI=23–88), respectively.

Environmental Investigation

In flock manufacture, nylon thread previously impregnated with a titanium dioxide delusterant is dyed, coated (with a finish consisting of tannic acid, an ammonium ether of potato starch, and fatty alcohol derivatives), cut, dried, and bagged. Flocked fabric is made by using the flock's electrostatic charge to place the flock on acrylic adhesive-covered cotton-polyester fabric, which is then heat-cured. Exposures generic to the industry include bioaerosols, nylon fiber ≥12 μ in diameter, a finishing agent, acrylic adhesive, nonfibrous zeolite, heat transfer oil, and thermal degradation products. Preliminary air sampling at the Rhode Island plant, collected volumetrically, revealed extremely high short-term total dust concentrations (up to 83 mg/m^3), only modest concentrations of fungal spores and endotoxin, low levels of volatile organic

[§] Background rates of PF/IPF were used to derive the standardized incidence ratio because cases of "flock-worker's lung" probably would have been relegated to this broader ILD subcategory had the apparently specific clinicopathologic picture and occupational association been overlooked.

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compounds, and negligible concentrations of metals. Respirable dust, characterized by both phase contrast microscopy and scanning electron microscopy with energy dispersive x-ray analysis, consisted of particles with physical structure and chemical composition similar to those of bulk samples of the finish components; a substantial number of respirable-size fragments of nylon also were present.

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Editorial Note: The findings in this report document an excessive incidence at two North American nylon flock production/flocking plants of a chronic diffuse ILD. The clinical and pathologic features of "flock-worker's lung" lack characteristics typically associated with previously recognized forms of occupational ILD (including hypersensitivity pneumonitis; pneumoconioses like silicosis or asbestosis; and those cases of BOOP that have followed acute massive exposure to a toxic gas, fume, or vapor) and indicate the occurrence of a previously unrecognized occupational illness.

The cause of the illness described in this report remains unknown. Although investigators of the ILD outbreak in Canada postulated an etiologic role for mycotoxins (*3*), no mycotoxins were detected at that plant, and two new cases of ILD occurred there after interventions were introduced to minimize mold growth; in addition, mycotoxin exposure has not been shown to cause chronic diffuse ILD. The findings in this report indicate a potential role for nylon flock and its finish in causing illness. Although intact nylon flock fibers are not considered respirable (i.e., they are too large to reach the respiratory bronchioles and gas-exchange units of the lung), preliminary evidence suggests that respirable-size nylon fragments are generated in this industry. This finding may have important implications because nylon is a polyamide, as are the agents recently implicated (*4*) in outbreaks of fatal BOOP among textile-dye sprayers in Spain and Algeria (*5,6*); furthermore, the biopsy specimens from one case-patient in Rhode Island revealed BOOP, and the index case-patient who did not have a biopsy had clinical findings that strongly suggested BOOP. Although the limited toxicologic data available for nylon and the three-component finish suggest the possibility that these substances may have adverse pulmonary effects (*7–9*), their role, if any, in causing "flock-worker's lung" has not been determined.

The two clusters described in this report together constitute the largest unexplained continuing outbreak of nongranulomatous chronic diffuse ILD in adults under investigation by CDC. Aspects of the illnesses of particular concern are the frequently subtle clinical, pulmonary function, and radiographic abnormalities; the potential for rapid clinical progression; and the apparent lack of complete reversibility. Until the specific cause of the outbreak is identified and eliminated, employers should ensure that work practices, engineering controls, and respirators are used to reduce respiratory exposures within the industry. Medical screening and surveillance should be intensified, and removal from exposure through alternative work or other accommodation should be offered to affected employees. CDC has initiated a series of toxicologic studies and is considering additional epidemiologic investigation within the flocking industry. Information concerning additional cases of ILD among workers employed in this industry can be reported to CDC's Epidemiological Investigations Branch, Division of Respiratory Disease Studies, NIOSH, telephone (304) 285-5751.

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Notice to Readers

National Fire Prevention Week — October 5–11, 1997

October 5–11 is National Fire Prevention Week. In the United States, a national health objective for 2000 is to reduce residential fire-related deaths to no more than 1.2 per 100,000 persons (objective 9.6) (*1*). In 1995, the United States had the highest death rate from fires of all developed countries (1.7 per 100,000 persons). During 1995 (the most recent year for which data are available), residential fires accounted for 3640 deaths and 18,650 injuries (*2*; CDC, unpublished data, 1995). Persons at highest risk were less likely to reside in homes equipped with functional smoke detector units (e.g., residents of manufactured homes and rental properties, low income and elderly persons, and children aged <5 years).

Most residential fires are caused by cooking or heating equipment, spontaneous combustion, or conditions suggesting arson. However, residential fires in which a death occurs are often caused by smoking, heating equipment, or conditions suggesting arson. Rates for fire-related death are highest in southern states, where use of wood-burning stoves and portable space heaters is widespread. In addition, these devices often are improperly placed and/or left unattended.

Although equipping homes with smoke detectors and adhering to basic fire-safety practices are the best deterrents to residential fires, many persons do not take these precautions. In 1995, an estimated 93% of U.S. homes were equipped with a smoke detector, but only 74% of homes had a smoke detector unit that was functional (*3,4*). The annual number of residential fire-related deaths could be reduced if all homes were equipped with sufficient functional smoke detector units.

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

September 26, 1997 / Vol. 46 / No. 38

MMWR™
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Gonorrhea Among Men Who Have Sex with Men — Selected Sexually Transmitted Diseases Clinics, 1993–1996

Among men who have sex with men (MSM), gonorrhea trends may reflect changes in sexual behaviors that also influence risk for human immunodeficiency virus (HIV) infection (*1*). Data from the Gonococcal Isolate Surveillance Project (GISP) were used to assess trends in gonococcal infection (GC) among MSM. For the subset of GISP sites where a substantial proportion of GC cases were in MSM, a special survey of the local areas was conducted to describe factors associated with GC in MSM. This report summarizes the results of that survey, which indicate that the number and proportion of MSM diagnosed with GC has increased in the sexually transmitted diseases (STD) clinics of several large cities in the United States.

GISP is a sentinel surveillance project begun in 1987 to monitor antimicrobial resistance in *Neisseria gonorrhoeae*. Through GISP, STD clinics in 26 U.S. cities collect gonococcal isolates and clinical information, including sexual orientation, from the first 20 male patients with urethral GC examined each month. The sexual orientation of GISP participants examined from 1993 through 1996 was analyzed, and surveys were conducted of the clinics where >5% of GISP isolates over the 4-year period were from MSM (n=8)*. The survey collected information from locally available data about absolute numbers of GC cases in MSM, in contrast to the proportions that were available from GISP data. The survey also addressed overall gonorrhea and other STD (i.e., nongonococcal urethritis [NGU]) trends and factors that could be associated with GC trends in MSM (i.e., changes in clinic practices, geographic clustering of cases, sexual risk behaviors, illicit drug use, and HIV serostatus).

MSM comprised 5.0% of all cases in the GISP sample in 1993, a proportion similar to preceding years, and 8.7% in 1996 ($p<0.001$). Among the subset of eight GISP clinics where >5% of isolates were obtained from MSM, the proportion increased from 12.0% (range: 4.2%–35.1%) in 1993 to 23.5% (range: 7.2%–57.1%) in 1996 ($p<0.001$) (Figure 1). The median age of MSM reported from all 26 clinics was 30 years and remained stable from 1993 through 1996. Changes in the race/ethnicity distribution were not statistically significant: from 1993 to 1996, the percentage of MSM who were

*Clinics were located in Denver; Honolulu; Long Beach, Orange County, San Diego, and San Francisco, California; Portland, Oregon; and Seattle, Washington.