NIOSH HEALTH HAZARD EVALUATION REPORT:

HETA #2002-0218-2881
Jergens Road Adult Services Center
Dayton, Ohio

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DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

PREFACE

The Hazard Evaluations and Technical Assistance Branch (HETAB) of the National Institute for Occupational Safety and Health (NIOSH) conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health (OSHA) Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

HETAB also provides, upon request, technical and consultative assistance to federal, state, and local agencies; labor; industry; and other groups or individuals to control occupational health hazards and to prevent related trauma and disease. Mention of company names or products does not constitute endorsement by NIOSH.

ACKNOWLEDGMENTS AND AVAILABILITY OF REPORT

This report was prepared by Steve Lenhart of the Industry Wide Studies Branch and Doug Trout of HETAB, Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS). Desktop publishing was performed by David Butler. Review and preparation for printing were performed by Penny Arthur.

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Highlights of the NIOSH Health Hazard Evaluation Jergens Road Adult Services Center Dayton, Ohio

Evaluation of Job Stress, Infectious Diseases, Gloves, Indoor Environmental Quality, and Cancer

NIOSH received a confidential employee request concerning job stress caused by behaviors of some consumers, policies of the Montgomery County Board of Mental Retardation and Developmental Disabilities (Montgomery County MRDD) concerning employee exposures to blood and other potentially infectious materials, disposable gloves that seemed to tear too often, a feeling that the building's heating, ventilation, and air conditioning (HVAC) systems were not working correctly, and reports that some people who had worked in the building have cancer.

What NIOSH Did

- Asked employees about their health and safety concerns.
- Reviewed Montgomery County MRDD's communicable diseases procedures.
- Toured the Jergens Center.
- Measured ventilation and comfort indicators.

What NIOSH Found

- Employees are bitten and scratched by some consumers.
- Montgomery County MRDD may view incorrectly that only nurses have exposure risks to potentially infectious materials.
- The HVAC system for rooms 103 and 107 may be working improperly or not supplying enough outside air.
- Different gloves have been ordered.

What Jergens Center Managers Can Do

- Evaluate employees' views on job stress by consulting with experts.
- Get employees training on adaptive coping strategies (to try to handle stressful situations better).
- Montgomery County MRDD should revise its policy on who has exposure risks to potentially infectious materials.
- Further evaluate the HVAC system serving rooms 103 and 107.

What the Jergens Center Employees Can Do

- Participate in management organized group discussions on job stress.
- Learn and use adaptive coping-strategies (ways to handle stressful situations).
- Report tearing or other problems with disposable gloves to mangers.

What To Do For More Information:

We encourage you to read the full report. If you would like a copy, either ask your health and safety representative to make a copy or call (513) 841-4252 and ask for HETA Report 2002-0218-2881

Health Hazard Evaluation Report 2002-0218-2881
Jergens Road Adult Services Center
Dayton, Ohio
October 2002

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SUMMARY

NIOSH received a confidential request for a health hazard evaluation (HHE) from an employee of the Jergens Road Adult Services Center in Dayton, Ohio. The facility is a developmental center where 200 people with developmental disabilities (consumers) receive habilitation services (e.g., feeding, personal care and hygiene, and communication and prevocational training). The Montgomery County Board of Mental Retardation and Developmental Disabilities (Montgomery County MRDD) operates the Jergens Center.

NIOSH investigators evaluated five issues in response to the HHE request—job stress, infectious diseases, disposable gloves, indoor environmental quality, and cancer. The challenging behaviors (e.g., biting and scratching) of some consumers were reported to be job stressors. Montgomery County MRDD's policies concerning employee exposures to blood and other potentially infectious materials were the basis of the infectious diseases concern. Associated with this issue was a concern that the disposable gloves provided to protect staff members from contacting potentially infectious materials seemed to tear too frequently. Another concern was whether heating, ventilation and air conditioning (HVAC) systems were operating correctly. The cancer concern was from unconfirmed reports that people who had worked in the building have cancer.

The activities of the NIOSH investigators included touring the Jergens Center, interviewing employees, reviewing Montgomery County MRDD's written communicable diseases procedures, and assessing the building's indoor environmental quality by measuring temperature, relative humidity, and carbon dioxide throughout the building.

Recommendations provided for improving working conditions at the Jergens Center included the following:

- Management should hire a consultant to evaluate the extent to which employees view job stress as a problem.
- Employees should be trained by a consultant experienced in the use of adaptive coping strategies to reduce stress associated with providing services to people with developmental disabilities.
- Montgomery County MRDD should revise its policy regarding the job classifications deemed to have risks of exposure to blood or other potentially infectious materials.
- Management should seek feedback from employees concerning the frequency with which gloves tear.
- The performance of the HVAC system serving rooms 103 and 107 should be further evaluated.

Keywords: SIC Code: 8331 (Job Training and Vocational Rehabilitation Services). Bites, bloodborne pathogens, cancer, developmental disabilities, disposable gloves, habilitation services, indoor environmental quality, infectious diseases, job stress, mental retardation.

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INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) received a confidential request for a health hazard evaluation (HHE) on April 8, 2002, from an employee of the Jergens Road Adult Services Center. The facility is a developmental center where approximately 200 people with developmental disabilities (consumers) receive habilitation services (e.g., feeding, personal care and hygiene, and communication and prevocational training). Most of the consumers receiving services have moderate or severe mental disabilities. The Jergens Center is one of three developmental centers operated by the Montgomery County Board of Mental Retardation and Developmental Disabilities (Montgomery County MRDD).

A medical officer and an industrial hygienist from NIOSH visited the Jergens Center on June 25, 2002, and evaluated five issues in response to the health hazard evaluation request—job stress, infectious diseases, disposable gloves, indoor environmental quality, and cancer. This report presents the findings, conclusions, and recommendations of their evaluation.

BACKGROUND

The Jergens Center is a one-story, brick building located in an industrial park north of downtown Dayton, Ohio. The building was purchased in 1984 by Montgomery County MRDD, and after extensive renovations were made, the building was reopened in 1986 as a developmental center. The Jergens Center consists of 20 classrooms, 12 restrooms, 2 shower rooms, offices, a staff lounge, a production area, a cafeteria, and a multi-purpose area. The building is heated and cooled by 14 heating, ventilation and air conditioning (HVAC) systems located on the roof. The facility has a staff of 58 employees— 35 program support assistants, 11 program coordinators, 4 administrators, 3 managers, 3 secretaries, a registered nurse, and a behavior-support person.

Information given on the HHE request form and a telephone conversation with the requester provided insight to the five issues of the health hazard evaluation. The requester reported that the challenging behaviors of consumers were a source of job stress at the Jergens Center. Montgomery County MRDD's policies regarding post-exposure evaluation and follow-up of exposure incidents with blood and other potentially infectious materials were the basis of the infectious diseases concern. Associated with this issue was a concern that disposable gloves provided to staff members to protect their hands against contact with blood or other potentially infectious human body fluids seemed to tear too frequently. Additionally, the requester was concerned about the building's indoor environmental quality and questioned whether the HVAC systems were operating correctly. Lastly, the cancer concern was due primarily to unconfirmed reports that people who had worked previously in the building had developed cancer.

METHODS

During an opening meeting with management representatives, the NIOSH investigators described the NIOSH health hazard evaluation program and outlined the activities planned for the site visit. They also distributed copies of a booklet describing the NIOSH health hazard evaluation program,[1] a NIOSH booklet describing methods of preventing the effects of work-related stress,[2] and an article describing issues affecting workers with developmental disabilities.[3] The remainder of the meeting consisted of a discussion of the five issues that prompted the health hazard evaluation.

During the meeting, Jergens Center management provided reports describing the findings of indoor environmental quality evaluations done at the Jergens Center beginning in 1986, and measures taken to improve the building's indoor environmental quality. They also provided a copy of Montgomery County MRDD's communicable diseases procedures.[4] A site walk-through was conducted after the opening meeting.

The NIOSH investigators reported preliminary findings and recommendations during a closing meeting held later in the afternoon. Those attending the opening and closing meetings included the Facility Manager and the Production Supervisor of Jergens Road Adult Services Center, the Facility Manager of Calumet Adult Services Center, the Safety and Workers' Compensation Specialist and the Buildings and Grounds Manager of Montgomery County MRDD, and Montgomery County's Risk Manager.

After the site walk-through, the NIOSH medical officer conducted individual, confidential interviews with five employees. The facility manager selected the employees based on a request of the NIOSH investigators that those asked to participate represent a range of work durations at the Jergens Center. During the interviews, employees were asked how long they had worked at the Jergens Center, their current job duties, and whether they had health and safety concerns.

While the medical officer interviewed employees, the NIOSH industrial hygienist took air measurements of carbon dioxide (measured in parts per million or ppm), temperature (°F), and percent relative humidity at various locations throughout the building. This was done to evaluate the requester's concern about the building's indoor environmental quality. All measurements were taken using a model 8550 Q-Trak™ IAQ portable, hand-held monitor with digital readout (TSI®, Inc., St. Paul, Minnesota).

EVALUATION CRITERIA

Indoor Environmental Quality

Measuring ventilation and comfort indicators is useful for providing information relative to the proper functioning and control of HVAC systems. Carbon dioxide is a normal constituent of exhaled breath and, its measurement can be used as a screening technique to evaluate whether adequate quantities of outdoor air are being introduced into an occupied space. The American Society for Heating, Refrigerating, and Air-Conditioning Engineers' (ASHRAE's) ventilation standard (ASHRAE 62-1999), Ventilation for Acceptable Indoor Air Quality, recommends outdoor air supply rates of 20 cubic feet per minute per person (cfm/person) for office spaces, and 15 cfm/person for reception areas, classrooms, libraries, and auditoriums.[5] Maintaining the recommended ASHRAE outdoor air supply rates when the outdoor air is of good quality, and there are no significant indoor emission sources, should provide for acceptable indoor air quality.

When carbon dioxide measurements are used to indicate the adequacy of the outdoor air supplied to an occupied area, indoor carbon dioxide concentrations are usually higher than the generally constant outside concentrations, which range between 300 ppm and 350 ppm. According to NIOSH, when indoor carbon dioxide concentrations exceed 800 ppm in areas where the only known source is exhaled breath, inadequate ventilation is suspected.[6] According to ASHRAE guidance, "where only dilution ventilation is used to control indoor air quality, an indoor to outdoor differential concentration not greater than 700 ppm of carbon dioxide indicates that comfort (odor) criteria related to human bioeffluents are likely to be satisfied."[5] Elevated carbon dioxide concentrations suggest that other indoor contaminants may also be increased. It is important to note that carbon dioxide is not an effective indicator of ventilation adequacy if the ventilated area is not occupied at its usual level.

Temperature and relative humidity measurements were taken because these parameters affect a person's perception of comfort in an indoor environment. The perception of thermal comfort is related to one's metabolic heat production, the transfer of heat to the environment, physiological adjustments, and body temperature.[7] Heat transfer from the body to the environment is influenced by factors such as temperature, humidity, air movement, personal activities, and clothing. The American National Standards Institute (ANSI)/ASHRAE Standard 55-1992 specifies conditions in which 80 percent or more of the occupants would be expected to find the environment thermally acceptable.[8] Assuming slow air movement and 50 percent relative humidity, the operative

temperatures recommended by ASHRAE range from 68°F to 74°F in the winter, and from 73°F to 79°F in the summer. The difference between the two ranges is due largely to seasonal clothing selection. ASHRAE also recommends that relative humidity be maintained between 30 percent and 60 percent.[8] In addition to being a comfort factor, excessive relative humidity can support the growth of microorganisms, some of which may be pathogenic or allergenic.

RESULTS

Job Stress

During the opening meeting, management representatives said they understood that the aggressive, challenging behaviors (e.g., biting, scratching, and verbal aggression) of some of the consumers and other conditions such as echolalia (repetition or echoing of words) could be sources of job stress at the Jergens Center. However, a management representative offered an opinion that these job stressors were no different from those found in similar settings and suggested that an employee who found the work stressful may not be suited for work with people with developmental disabilities. To address this issue, a review of job-stress literature was done to gain insight to the importance of individual differences (e.g., personality and coping style) and working conditions on the development of job stress, and to understand how they affect work with people with developmental disabilities. The findings of the review are presented in the Discussion and Conclusions section.

Infectious Diseases

A primary concern of the requester was associated with a belief that a source individual's hepatitis B virus (HBV) or human immunodeficiency virus (HIV) status would not be disclosed to an exposed employee following an exposure incident. 29 CFR 1910.1030 (f)(3)(ii)(C) of the Occupational Safety and Health Administration's (OSHA) Bloodborne Pathogen Standard[9] requires the following:

Results of the source individual's testing shall be made available to the exposed employee and the employee shall be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual.

This section of the OSHA standard is addressed in the Montgomery County MRDD's communicable diseases procedures in the following way:

Results of the source individual's testing shall be made available to the exposed staff member, and he/she shall be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual by the medical provider.

A second issue related to HBV, which was not described as in the HHE request but was raised during employee interviews, involved uncertainty concerning which employees were eligible to receive hepatitis B vaccination. Some employees thought that program support assistants, the job classification of staff members who provide direct care to consumers, could not receive vaccination by Montgomery County MRDD. However, a recently hired program support assistant told us that he was offered and had accepted hepatitis B vaccination. Conversely, a long-term program support assistant, who had recently requested vaccination because of his increasing concern of being bitten by a consumer, was told that he could not receive it because he had refused vaccination when he was hired.

29 CFR 1910.1030 (f)(1)(i) and (f)(2)(iii) require the following:

1910.1030 (f)(1)(i): The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident.

1910.1030 (f)(2)(iii): If the employee initially declines hepatitis B vaccination but at a later date while still covered under the standard decides to

accept the vaccination, the employer shall make available hepatitis B vaccination at that time.

These sections of the OSHA standard are addressed in the Montgomery County MRDD's communicable diseases procedures in the following way:

All staff who have been identified as having exposure to blood or other potentially infectious materials will be offered the hepatitis B vaccine, at no cost to the staff. Further, if the staff member initially declines the vaccination, but at a later date decides to accept it, it shall be made available at that time.

Although employees and Jergens Center management agreed that program support assistants had risks of being bitten by consumers, the only job classifications identified in Montgomery County MRDD's Communicable Diseases Procedures as having risks of occupational exposure to blood or other potentially infectious materials were registered and licensed nurses.

Employees of Montgomery County MRDD receive occupational health services from a local occupational health clinic (MedWork). Employees of Jergens Center who have potential occupational exposure to bloodborne pathogens, or who experience any other work-related injury, are cared for by an on-site nurse or the contractor's staff.

Disposable Gloves

During the opening meeting, a management representative said they shared the HHE requester's frustration that nearly two years had been spent trying to find disposable gloves that were resistant to tearing. Jergens Center management appeared committed to solving the problem and was hopeful that a recently purchased supply of disposable gloves made of nitrile rubber would solve the problem.

Indoor Environmental Quality

Measurements of carbon dioxide, temperature, and relative humidity were taken on the south side of the building in the production area and in room 304, and on the north side of the building in the cafeteria and in rooms 103 and 107. With the exception of the cafeteria, all of the areas sampled were occupied by employees and consumers. For comparison purposes, measurements were also taken outside in the front parking lot. The five indoor carbon dioxide measurements were 550 ppm (room 304), 660 ppm (cafeteria), 780 ppm (production area), 980 ppm (room 107), and 1150 ppm (room 103). The air concentration of carbon dioxide measured outside the building was 380 ppm. Temperatures in the building showed little variation and ranged between 71°F and 73°F. The relative humidity measurements also showed little variation and ranged between 60 percent and 64 percent. The outdoor temperature shortly after a brief rain shower was 80°F, and the relative humidity was 88 percent.

Interviewed employees did not raise any health complaints related to indoor environmental quality or cancer. During the opening and closing meetings, although the HVAC systems and indoor environmental quality were discussed in general, no health problems were raised that were thought to be related to indoor environmental quality.

DISCUSSION AND CONCLUSIONS

Job Stress: Literature Review

NIOSH defines job stress as the harmful physical and emotional responses that occur when a job's requirements do not match a worker's capabilities, resources, or needs.[2] Early warning signs of job stress include headache, mood and sleep disturbances, upset stomach, job dissatisfaction, and low morale. Stress has also been suggested to have an important role in several types of chronic health problems—especially cardiovascular disease, musculoskeletal disorders, and mental health problems such as depression and burnout. Most researchers agree that job stress results from the interaction of the worker and the conditions of work.

Although the importance of individual differences such as personality and coping style should not be ignored, NIOSH supports the view that working conditions play a primary role in causing job stress.[2] Working conditions that may affect a person's stress level include the design of tasks (e.g., infrequent breaks, shift work, and heavy workload), management style (e.g., poor communication and lack of worker participation in decision-making), interpersonal relationships (e.g., lack of support or help from coworkers and supervisors), work roles (e.g., conflicting or uncertain job expectations), career concerns (e.g., lack of opportunity for growth or promotion), and environmental conditions (e.g., crowding, commotion, and ergonomic problems).

Only a few studies have been published concerning job stressors of staff working in services for people with developmental disabilities who have challenging behaviors.[10,11,12,13,14] Using an open-ended survey approach, researchers interviewed 21 technicians who cared for people with severe and profound mental retardation residing in a state institution.[10,11] The stressors reported most often did not result from the residents but rather from the technician's inability to control critical aspects of their work. For example, everyone interviewed was frustrated that technicians' experience with the residents was not sought by the hospital's psychologists when preparing residents' behavior programs. Also, all felt strongly that the amount of time spent doing paperwork contributed to their job stress. Eleven technicians (52%) reported assaults by residents as the only aspect of their direct care responsibilities that they considered stressful, not only because they feared injury, but also because they worried that coworkers would not come to their aid.

To expand on the findings of the study described above, researchers administered a written survey to 332 employees of a state hospital and developmental center serving children and adults with severe developmental disabilities or mental illness.[12] The stressors reported most frequently were concerns about under-medicating patients, a lack of materials to satisfactorily conduct treatments, and having little control over administrative decisions. Sixty-one study participants (18 percent) reported that they worried about being a victim of a resident's assault. The authors recommended that job stress may be diminished by organizational strategies that facilitate technicians' roles in decision-making.

The authors of two studies have described the emotional reactions and coping strategies of direct care staff to aggressive behaviors.[13,14] In the first study, 83 direct care staff from 23 community residences for adults with mental retardation in London, England, completed questionnaires.[13] The researchers reported that the coping approaches of the study participants fell into one category containing mainly adaptive or "problem-focused" strategies (e.g., planning, using support from others, and taking action to deal with the challenging behaviors) and two categories containing maladaptive or "emotion-focused" strategies—*disengagement* (e.g., giving up attempts to cope and alcohol and drug use) and *denial* (i.e., denying its importance and use of religious coping behaviors). The author made the following recommendations concerning intervention and training of direct-care staff in mental retardation services related to coping and the emotional reactions of staff members to challenging behaviors:

"Training efforts could beneficially be targeted at reducing staff tendencies to make use of disengagement strategies to cope with challenging behaviors and increase their use of typically adaptive strategies. This could be accomplished by ensuring that staff members receive positive feedback about their interactions with residents and remain engaged with them and, further, by training staff to use more active problem-solving approaches to coping with challenging behavior. Increasing the availability of emotional and instrumental support for staff members may be an additional way of reducing the chances that they will resort to psychologically damaging coping efforts."

In the second coping study, fifty-five teachers and support staff from three schools for children with developmental disabilities completed questionnaires.[14] The study's findings suggested that

using maladaptive strategies to cope with challenging behaviors is associated with an increased risk of burnout, and that this risk is in addition to the risk associated with exposure to challenging behaviors. The authors recommended that staff training or support intervention be developed that reduces staff reliance on maladaptive strategies and encourages the use of adaptive strategies.

Infectious Diseases

Disclosure of a Source Individual's Testing

Montgomery County MRDD's written communicable diseases procedures were in compliance with OSHA's Bloodborne Pathogen standard in that the result of a source individual's testing is expected to be made available to an exposed employee, and the employee is to be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual. However, detailed information concerning how the intent of the OSHA standard should be enacted is not present in Montgomery County's procedures. An example of how this information can be communicated to employees is found in the following excerpt from the procedures of the Southwest Ohio Developmental Center (SODC) in Batavia, Ohio:

Results of the source individual's testing shall be made available to the exposed employee and the licensed health care professional, and the employee shall be informed that further disclosure of this information is in violation of SODC policy and Section 5123.89 of the Ohio Revised Code and can lead to progressive discipline, up to and including removal from employment.[15]

The Southwest Ohio Developmental Center is one of twelve state-operated residential developmental centers in Ohio. The procedures in place for this State facility may not be applicable to Montgomery County MRDD; however, it may be possible to adopt similar language in the Montgomery County procedures.

Risks of Bloodborne Pathogen Transmission

HBV, hepatitis C virus (HCV), and HIV are the bloodborne pathogens most frequently associated with occupational exposures.[16] Factors affecting bloodborne pathogen transmission include the amount of infected fluid, source infectivity, recipient susceptibility, and the site, duration, and dose of exposure.[17] Potential exposures of staff in residential developmental centers have been reported to occur primarily from residents' bites, fingernail scratches, and body fluids, and injury occurring occasionally from sharp instruments. Residents' bites also pose a potential risk of infection to the resident from the staff person who is bitten.[17] The risk of bloodborne pathogen transmission from fingernail scratches has been reported to be minimal because the potential for enough infectious particles to be in dried blood under the nails is believed to be low.[17]

The Centers for Disease Control and Prevention (CDC) estimates that 4 percent of HBV cases are acquired from occupational exposures and recommends pre-exposure vaccination of people at high risk of infection.[18] The CDC recommended that "staff of nonresidential day-care programs (e.g., schools, sheltered workshops for the developmentally disabled) attended by known HBV carriers have a risk of HBV infection comparable to that among healthcare workers and therefore, should be vaccinated." Because the HBV status of consumers may not be readily available to MRDD staff, it is most appropriate to vaccinate all workers who may be at risk of occupational exposure to HBV. Additionally, because of high rates of HBV infection reported among persons with developmental disabilities and their predisposition to the development of chronic HBV infection after exposure, immunization of persons with developmental disabilities has also been recommended.[18,19,20,21]

The risk of HBV transmission to a nonimmune person after an occupational exposure depends on the titer of virions in a contaminant such as blood, saliva, semen, urine, or feces. Although the amount of HBV in many body fluids has not been quantified, and the

titer in saliva and semen is generally 1,000 to 10,000 times lower than the corresponding titer in serum,[16] transmission of HBV from human bites has been reported.[22,23,24,25] Thus, because of the risk of HBV transmission from human bites, CDC guidelines and OSHA regulations for managing occupational exposures to bloodborne pathogens and postexposure prophylaxis should be implemented in developmental centers to protect staff and consumers at risk of being bitten.[9,26]

Saliva may contain HCV, but HCV RNA has not been detected in urine, feces, saliva, vaginal secretions, or semen from patients with chronic HCV infection.[16] Also, although HCV infection is more common among health care workers than the general population, the risk of occupational transmission of HCV appears to be low relative to that of HBV.[16] Immunization and post-exposure prophylaxis are currently unavailable for HCV. HIV only rarely exists in the saliva of infected persons, and when present exists at low levels.[27,28] Although the risk of HIV transmission from a bite appears to be negligible,[17,29] any employee (even those who are vaccinated against HBV) experiencing potential transmission of a bloodborne pathogen should be assessed immediately by an occupational health professional. For all bloodborne pathogens, avoiding exposures through the use of standard precautions is the recommended way to prevent occupational infection.[16]

Disposable Gloves

Disposable (single use) gloves are described simply as "surgical or examination gloves" in OSHA's bloodborne pathogens standard [29 CFR Part 1910.1030(d)(3)(ix)(B)]. *Surgical gloves* are commonly regarded as being sterile, whereas *examination gloves* are regarded usually as being nonsterile.[30,31] Although no specific guidance concerning the selection of appropriate glove materials is given in the standard, the standard's compliance directive includes the following statements: "Studies have shown that gloves provide a barrier, but that neither vinyl nor latex procedure gloves are completely impermeable. Thus, hand washing after glove removal is required."[32] The directive also includes a statement that plastic film food handling gloves ("cafeteria" or "baggie" gloves) are not appropriate for exposure-related tasks because they have poor fitting characteristics.

No reason was given for why the gloves previously used at the Jergens Center seemed to tear frequently. Glove characteristics that contribute to tearing include the composition and quality of its material, and a glove's thickness and flexibility. Wearing gloves that are too small causes them to stretch, and thus they are likely to tear more frequently. The replacement glove that will be tried next at the Jergens Center is made of nitrile, which has been reported to have good tear resistance and excellent flexibility.[33]

Indoor Environmental Quality

According to the information provided to us during the opening meeting, the Jergens Center was closed within the first week after the building was reopened in 1986, following completion of the renovation project. Problems associated with the building's indoor environmental quality were blamed for a variety of symptoms reported by 38 of the 590 people (80 staff members and 510 consumers) in the building. Their symptoms included headache, breathing difficulty, skin rash, fatigue, nausea, vomiting, dizziness, and joint pain. The indoor environmental quality issue remained a problem for several months and caused a series of evaluations to be done by several agencies. The findings and recommendations of most investigators focused primarily on correcting deficiencies in the building's HVAC systems.

When compared against ASHRAE recommended temperature and relative humidity ranges, the temperatures and relative humidities measured in the Jergens Center during this evaluation should be considered acceptable to most of the building's occupants. However, carbon dioxide concentrations measured in rooms 103 and 107 exceeded the NIOSH recommended level of 800 ppm, and the indoor to outdoor differential concentration of room 103 exceeded ASHRAE guidance. These measurements suggest that the HVAC system

serving these rooms may have not been operating effectively.

No specific health problems were raised by employees or management representatives during our site visit. However, during the walk-through tour, two employees commented that room 103 "felt stuffy", and it is possible that some concerns about indoor environmental quality have remained among some employees since the building reopened in 1986. Studies concerning indoor environments have been published in which a high prevalence of symptoms has been reported among occupants of office buildings.[34,35,36,37,38] A typical spectrum of symptoms has included headaches, unusual fatigue, varying degrees of itching or burning eyes, irritations of the skin, nasal congestion, dry or irritated throats, and other respiratory irritations. Typically, the workplace environment has been implicated because workers report that their symptoms lessen or resolve when they leave the building.

Measurement of indoor environmental contaminants has rarely proved to be helpful, in the general case, in determining the cause of symptoms and complaints except where there are strong or unusual sources, or a proved relationship between a contaminant and a building-related illness. However, measuring ventilation and comfort indicators such as carbon dioxide, temperature, and relative humidity is useful in the early stages of an investigation in providing information relative to the proper functioning and control of HVAC systems.

Scientists investigating indoor environmental problems believe that there are multiple factors contributing to building-related occupant complaints.[39,40] Among these factors are imprecisely defined characteristics of HVAC systems, cumulative effects of exposure to low concentrations of multiple chemical pollutants, odors, elevated concentrations of particulate matter, microbiological contamination, and physical factors such as thermal comfort, lighting, and noise.[37,38,39,40,41] Design, maintenance, and operation of HVAC systems are critical to their proper functioning and provision of healthy and thermally comfortable indoor environments. Some studies have shown relationships between psychological, social, and organizational factors in the workplace and the occurrence of symptoms and comfort complaints.[42,43]

Cancer

Although no specific concerns about cancer were raised during our site visit, the following information is offered as general information about cancer. Cancer is a group of different diseases that have the same feature, the uncontrolled growth and spread of abnormal cells. Each different type of cancer may have its own set of causes. Many factors play a role in the development of cancer. The importance of these factors is different for different types of cancer. Most cancers are caused by a combination of factors that interact in ways that are not fully understood. Some of the factors include (a) personal characteristics such as age, sex, and race, (b) family history of cancer, (c) diet, (d) personal habits such as cigarette smoking and alcohol consumption, (e) the presence of certain medical conditions, (f) exposure to cancer-causing agents in the environment, and (g) exposure to cancer-causing agents in the workplace. In many cases, these factors may act together or in sequence to cause cancer. Although some causes of some types of cancer are known, we do not know everything about the causes of cancer. This can be frustrating to researchers and to people whose lives have been affected by cancer.

Cancer is common in the United States, and occurs among people at any workplace. One in two men and one in three women will develop some type of cancer in their lifetime. One of every four deaths in the United States is from cancer. These figures show the unfortunate reality that cancer occurs more often than many people realize. Cancers and other illnesses often appear to occur in clusters, which scientists define as an unusual concentration of cancer cases within a defined geographic area over a defined time interval. A cluster also occurs when the illnesses are found among workers of a different age or sex group than is usual. The cases of illness may have a common cause or may be the coincidental occurrence of unrelated causes. The number of cases may seem high, particularly among the small group of people who have something in common with the

cases, such as working in the same building. In many workplaces the number of cases is small. This makes it difficult for us to detect whether the cases have a common cause, especially when there are no apparent disease-causing exposures.

RECOMMENDATIONS

Job Stress

- Jergens Center management should not dismiss job stress associated with working with people with developmental disabilities as a necessary evil that employees must simply accept as part of their job. Instead, they should take a proactive approach to the issue by (1) hiring a consultant to evaluate the extent to which employees view job stress as a problem and (2) implementing intervention strategies that will alleviate sources of stress.

- Stress evaluation methods include holding group discussions with employees or using an employee survey. Regardless of the method used, information should be obtained about employees' perceptions of job conditions and their levels of stress, health, and satisfaction.[2]

- To reduce job stress associated with providing services to people with developmental disabilities, employees should be trained by a consultant experienced in the use of adaptive coping strategies (i.e., active problem-solving approaches).

- Jergens Center management should view job-stress prevention as a continuous process that uses evaluation data to refine or redirect intervention strategies.

Infectious Diseases

- The section of the Ohio Revised Code that concerns the disclosure of confidential medical information of a consumer receiving services should be cited in subsection (a)(4) of Part II.D.3 (post exposure evaluation and follow-up) of Montgomery County MRDD's communicable diseases procedures.

- Montgomery County MRDD should revise its policy regarding the job classifications deemed to have risks of exposure to blood or other potentially infectious materials, and consequently who is eligible to receive hepatitis B vaccination, to include all of the program support assistants working in its three developmental centers.

- Any employee experiencing an event at the Jergens Center that involves potential occupational exposure to a bloodborne pathogen should be referred immediately to the occupational health clinic for evaluation. Counseling, treatment, and post-exposure prophylaxis should be offered at that time, as appropriate.

- Montgomery County MRDD should ensure that the developmental center managers and affected employees understand that if an employee initially declines HBV vaccination but at a later date while still covered under the standard decides to accept it, HBV vaccination will be provided.

Disposable Gloves

- Different sizes of gloves should be available for use by employees to decrease the likelihood that gloves will tear because they are too small.

- Management should seek feedback from employees concerning the frequency with which the nitrile gloves tear compared with the previous gloves.

- There may be some activities done at the Jergens Center for which any disposable glove will occasionally be apt to tear. When such activities are done, the merits of wearing double gloves or switching to a thicker glove material should be assessed.

Indoor Environmental Quality

- The HVAC system serving rooms 103 and 107 should be further evaluated to ensure that the recommended ASHRAE outdoor air supply rate is maintained.[5]

Cancer

The following internet resources may be useful in helping address employee concerns about cancer:

- The American Cancer Society's Cancer Facts and Figures (www.cancer.org). Search using the keyword "statistics," for annual summary statistics on different types of cancers.

- Guidelines for Investigating Clusters of Health Events (MMWR July 27, 1990, Vol 39 (RR-11):1–16). (Available from the CDC Web site at http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/00001797.htm)

- How to Investigate an Outbreak, A guide for Science Olympiad participants and other students developed by the Centers for Disease Control and Prevention and adapted from CDC's *Principles of Epidemiology* (Self-Study Course 3030-G). This is a teaching aid for classroom use to assist in the Science Olympiad event *Disease Detectives* and for other educational purposes. (Available from the CDC Web site at http://www.cdc.gov/excite/how%20to%20investigate.pdf)

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