

Guidance For Occupational Health Services In Medical Centers

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INTRODUCTION

Guidance for Occupational Health Services in Medical Centers is dedicated to the memory of Dr. Geoff Kelafant, who was tragically killed in a diving accident, March 2004. Geoff was the original author of a set of guidelines for the practice of occupational health in medical centers, and developed the idea to establish a public access internet site to assist practitioners of medical center occupational health. For more than 10 years, he developed and maintained the guidelines, added a broad range of additional information and links, and summarized information essential to the care of medical center-based working populations. Geoff did nearly all of this work without financial support and was steadfastly dedicated to improving the quality of medical practice in our field. In addition to the guidelines, he established an on-line discussion forum to address medical center occupational health practice issues. Geoff oversaw the forum with his own unique and wonderful combination of biting wit, good judgment, and pithy commentary.

Geoff was a dear friend to many of us and a respected colleague. He was bright, funny, kind, and brutally honest. His gifts to those practicing medical center occupational health have been inestimable; his absence leaves a void in our professional lives, and for a great many of us, in our personal lives as well. Few have contributed as much to our small field as he. He worked tirelessly at establishing guidelines for medical center occupational health, kept all of us up to date, and most importantly, shared with us his perceptive insight and humor.

Geoff's enduring legacy is the profound impact he made on medical center occupational healthcare in the United States and Canada. His work supported the creation of a real community, a common purpose, and a set of standards among those of us who practice in medical center occupational health. In many cultures and belief systems, we live on in this world because of our good deeds; Geoff will live longer than most.

PURPOSE OF THE GUIDANCE DOCUMENT

This document represents a collation of pertinent guidelines, best practices, and professional opinions applicable to the practice of occupational medicine in the medical center setting. Its intent is to provide assistance in handling the broad range of issues encountered by hospital-based occupational medicine practitioners. The Guidance Document and its hyperlinks will be updated periodically to incorporate new information as it becomes available.

ROLE OF THE MEDICAL CENTER OCCUPATIONAL HEALTH PROVIDER

MEDICAL ASSESSMENT OF EMPLOYEES

Occupational health practice in a medical center setting requires the same skills as such practice elsewhere, including thoughtful administrative management; knowledge of and interactions with safety, industrial hygiene, and toxicology; and sound preventive and clinical medicine, including surveillance, assessment of history and physical findings, diagnosis, treatment, and disposition.

Preplacement Medical Evaluation (PPME)

The Preplacement Medical Evaluation (PPME) usually represents the first clinical encounter for a prospective employee, setting the tone and defining expectations from occupational health Services (OHS). The PPME, which must be done after the offer of a job, serves to document those existing medical issues that are likely to have an impact on the new employee's performance, health and safety in the healthcare work setting. It is not designed to diagnose or treat previously undiscovered medical problems. The Americans with Disabilities Act (ADA) of 1992 requires job descriptions that identify the "essential functions" of the job to be offered, with specific, precise descriptions and terminology with which employee capabilities must be compared. OHS should gather enough information to ensure that employees' medical and functional status enables them to perform the essential functions of the job. OHS should outline the specific constraints and restrictions that Human Resources (HR) can use to determine appropriate accommodation, where and if feasible and appropriate. However specific diagnoses or other clinical information should not be released

State laws differ, but occupational physicians must be aware of local licensing and skill requirements. In general, they must act as a resource for nurse- and mid-level provider based evaluations and should be involved in any communication with HR about restrictions or failure to meet medical or functional standards for the offered job. Refusal to clear someone for work must be based on the issues of "direct threats" and on inability to meet specific standards. For example, a known alcoholic in acute relapse may not be suitable for hire, if existing policy states as such, but a cocaine addict who has completed rehabilitation cannot be refused employment on that basis alone. Conditions identified during the course of the PPME, such as elevated blood pressure, should be communicated to the individual with recommendations for follow-up, preferably in writing. New employees should also be fully informed of any recommended restrictions shared with HR.

The PPME documentation should be housed in a record/database separate from the institution's medical record for patient care, primarily for access at a later date and to clarify the purpose of the data for evaluation rather than general health care. Of course, the data should be available to the providers of the healthcare institution if the new employee wishes to release the information to them according to the Health Information Portability and Accountability Act (HIPAA) of 1996 (HIPAA) rules.

Other evaluations, such as drug testing, commercial driver certification, baseline medical status before working with hazardous chemicals, immunization status, examinations for respirator clearance, or tuberculosis surveillance status may be required before starting work, but some

may be delayed until specific job assignments have been clarified. Specific regulations apply to some functions, such as flight examinations or drug testing, requiring specific certification by designated agencies such as the Federal Aviation Administration or testing and certification as a Medical Review Officer under Department of Transportation Guidelines.

Periodic Medical Evaluation

The healthcare workplace represents a very hazardous environment (see Workplace Hazards). Engineering and administrative controls should precede the use of personal protective equipment, but medical surveillance for adverse health effects from hazardous exposures often represents good medical practice and is required by Federal and even some state laws for specific hazards. Surveillance is required for tuberculosis, and the Occupational Safety and Health Administration (OSHA) enforces the Centers for Disease Control and Prevention (CDC) guidelines on tuberculosis as regulation. OSHA and the National Institute for Occupational Safety and Health (NIOSH) recommend surveillance for employees exposed to hazardous drugs, despite a lack of robust scientific support for benefits or utility.

For exposures to certain substances, e.g. ethylene oxide, formaldehyde, lead, asbestos, cadmium and ionizing radiation, federal OSHA standards require medical surveillance when action levels are surpassed.

Most states have an “impaired provider” program for licensed individuals with mental, physical, or chemical dependence conditions that may impair their ability to practice safely. OHS is often part of the administrative process that initially reports such providers to the state licensing board(s) and subsequently monitors those providers to ensure compliance with the Board recommendations. Clear understanding of the regulations, understanding of Privacy issues, as defined in HIPAA and other regulations, and unambiguous communication capabilities, together with strict confidentiality in behavior and record-keeping, are essential for successful practice.

Episodic Medical Evaluation

Job transfers

Since different jobs have different physical requirements, the preplacement medical evaluation is specific to the job. Therefore OHS should have an agreement with HR to review employees who are transferring to jobs that have specific physical and/or mental requirements. This may only require a review of the employee’s current medical status, particularly any temporary or permanent restrictions affecting work performance. If a face-to-face evaluation is normally required for the new job, the transferring employee should undergo that same evaluation. If a record review suggests a substantial mismatch of skills and requirements or simply a lack of information, OHS should contact the employee for clarification or a face-to-face evaluation.

Illness/injury affecting work performance

Work-related injuries and illnesses are best evaluated and managed by an occupational health provider in OHS. While healthcare workers may have the right to seek care elsewhere, the advantages of care from an in-house provider are straightforward. Convenience (access to physical therapy and other modalities), familiarity with the work site, and communication ease with supervisors generally facilitate care and recovery. OHS must carefully maintain good relationships with all parties, understand and respect employee/supervisor relationships, and maintain a patient/employee focus in clinical management. For those employees seeking care elsewhere who have restrictions or a prolonged duration of time away from work, the OHS provider should periodically contact the employee and request authorization to communicate with the treating provider. The treating provider should provide regular information to the supervisor or to HR on progress, as required by workers’ compensation statutes. OHS often acts as the

clearinghouse for communication between other providers and the employee's supervisor and/or HR.

Non-occupational injuries or illnesses should be treated similarly to work-related conditions if they affect work performance. Particularly in the case of contagious diseases, OHS providers should evaluate the employee before s/he returns to work, or establish criteria for returning to work that the employee's attending physician must attest to. Some facilities have a policy requiring OHS clearance after a certain minimum consecutive days off work. Home or sports injuries may also require evaluation to determine restrictions in the workplace. As a service to the employee and to minimize time away from work, many OHS units may offer limited acute care services, such as throat cultures, ear lavage, rash evaluation, etc. Such services serve several purposes. They help employees trust the OHS unit as they rely on providers. Travel time to and from physician offices is shortened, so that staff are available to work longer. Conditions with potential implications for coworkers and patients can be identified early.

Medical evaluation/treatment should be provided for bloodborne pathogen and other infectious exposures, traumatic or ergonomic-related injuries, chemical exposures, and other work-related events. OHS should establish specific protocols and arrange 24/7 coverage.

Job fitness evaluation

Immediate evaluation may be necessary when a worker on duty is exhibiting dangerous or unacceptable behavior: verbal or physical assault, lapses into unconsciousness, alcohol odor on breath, slurred/garbled speech, etc. Such evaluations should begin with a report from the supervisor of the specific behavior in question. The supervisor should escort the employee to OHS. The employee should not be released to work until OHS has conducted a thorough history, physical, and any necessary consultation/testing. If the worker is expected to return to work in some capacity, the cost of the evaluation should be borne as a business expense while records are kept confidential and the provider only reports to the supervisor that the behavior was or was not related to a medical condition and when and under what conditions the employee may return to work.

Consultative visits may be arranged with OHS on a scheduled basis if either a supervisor or a worker recognizes that work performance is impaired by a real or perceived medical condition. OHS can evaluate the worker, coordinate optimal control of the medical condition, and recommend restrictions/accommodations that will maximize success in the workplace. OHS must resist the temptation to attribute all performance deficits to a medical condition, thereby "medicalizing" either poor motivation, relationship conflicts, or lack of skills. This caveat is true in any work environment, but the tendency to "medicalize" may be particularly tempting in a healthcare environment.

MEDICAL DIRECTION

The unique setting of OHS in healthcare

Development and management of OHS in a healthcare setting is a daunting task and requires constant awareness of the distinction between the mission of the organization (healthcare delivery) and the unit (occupational health services delivery). Five principles are essential to establish a proper relationship with key members of the organization:

1. Title: Although the OHS director in non-clinical industries is usually called the corporate medical director, that title may be impolitic in healthcare, particularly if the organization is "physician-led." Thus, the title of "Medical Director, OHS" clarifies the difference between mission leadership and "line operations" support.
2. Reporting relationship: The OHS medical director should have ready access to the senior management of the medical center. OHS can provide case management to ensure

- proper care, appropriate restrictions, and timely return to duty after an illness or injury, but such work with HR and supervisors often encounters resistance around job limitations and may require top management support.
3. Role as a specialist: The OHS medical director must be able to assure colleagues in other disciplines that OHS is not in the business of “stealing” or diverting patients from other providers. Medical colleagues are often unaware of the specialty of occupational medicine and its contents. The OHS medical director must clarify the role of OHS for colleagues in family medicine, orthopedics, etc., and be recognized as a specialist, expert in the management of disability, hazardous exposures, workers’ compensation and the interface of medical care with legislative requirements and regulations (FMLA, ADA, HIPAA, OSHA standards, CDC guidelines, etc.). Consultation services and support to colleagues struggling with such issues for outside care, including workers’ compensation, are important in developing a role.
 4. Institutional visibility: The medical director of OHS must develop alliances with organizational units that may be foreign to other physicians in the medical center, including safety, human resources, infection control, industrial hygiene, engineering, facilities management, environment services, purchasing, and the institution’s insurance carrier. Assignment to key committees, and attendance at meetings; establishment of policies, supported in the institutional framework; and presence in the various areas during rounds and problem solving is key to maintaining an effective presence.
 5. OHS staff: Success as medical director of OHS hinges primarily on the relationship with occupational health nurses and other staff. Frequent meetings, philosophical alignment, and respect of each other’s skills and opinions represent the foundation of a successful program. Nursing staff should be trusted to administer jointly developed policy and procedures, handle phone calls from employees, serve as internal case managers for disabled employees, and run programs, such as PPMs, blood and body fluid exposure, TB surveillance, etc. Mid-level providers can manage much of the clinical volume. Staff may benefit from regular attendance at meetings (AOHP, AAOHN, ACOEM), and they need accessibility for informal “curbside” consult or to transfer management of a difficult case.

Disability management

Individual cases should be followed in OHS if they meet certain criteria: restrictions affecting work performance, prolonged time off work, or work-related injury/illness requiring ongoing treatment/restrictions. Case management requires differing levels of intensity depending on the severity/duration of the disability. At a minimum, a nurse case manager should monitor the medical records and work status reports from other providers with the option for direct communication with the employee or referral to the medical director/designee for evaluation. OHS must be careful to have authorization from the employee/patient to communicate with the supervisor and administration (see medical records and HIPAA).

Population-based disability management is no different in healthcare than in any other industry and works most effectively when OHS, HR, and the insurer(s) share the same database(s).

Return-to-work programs may be housed outside of OHS but require constant communication with OHS for clarification of restrictions and comparison of temporary work assignments. Ideally, alternate, “transitional” work should be available whether restrictions arise from an occupational or non-occupational condition. OHS staff can serve as a resource to supervisors to coordinate the smooth and rapid return to work either in the original assignment or in another job within the organization. The success of this program depends on HR absence policies, disability benefits, and pay and reporting rules, i.e., whether the supervisor retains the restricted employee on his/her payroll while on modified duty. As importantly, worker satisfaction and relationship with co-workers and supervisor represent more subtle but equally powerful forces. Once again, OHS must be vigilant to avoid “medicalizing” relationship issues and to help to negotiate a return to some useful function within the organization.

Health Benefits Administration

Some input from OHS may be useful as employers construct health benefit plans for employees. In particular, occupational medicine providers may play a role in arranging employer-sponsored programs to address general home and workplace safety, healthy dietary choices, age-specific cancer screening recommendations, smoking cessation, and other preventative health efforts. OHS staff often serve as a resource to employees reminding them when they might benefit from an available service.

Employee Assistance Program (EAP)

EAP in the healthcare setting is particularly valuable for de-escalation of relationship issues in the workplace. Workers and supervisors in healthcare tend to view all problems in the context of medical diagnoses and may require clarification of such issues outside the medical arena. EAP does not establish an on-going relationship with the worker as a patient and generally does not bill on a fee-for-services basis. Such services may be obtained through an outside vendor, but there are some particular advantages to keeping EAP services "in house." The medical director may want to serve as a liaison to the EAP for oversight/advice about policies and particular cases as well as to gather data as to any trends in employee dissatisfaction or types of problems. When particular problems arise in a work area, an EAP counselor can serve in an organizational development role to guide the workers in that unit to a reasonable reconciliation before individual members develop performance deficits or symptoms of distress that will affect productivity or tax the healthcare system. Confidentiality and maintenance of trust do require a great deal of attention with in-house units, both in selection of a physical location and in maintenance of confidentiality.

Medical records

In order to satisfy HIPAA, OHS must decide, whether it is part of the practice of the healthcare organization or part of the administration. This then defines how records are stored (firewall), who has access to which elements (role-based access), and whether a signed release is needed (HIPAA-compliant release). While individual circumstances may vary, it is usually preferable to place OHS as part of the practice. This allows free communication between the medical director/OHS staff and the other providers in the organization.

OHS must have specific authorization from the employee/patient to release any medical information to the supervisor/administration. Generally, OHS will not need to share medical information with the employer, even with a release. Communication regarding work status should be devoid of protected health information.

Medical records and documentation should be housed in a record/database separate from the institution's medical record for patient care. It should include pre-placement, medical surveillance, infectious disease and workers compensation records. They should not be accessible to professionals without involvement in direct care of the employee. Still, the data should be available to healthcare providers if the employee wishes to release the information to them.

HEALTH CARE SAFETY AND OCCUPATIONAL HEALTH

The Joint Commission on Accreditation of Health Care Facilities (JCAHO) requires that facilities have a safety program. Such programs require skills in safety, industrial hygiene, engineering, environmental management, housekeeping, workers compensation, and clinical disciplines. Such programs generally consist of written policies, require some form of internal inspection and quality assurance, and rely on defined approaches to the solving of recognized problems. Establishment of top management commitment to safety, health, and environmental management (SHEM) represents a core value for an organizational without which little progress will occur.

JCAHO requires some form of recordkeeping. Although OSHA logs (1910.1904) often represent the formal output, many facilities and employers have developed complex systems to bring the various disciplines together in a single community of practice. This is generally collected in a committee called, in health care, an "Environment of Care" committee (EoCC), a safety committee, or some other organizational unit with regular meetings, minutes, a strategic plan, and formal reporting relationships to hospital leadership.

Healthcare safety staff often take the lead, but OHS clinician collaboration in several core functions is essential for the successful administration of these programs.

- a. The Hazards section of this guideline identifies hazards for which the hospital (internal or consulting) safety staff should develop programs. Many of these require medical surveillance programs, medical evaluation for fitness and capacity, and medical support for failures.
- b. Safety investigations of adverse incidents to employees require the establishment of incident review boards. Such investigations identify what should have occurred, what actually occurred, and why the two diverged in an attempt to prevent the next occurrence. Such groups generally function better when they are composed of individuals with a wide variety of skills (safety, engineering, clinical) and diverse viewpoints (management, professional, and employee representatives). Many facilities establish some fixed set of criteria by which incidents for review are selected (all lost time cases, or all diseases, or all cases costing more than a set sum of money, or events by quarterly frequency of occurrence).
- c. Scheduled evaluations of the environment of care (safety rounds) can identify newly occurring hazards, inurement to hazards and worsening work practices. Walk-throughs with safety, employee health, and employee representatives remain an important tool for safety management.
- d. Annual written reports, of money spent, costs saved, and services delivered reminds management of the value of programs

<http://www.jointcommission.org/>

<http://www.va.gov/ncps/>

<http://www.osha.gov/SLTC/accidentinvestigation/index.html>

BIOLOGICAL HAZARDS

MODES OF TRANSMISSION

Healthcare workers may be exposed to a variety of biological hazards. As discussed below, effective immunization and infection control programs, as well as appropriate postexposure evaluation and medical management policies, must be established. Common blood-borne pathogens include HIV, hepatitis B and hepatitis C; uncommon pathogens include syphilis, viral diseases, and malaria. Pathogens transmitted via the airborne route include tuberculosis, measles, varicella, and under certain conditions smallpox, hemorrhagic fevers, SARS, and possibly influenza. Droplet-transmitted pathogens include meningococcus, pertussis, H. influenzae, M. pneumoniae, Group A streptococcus, mumps, rubella, adenoviruses, parvovirus and influenza. Infections spread by skin exposure include Herpes simplex, papilloma virus and fungi. Enteric pathogens include hepatitis A, Salmonella, Shigella, and Norovirus. Research institutions may present special challenges, such as those associated with handling animals in research and biological agents that require special facilities.

Table 1 -Diseases Spread by Droplet or Airborne Transmission

Disease	Organism	Clinical Manifestations	Healthcare/personal care workers at risk
<u>Adenovirus</u>	Adenovirus	Rhinitis, pharyngitis, malaise, rash, cough	All, especially those in intensive care units, long-term pediatric care facilities and ophthalmology clinics
<u>Influenza</u>	Influenza virus	Fever, chills, malaise, cough, coryza, myalgias	All, especially physicians and nurses
<u>Measles (Rubeola)</u> (airborne spread)	Rubeola virus	Fever, rash, malaise, coryza, conjunctivitis, Koplik's spots, adenopathy, CNS complications	All
<u>Meningococcal disease</u>	Neisseria meningitides	Fever, headache, vomiting, confusion, convulsions, petechial rash, neck stiffness	Emergency medical personnel, emergency department staff
<u>Mumps</u>	Mumps virus	Painful/swollen salivary glands, orchitis, meningoencephalitis	All, especially pediatricians, dentists, daycare workers
<u>Pertussis</u>	<u>Bordetella Pertussis</u>	Malaise, cough, coryza, lymphocytosis, "whooping" cough	All, especially pediatric healthcare workers
<u>Parvovirus B19</u>	Parvovirus B19	Rash, aplastic anemia, arthritis, myalgias	All, especially nurses
Respiratory Syncytial Virus (<i>principally spread by contact</i>)	RSV	Often asymptomatic; respiratory symptoms	All, especially pediatric healthcare workers
<u>Rubella</u>	Rubella virus	Fever, malaise, coryza, rash	All
<u>Tuberculosis</u> (airborne spread)	Mycobacterium species	Fever, weight loss, fatigue, pulmonary disease, extra pulmonary involvement including lymphatic, genitourinary, bone, meningeal, peritoneal, miliary	All, especially nurses, pathologists, laboratory workers, housekeeping staff
<u>Varicella</u> (airborne and contact spread)	Varicella zoster virus	Chickenpox or zoster presentation	All

Table 2 - diseases spread by contact with blood or body fluids or via percutaneous exposure

Disease	Organism	Clinical Manifestations	Healthcare/personal care workers at risk
<u>Hepatitis B</u>	Herpes B Virus	Malaise, arthralgias, fatigue, anorexia, nausea, vomiting, diarrhea, constipation, rash, fever, abdominal pain, jaundice, hepatosplenomegaly, adenopathy	All, especially nurses, laboratory workers, surgeons, dentists, dialysis workers
<u>Hepatitis C.</u>	Hepatitis C virus	Often asymptomatic. Malaise, arthralgias, fatigue, anorexia, nausea, vomiting, diarrhea, constipation, fever, abdominal pain, jaundice, hepatosplenomegaly, adenopathy	All, especially oral surgeons
<u>AIDS/HIV Infection</u>	Human Immunodeficiency Virus	Adenopathy, fever, weight loss, fatigue, chronic diarrhea, anemia, leukopenia, oral candidiasis, opportunistic infections certain cancers, neurologic symptoms	All, especially nurses and laboratory workers
<u>Viral hemorrhagic fevers-including Lassa fever, Marburg virus, Crimean hemorrhagic fever, Ebola virus</u>	Various viruses	Wide spectrum of symptoms, but All involves some degree of hemorrhagic symptoms and complications	All, especially nurses
Other diseases that have been transmitted via percutaneous injuries (laboratory, research facilities)		<u>Blastomycosis, Brucellosis, Cryptococcosis, Diphtheria, Gonorrhea, Herpes Simplex, Leptospirosis, Malaria, Mycoplasmosis, Rocky Mountain Spotted Fever, Scrub Typhus, Herpes B Virus, Sporotrichosis, Staphylococcal Disease, Streptococcal Disease, Syphilis, Toxoplasmosis, Tuberculosis, Yellow Fever, Creutzfeldt-Jacob disease</u>	

Table 3 - Diseases Spread Via Fecal-Oral Route

Disease	Organism	Clinical Manifestations	Healthcare/personal care workers at risk
<u>Helicobacter pylori</u>	Helicobacter pylori	Gastric ulcers	Endoscopy personnel
<u>Hepatitis A</u>	Hepatitis A virus	Gastrointestinal symptoms, malaise, jaundice, hepatomegaly	All Healthcare and personal care workers, especially neonatal nurses
<u>Norovirus</u>	Norovirus	Gastrointestinal symptoms	All Healthcare and personal care workers, especially nurses and care attendants
<u>Polio</u>	Poliomyelitis virus	Also weakness, headache, stiff neck, fever, nausea and vomiting, sore throat	All
<u>Salmonellosis</u>	Salmonella species	Gastrointestinal symptoms, fever, bacteremia, carrier state possibly	All Healthcare and personal care workers, especially nurses and laundry workers
<u>Shigellosis</u>	Shigella species	Gastrointestinal symptoms	All Healthcare and personal care workers, especially nursery nurses

Table 4 - Diseases Spread by Skin Contact

Disease	Organism	Clinical Manifestations	Healthcare/personal care workers at risk
<u>Herpetic Whitlow</u>	Herpes simplex	Vesicles, pruritis	All, especially dentists, anesthesiologists, dialysis technicians, physical therapists, physicians, nurses
<u>Tinea corporis ringworm</u>	Microsporum, trichophyton species	Ring shapes lesions or scaly lesions on body	All
<u>Warts</u>	Papilloma virus	Dermatologic manifestations which vary widely in shape, size, and appearance	Dermatologists
<u>Staphylococcal Infections</u>	MSSA, MRSA, VISA, VRSA	Skin lesions, invasive infections, systemic disease	All

INFECTION CONTROL PRACTICES

<http://www.cdc.gov/ncidod/dhqp/about.html>

<http://www.cdc.gov/ncidod/dhqp/index.html>

<http://www.cdc.gov/ncidod/dhqp/healthDis.html>

<http://www.cdc.gov/ncidod/dhqp/worker.html>

http://www.cdc.gov/ncidod/dhqp/gl_hcpersonnel.html

http://www.cdc.gov/ncidod/dhqp/wrkr_occHealth.html

<http://www.shea-online.org/>

<http://www.apic.org//AM/Template.cfm?Section=Home1>

http://www.cdc.gov/ncidod/dhqp/gl_environinfection.html

http://www.cdc.gov/ncidod/dhqp/gl_isolation.html

http://www.cdc.gov/ncidod/dhqp/gl_handhygiene.html

Appropriate training and policies to minimize patient-to-employee and employee-to-patient transmission of communicable disease are essential. Effective surveillance activities should also be in place to prevent transmission of communicable disease and to diminish absenteeism.

Policies and procedures should include:

- 1) Thorough preplacement evaluation, including documentation of immunizations, TB surveillance testing, and orientation to communicable disease work restrictions.
- 2) Periodic re-evaluation to encourage preventive activity and use of personal protective equipment.
- 3) Initial and periodic mandatory training in the use of personal protective equipment and universal precautions.
- 4) Periodic review of employee lists to assure adequate numbers and training of employees for respirator use.
- 5) Immunization review and updated programs.
- 6) Ongoing tuberculosis testing requirements to include employees, volunteers, students, and medical staff.
- 7) Care of personnel for work-related exposures and illnesses.
- 8) Monitoring exposures to infectious disease.
- 9) Maintenance of employee health records.
- 10) Providing educational sessions and literature encouraging work and personal hygiene.
- 11) Establishing work restriction programs to prevent transmission of communicable disease.

Suggested immunizations for health care facility employees

A number of immunizations may be indicated or considered in health care workers depending on the risk of exposure or the infection risk to patients. These vaccinations include:

Diseases for which immunization is strongly recommended – Hepatitis B, measles, mumps, rubella, influenza, varicella, pertussis

Diseases for which immunization/prophylaxis may be indicated – hepatitis A, meningococcal disease

No increased risk among health care workers, but should be current – diphtheria, tetanus

Special circumstances, including research and animal labs – rabies, Q fever, polio, vaccinia, others as appropriate for circumstances

<ftp://ftp.cdc.gov/pub/Publications/mmwr/rr/rr4618.pdf>

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm>

<http://www.cdc.gov/vaccines/vpd-vac/varicella/vac-faqs-clinic-hcp.htm>

Needlestick injuries

Needlestick injuries remain a significant cause of health care worker injuries. Sharps with engineered safety features should be regularly reviewed, trialed, and implemented where feasible. Needles should not be recapped or broken before disposal. Puncture resistant containers should not be filled to capacity. Needlestick injuries require determination of worker and source (wherever possible) serological status regarding hepatitis B and C, and HIV. Appropriate consents to HIV test the worker and source are necessary, and regulations vary by State. Under special circumstances, some states allow for source patient testing without the permission of the source patient. Recommendations and practices regarding blood-borne exposures change frequently and policies should regularly be reviewed and updated. Generally, serological follow-up of the healthcare worker exposed to HIV, HBV, or HCV should be carried out at baseline, 6 weeks, 3 months, and 6 months following exposure. Current guidance with respect to prophylaxis or early treatment of specific infections should be followed. (See specific bloodborne pathogens below.)

In all cases of confirmed HBV, HCV, or HIV exposure, which include mucous membrane exposure as well as the more common “sharps” exposure, a counseling session with a knowledgeable health care provider should be offered to the exposed employee. Information should be obtained to determine if the employee is a member of a high-risk group. The employee should be advised to report any illness which occurs within the initial six-month period following exposure, particularly skin rashes, fever, malaise, joint pain, muscle aches, enlargement of lymph nodes, and any acute infections. Instructions on the use of condoms or abstinence to prevent sexual transmission of HIV during the six months following exposure should be given. Women of childbearing age should be checked for pregnancy if they elect to take prophylactic medication. Benefit and risk information regarding medications should also be discussed. Information should be provided regarding availability of follow-up counseling and community resources. Standard first aid should be provided for all needlestick injuries, cut and bite wounds, including washing the injury site and applying antiseptic. If the exposure is to mucous membranes (i.e. eyes), copious irrigation should be performed immediately.

Preplacement testing for bloodborne diseases, especially hepatitis C, is a controversial issue. Worker compensation precedent in some states assumes that a health care worker who has contracted a bloodborne disease must have acquired it as a result of an occupational exposure unless there is compelling evidence to the contrary. Preplacement testing, where legal, may serve to protect the employer from future liability as well as making the employee aware of the presence of a potentially debilitating and possibly fatal disease. Early treatment of chronic hepatitis C is another controversial area, and practitioners should consult experts in the field when there are questions regarding evaluation and treatment. Preplacement testing for surface and core antibody to Hepatitis B and for Hepatitis B surface antigen or obtaining records documenting prior adequate Hepatitis B titers is recommended

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm>

http://www.cdc.gov/ncidod/dhqp/gl_occupational.html

<http://www.osha.gov/SLTC/bloodbornepathogens/index.html>

<http://www.cdc.gov/niosh/topics/bbp/>

<http://www.cdc.gov/niosh/docs/2008-101/>

Hepatitis B

Percutaneous exposure to HBV-infected blood is associated with a seroconversion risk of 1-6% if a source patient is e-antigen negative, but 22-31% if the source patient is e-antigen positive. HBV is resistant to drying, ambient temperatures, simple detergents and alcohol, and may survive on environmental surfaces for up to one week.

Workers with reasonably anticipated potential blood and body fluid exposure should, according to federal regulation, be offered vaccination for hepatitis B. Those previously vaccinated for hepatitis B should have documentation of hepatitis B surface antibody response to the vaccine. Hepatitis B surface antibody testing should be carried out among previously vaccinated personnel without such documentation. Because hepatitis B surface antibody titers wane with time without compromising immunity, a negative hepatitis B surface antibody test several years following completion of vaccine does not provide evidence that an individual is a non-responder to the vaccine. Reasonable management of such individuals as a part of the pre-placement evaluation includes a single booster of vaccine, followed 4-6 weeks later by retesting of hepatitis B surface antibody. Those who remain hepatitis B surface antibody-negative should have the vaccine series repeated, with surface antibody testing thereafter. Recommendations for non-responders, low responders, workers who are exposed without completing a series and unvaccinated workers tend to change frequently, so policies should be regularly reviewed and updated. At a minimum, vaccine nonresponders should be tested for the presence of hepatitis B surface antigen, and if positive, educated about treatment options.

HCW who have hepatitis B or C may hesitate to admit that they are infected out of fear that this will restrict their careers. Depending upon institutional policies, those who perform invasive procedures may indeed need to restrict some aspects of their practice, particularly if they have chronic active hepatitis B. However, most healthcare workers can work safely with their infections. Those with chronic hepatitis B also may be unaware that treatment is now available, and OHS can assist with referrals for such treatment.

http://www.cdc.gov/ncidod/dhqp/gl_occupational.html

<http://www.cdc.gov/vaccines/vpd-vac/hepb/default.htm>

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm>

<http://www.cdc.gov/ncidod/diseases/hepatitis/b/index.htm>

Human Immunodeficiency Virus (HIV)

Routine patient contact has not been found to increase worker risk of acquiring HIV. Health care workers should be trained, retrained and mandated to follow CDC Standard Precautions Guidelines. Personnel should minimize the risk of exposure to parenteral or mucosal contact with potentially infectious material (blood, sputum, aerosols, and other body fluids). Appropriate personal protective equipment and training should be available and mandated.

A 0.3% risk of HIV infection following needlestick exposures is commonly quoted. Characteristics that may be associated with higher risk of seroconversion include deep injury, visible contamination of the device with blood, needle placement directly into an artery or vein, or exposure to an individual with elevated viral titers. Risk of seroconversion following mucous membrane exposure has been estimated at 0.09%, based on one seroconversion in six studies.

In addition to following the basic protocol for HIV exposures, the need for prophylaxis with antiretroviral medications should be evaluated on an individual basis by the employee health physician treating the employee, and drugs should be made quickly available (preferably within one or two hours) and provided free of charge to the employee if the employee elects to take them. After the initial baseline HIV antibody is drawn, the employee should receive recall notices for follow-up HIV antibody testing at appropriate intervals for at least 6 months unless the source patient has been identified as not having HIV or another bloodborne pathogen and is not part of a risk group for early HIV infection i.e. active current IV drug user. Informed consent and confidential reporting are key elements of any HIV surveillance activity.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm>

<http://www.cdc.gov/hiv/>

Hepatitis C

Following percutaneous exposure to infected blood, risk of hepatitis C seroconversion among exposed healthcare workers ranges from 0 to 10%, with an average risk of 1.8%. Infection following mucocutaneous exposure appears to be much less common. Antibodies to HCV may be detected within 5 to 6 weeks of infection, and may persist regardless of whether virus is actively replicating. Most individuals have no acute symptoms.

The management of patients acutely infected with hepatitis C is a topic of current discussion. No hepatitis C vaccine is available, and administration of immune globulin is ineffective. Several studies have demonstrated the efficacy of interferon alpha2b in treating acute hepatitis C. One report has demonstrated long-term viral clearance in 98% of subjects when interferon alfa-2b was begun during acute disease at an average of 89 days following infection. It has been shown that symptomatic patients with acute hepatitis C are more likely to spontaneously clear the virus than are patients with asymptomatic infection. Another study documented spontaneous viral clearance, generally within 12 weeks of symptom onset in 52% of symptomatic acute infections, but no spontaneous viral clearance among patients with asymptomatic acute infection. Given the high cure rates associated with acute therapy, and the toxicities of interferon and ribavirin, there is no role for prophylactic therapy in individuals exposed percutaneously or mucocutaneously to hepatitis C-infected blood or body fluids. Acute therapy should be considered for seroconverters.

http://www.cdc.gov/ncidod/dhqp/gl_occupational.html

<http://consensus.nih.gov/2002/2002HepatitisC2002116html.htm>

<http://www.cdc.gov/mmwr/PDF/rr/rr5203.pdf>

<http://www.cdc.gov/ncidod/diseases/hepatitis/c/fact.htm>

Enteric pathogens

Dietary personnel should have prompt evaluation and treatment of any gastrointestinal disease. Prompt reporting of gastrointestinal illnesses should be required, and re-evaluation prior to return

to work is essential. HR policies that provide paid sick time for such illness may encourage employee compliance. Good handwashing technique, use of non-latex disposable gloves, and proper training should be encouraged and reinforced during site visits.

Hepatitis A virus is found in serum, stool and liver only during acute infections. IgM antibody identifies acute infection while IgG anti-hepatitis A indicates prior HAV exposure with immunity to recurrent infection. Hepatitis A vaccine may be indicated in certain high-risk settings.

<http://www.cdc.gov/ncidod/diseases/food/index.htm>

Influenza

An active influenza vaccine program benefits employees, patients, and institutions. Vaccination of health care workers not only reduces the risk of patient exposure to an infected worker (and vice versa) but may also decrease the sickness/absenteeism rate for the institution. Influenza vaccine should be offered to all employees free of charge and strongly encouraged among employees with potential direct patient contact. Multi-pronged influenza vaccination programs including “flu vaccine fairs”, decentralized or unit-based vaccination, coverage of all employee shifts, coupled with assertive education campaigns have been shown to result in influenza vaccine adherence exceeding 70%. Prophylaxis with antiviral medications may be indicated for unvaccinated health care workers during institutional outbreaks.

Standard and Droplet precautions are recommended for healthcare workers caring for patients with influenza. For pandemic influenza, enhanced precautions, including N95 respirators, should be used in accordance with OSHA and CDC guidance. For patients with significant diarrhea, contact precautions should be added. If spray or splatter of infectious material is likely, goggles or face shield should be worn according to Standard Precautions.

<http://www.cdc.gov/flu/>

<http://www.cdc.gov/flu/professionals/acip/index.htm>

<http://www.cdc.gov/flu/professionals/vaccination/index.htm>

<http://www.cdc.gov/flu/professionals/infectioncontrol/index.htm>

<http://www.cdc.gov/flu/professionals/antivirals/index.htm>

<http://www.cdc.gov/flu/professionals/flugallery/index.htm>

<http://www.pandemicflu.gov/index.html>

Pneumonia

Current guidelines from the CDC should be consulted to determine the need for pneumococcal vaccine based on the employee’s age, medical history, and potential work and non-work exposures.

Varicella

Employees having direct contact with children or immunocompromised patients should have their varicella immune status documented. For the general public, a positive history of chicken pox in an adult born in the United States is a reliable indicator of immunity. Employees with negative or unknown histories of varicella should have their immune status determined by a varicella zoster

virus titer. Employees raised in tropical climates are at greater risk of being susceptible. Varicella-susceptible employees who are exposed to varicella should be restricted from work in patient areas from the tenth day following initial exposure to the twenty-first day post varicella exposure. Institutions may elect to establish a policy requiring immune status documentation at hire, to allow for vaccination of susceptible personnel and minimize furlough time following an exposure. Employees infected with varicella should be restricted from patient work until all lesions are dried and crusted. Immunocompetent employees with localized zoster should be restricted from caring for high-risk patients until lesions are crusted, but may care for other patients as long as lesions are covered. Immunosuppressed employees with localized zoster may have respiratory shedding of virus and should be restricted from patient care until lesions are crusted.

Although not as protective as seroconversion to native varicella, varicella vaccination should be administered for those employees who are not immune. If lesions occur post-vaccination, the affected employee should be restricted from patient care until lesions are crusted. Because immunity from varicella vaccine may wane over time, vaccinated employees may not be fully protected if they are exposed to varicella later in their career. The OHS should maintain a record of immunizations and investigate the medical histories of all exposed workers. While those with natural immunity need no specific monitoring after exposure, workers who are exposed to varicella after receiving the varicella vaccine require special attention. The OHS may test them for the presence of circulating varicella IgG 5 to 6 days after the exposure, and monitor them daily from days 10 to 21 after exposure if IgG is not present. If resources do not allow daily monitoring, furlough from the workplace is another option. If IgG is present, the employee should still be educated that a mild case of varicella is still possible, and workers who experience any skin lesions consistent with primary chickenpox should report to OHS for evaluation. If resources allow, these employees may also benefit from daily monitoring during the incubation period.

The single-dose zoster (shingles) vaccine is indicated for adults over age 60, regardless of varicella immunity history. However it should not be administered to individuals who have undergone the two-dose varicella series.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5604a1.htm>

http://www.cdc.gov/ncidod/dhqp/gl_hcpersonnel.html

<http://www.cdc.gov/vaccines/pubs/ACIP-list.htm#vacc>

Measles, Mumps, Rubella

Healthcare workers should have documented immunity to measles, mumps and rubella (MMR). Proof of immunity should be by a statement of vaccination from a physician or health care facility, documentation of protective titers, vaccination at time of employment without prescreening, or screening followed by vaccination if the employee is negative. MMR vaccine should not be administered during pregnancy and specific instructions should be provided regarding avoidance of conception for at least three months. As a live virus vaccine, MMR should not be administered to individuals with severe immunosuppression. The Advisory Committee on Immunization Practices (ACIP) has published guidelines on the use of MMR vaccine in HIV-infected patients, based on the patient's age and CD4 count. History of prior rubella disease is not considered acceptable proof of immunity to rubella.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00050577.htm>

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00053391.htm>

<http://www.cdc.gov/vaccines/pubs/ACIP-list.htm>

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5522a4.htm?s_cid=mm5522a4_e

Pertussis

Several outbreaks of pertussis have occurred among health care workers. Disease is spread by droplets and direct contact, and antibiotic prophylaxis is indicated for workers with close exposures to acutely infected individuals. Prophylactic regimens in common use include erythromycin, trimethoprim-sulfamethoxazole, clarithromycin, or azithromycin. A pertussis vaccine for adults has been approved and is recommended for healthcare workers. The best approach to postexposure management of vaccinated individuals is not clear at this time; it is unknown whether vaccinated individuals may still contract subclinical disease or be contagious to others. It may be reasonable to offer postexposure prophylaxis to vaccinated workers, based upon the time since vaccination, their work setting, home contacts and other risk factors.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm>

<http://www.ocoem.org/guidelines.aspx?id=562>

Tuberculosis

Tuberculosis poses a threat to health care personnel. Immunization and travel from endemic TB areas occurs on a daily basis. Multiple Drug Resistant Tuberculosis (MDRTB) is a problem in high-risk populations (eg, foreign born, alcoholics, IV drug users, prison inmates, homeless, immunosuppressed and AIDS patients). Health care workers performing bronchoscopies, intubations, respiratory care, and aerosolized pentamidine treatment are at particularly high risk. Each institution should develop a policy that protects workers and patients, and provides for appropriate surveillance and treatment. Two step testing is currently recommended for health care workers at the time of hire, regardless of BCG vaccination history. While the Mantoux TB skin test is still the foundational test for latent TB, new blood assays for *M. tuberculosis* which measure T-cell activation, e.g., QuantiFERON-TB Gold, which are more specific, but possibly less sensitive, have been approved for use as an alternative to the TB skin test, and may prove especially useful for testing of employees previously vaccinated with BCG.

Screening as well as evaluation and treatment of reactors/converters should follow the most current CDC recommendations. An employee database, with readily available identification of conversions by area of institution should be maintained. Work areas with two or more skin test conversions in a year may have experienced an unrecognized TB exposure, and should be investigated accordingly. As surveillance programs are only helpful if they cover the entire population at risk, compliance with the TB skin testing program should also be monitored and compliance rates by area should be reported regularly to the institutional leadership.

A person with a newly positive PPD should be offered prophylactic therapy. Those with positive TB skin tests (TST) of uncertain duration under the age of 35 should also be offered prophylactic therapy, as should anyone with a positive TST at high risk of activation. Conditions which place individuals at high risk of activation include HIV, silicosis, "old TB" on x-ray with no prior treatment, chronic renal failure, diabetes mellitus, malignancy, nutritional or GI deficiency, and immunosuppression.

Appropriate environmental controls, personal protective equipment and an early high index of suspicion are necessary steps to limit transmission of TB. Effective respirators (N-95 or HEPA) should be available and employees properly fit tested after being medically evaluated for the respirator. OSHA currently requires initial and annual training and fit testing of respirator users.

Negative pressure rooms should be available and properly utilized in various patient care areas of medical facilities.

<http://www.cdc.gov/tb/>

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm?s_cid=rr5417a1_e

Severe Acute Respiratory Syndrome (SARS)

From November, 2002, through July, 2003, 8098 individuals worldwide contracted SARS, a new human respiratory disease caused by a novel coronavirus. The disease, which appeared to be transmitted primarily by droplets and direct contact, spread to more than 1700 healthcare workers. In some hospital settings, primarily because of delayed recognition of the disease, attack rates among healthcare workers were nearly 60%. Worldwide SARS claimed 774 deaths from 2002-2003, with a case fatality rate of 9.6%.

Clinical illness was characterized by an incubation period of about 2-10 days, fever, chills, rigors, headache, malaise, and sometimes diarrhea, followed by lower respiratory tract involvement. While most patients with SARS did not transmit the disease to others, well publicized accounts of "superspreaders" attested to the potential for widespread transmission in certain settings and with certain individuals.

The key step in preventing transmission to healthcare workers is early recognition of disease and proper isolation of potentially infected patients. Numerous accounts have detailed spread of SARS in hospitals when patients were treated for days prior to the recognition that they were infected with the virus. In one such account, it was estimated that a single index patient had potentially exposed 10,000 patients and visitors and 930 hospital staff, triggering a nationwide SARS outbreak in Taiwan. Current CDC guidelines call for various measures to screen patients with respiratory symptoms or atypical pneumonia for SARS, depending upon the current disease epidemiology. The imposition of hand washing and surgical mask donning among symptomatic patients in clinics and acute care hospitals is designed to minimize transmissions in waiting rooms and other settings of respiratory pathogens, including SARS.

<http://www.cdc.gov/ncidod/sars/>

<http://www.cdc.gov/ncidod/sars/guidance/C/index.htm>

<http://www.cdc.gov/ncidod/sars/guidance/C/app2.htm>

Agents of Bioterrorism

Occupational and environmental medicine practitioners in medical centers should be involved in institutional initiatives to prepare for bioterrorist attacks. The CDC classifies agents of bioterrorism into three categories. Category A diseases/agents are those which can be easily disseminated or transmitted from person to person; which result in high mortality rates and have potential for major public health impact; which might cause public panic and social disruption; and which required special action for public health preparedness. Category B disease/agents are considered moderately easy to disseminate; result in moderate morbidity rates and low mortality rates; and require specific enhancements of diagnostic capacity and enhanced disease surveillance. Category C diseases/agents include those that could be engineered for mass dissemination in the future due to their availability, ease of production and dissemination, and potential for high morbidity and mortality rates.

Category A agents include *Bacillus anthracis* (anthrax), *Clostridium botulinum* toxin, *Yersinia pestis* (plague), *Variola major* (smallpox), *Francisella tularensis* (tularemia), and the viral hemorrhagic fevers (Ebola, Marburg, Lassa, and Machupo). Category B agents include *Brucella* species (brucellosis), Epsilon toxin of *Clostridium perfringens*, food safety threats (*Salmonella* species, *Escherichia coli* O157:H7, *Shigella*), *Burkholderia mallei* (glanders), *Burkholderia pseudomallei* (melioidosis), *Chlamydia psittaci* (psittacosis), *Coxiella burnetii* (Q fever), Ricin toxin, Staphylococcal enterotoxin B, *Rickettsia prowazekii* (typhus fever), viral encephalitis (alphaviruses [e.g., Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis]), and water safety threats (e.g., *Vibrio cholerae*, *Cryptosporidium parvum*). Emerging infections such as Nipah virus and hantavirus are considered to be Category C agents.

Agents of bioterrorism vary in their propensity for transmission from person to person. Guidelines addressing infection control in medical center settings, vaccinations, prophylactic therapies and other issues pertinent to medical center preparedness can be accessed at www.bt.cdc.gov.

<http://emergency.cdc.gov/bioterrorism/>

<http://emergency.cdc.gov/bioterrorism/prep.asp>

Laboratory and animal handling biosafety

Biomedical research poses unique exposure risks to employees. A team approach with administrative, safety, and engineering personnel is required to ensure that proper ventilation and other primary prevention controls are in place to reduce occupational disease and injury in this setting. Laboratory animal allergy from the respiratory inhalation of sensitizing proteins, as well as through dermal contact, may affect up to 30% of researchers. Zoonotic infections are possible from virtually every laboratory animal species, requiring that occupational and environmental medicine physicians work closely with veterinarians to determine which employees may be at risk for bites and infections, such as rabies, salmonella, and ringworm. Other hazardous exposures may include percutaneous exposures to biologic agents, radioactive isotopes, carcinogens, chemicals, anesthetics, and drugs. Well designed medical monitoring and surveillance programs should be developed in the areas of reproductive hazards, hearing conservation, respiratory protection, immunizations, bloodborne pathogens exposures, zoonoses, emergency medical response, physical and environmental hazards.

An ideal occupational health program for animal facilities starts with hazard identification based on the species used. Administrative controls should be in place to permit animal access only to individuals appropriately trained and enrolled in the occupational health program. The institution must identify which workers are exposed to animal hazards, and provide appropriate education and training.

The animal research facility's occupational health program should be risk-based. Since all mammalian and bird species pose a risk of occupational allergy, an allergy surveillance program is the foundation of the program. This may consist of a screening questionnaire, prompting further medical evaluation if symptoms are present. Sensitized individuals must be enrolled in a respiratory protection program with appropriate PPE to prevent further exposure, because the risk of occupational asthma in this sensitized population is up to 20%. Alternatively, institutions may elect to enroll all animal workers in a respiratory protection program attempting to prevent initial sensitization.

Some species carry zoonotic diseases which can be prevented through immunization, or detected early through medical surveillance. For these workers, the occupational health program should provide appropriate immunization and/or periodic medical screening exams. Examples include rabies, carried by ferrets, dogs, bats and other species, and *Coxiella burnetii* (Q Fever) carried by ruminants. Other zoonotic diseases, such as simian herpes B virus carried by certain

non-human primates, require specialized knowledge to deliver immediate medical care and postexposure prophylaxis, to prevent life-threatening infection in the event of a bite, splash or scratch. The occupational health practitioner caring for primate handlers must understand these risks, and have excellent rapport with the veterinarians and animal facility managers. Education and protocols for bite management must be established and communicated in advance. Exposure management often requires coordination of testing for both the animal and the human involved.

Serum banking, once a mainstay of occupational health programs for animal workers, has proven to be of little utility. While for certain agents or hazards, serum banking may be a compliment to the program, it should not be used as a substitute for regular thoughtful medical evaluation.

<http://www.cdc.gov/ncidod/srp/animals/laboratory.html>

<http://www.cdc.gov/od/ohs/biosfty/bmb15/bmb15toc.htm>

<http://www.osha.gov/SLTC/laboratories/index.html>

<http://www.cdc.gov/od/ohs/>

<http://www.nap.edu/catalog/10713.html>

International Travel

International travel has become more common for employment, recreation, education, and medical missions. Employees should be evaluated and educated in advance of travel regarding health risks.

Healthcare workers who will be carrying out clinical work in HIV-endemic areas of the world without ready availability of antiretroviral medications should be provided with an initial supply of antiretroviral medications and a method to access sufficient medications for a full 28-day course in the event of bloodborne exposure from an HIV-positive source patient.

Institutions which send healthcare workers to areas of the world where extensively drug resistant tuberculosis (XDR TB) is present, and where existing infection control measures have not been shown to adequately control transmissions, may consider use of BCG vaccination. Institutions which make BCG vaccination available to healthcare workers traveling to such environments should make clear that the vaccine has been associated with varying levels of protection, that protection is by no means complete, and that all other infection control measures must continue to be assiduously followed. Due to its interference with tuberculin skin testing, tuberculosis surveillance among recent BCG recipients must be carried out using the QuantiFERON-TB Gold assay.

Discussion of diseases typically encountered in the developing world, their prevention and treatment can be found at www.cdc.gov/travel. Protective immunization guidelines are published by the U.S. Centers for Disease Control and Prevention (CDC). Post-travel evaluation and/or testing should be performed as necessary, particularly if illness has occurred during or after travel.

<http://wwwn.cdc.gov/travel/>

<http://wwwn.cdc.gov/travel/content/Vaccinations.aspx>

<http://wwwn.cdc.gov/travel/content/PresentationsHealthPros.aspx>

<http://www.cdc.gov/ncidod/eid/>

PHYSICAL HAZARDS

Physical hazards commonly found in healthcare facilities include electrical hazards, noise, slipping/tripping/falling hazards, heat, poor lighting, inadequate ventilation, and working with medical equipment such as lasers and x-ray equipment. Occupational health services should support the development of a comprehensive safety program. The program should include medical surveillance activities, environmental surveillance reports, safety reviews, incidents reports, and review in promotion of safe work practices.

Physical hazards include trauma resulting from being struck by an object, in fall etc., electrocution, ionizing radiation, non-ionizing radiation, including lasers, noise, asphyxiation in confined spaces, and heat and cold stresses resulting from ambient weather or from heating, ventilation, and air conditioning problems. Many healthcare worksites have typical industrial exposure hazards, associated with shop activities, including plumbing, heating/cooling, electric, carpentry tasks, laundry, and housekeeping. Where indicated, surveillance may be necessary for repetitive motion/cumulative trauma disorders, shop safety, vision and hearing protection, and instruction in compliance in the use of personal protective equipment. Healthcare institutions should be instrumental in developing safety programs that incorporate OSHA standards, corporate policies, and best practice guidelines. They should encourage compliance as part of their "corporate culture." These programs should include medical surveillance activities, environmental surveillance reports and review, safety reviews, review of incident reports and mechanisms for employees to report hazardous activities and participate in the development solutions.

<http://www.osha.gov/SLTC/etools/hospital/mainpage.html>

Laser safety

The growing use of lasers in both inpatient and ambulatory settings has increased the need for comprehensive laser safety programs. ANSI standard Z. 136.3 (1986) addresses a number of safety and specific medical issues pertinent to laser use. A baseline ophthalmology history and screening exam is recommended by ANSI. This may include use of precise visual acuity testing, using visual contrast sensitivity. Exit examinations often include Amsler grid examination, to document normal visual field performance. Proper eye protection should be provided. Local exhaust ventilation and personal protective equipment should be considered for control of exposure to the surgical plume. Administrative and engineering controls may be helpful to decrease the number of potential exposures.

<http://www.osha.gov/SLTC/laserelectrosurgeryplume/index.html>

<http://www.osha.gov/SLTC/laserhazards/index.html>

Ionizing radiation

Programs should comply with federal and state regulations regarding ionizing and non-ionizing radiation and the radiation safety committee should include personnel from the employee health medical and nursing staff as well as radiology, nuclear medicine, surgery and physical plant workers.

<http://www.osha.gov/SLTC/radiation/index.html>

<http://www.osha.gov/SLTC/radiationionizing/index.html>

Nonionizing radiation (NIOSH)

http://www.osha.gov/SLTC/radiation_nonionizing/index.html

Ergonomic

Ergonomic issues arise in almost all activities performed in healthcare facilities. Of particular concern are back injuries and repetitive motion/cumulative, trauma disorders. Back problems continue to be the leading cause of lost time injuries among healthcare workers. Recent data suggest that the incidence of back injury is highest among nurse aides and exceeds even the incidence rate of back injury in industrial workers. Cumulative trauma is an issue with clerical workers, laboratory personnel, custodial workers and potentially the entire hospital workforce. OHS should work closely with purchasing, administration and safety in the acquisition, implementation and design of facilities and equipment. The establishment of ergonomic committees and surveys and the development of systematic approaches to ergonomic hazards with written programs are essential. Technology has evolved to the point where minimal lift policies are economical, practical and safe in many institutions.

Integrated approaches to safe patient movement and handling are increasingly common in acute care hospitals. Such programs should include identification of high risk areas, assessment of hazards, selection of equipment, training, maintenance, and development of no-lift policies. Use of safe patient handling equipment has been associated with substantial reductions in injuries among acute care hospital personnel.

<http://www1.va.gov/visn8/patientsafetycenter/resguide/ErgoGuidePtOne.pdf>

<http://www.osha.gov/ergonomics/guidelines/nursinghome/index.html>

<http://www.cdc.gov/niosh/topics/ergonomics/>

<http://www.aohp.org/About/documents/GSBeyond.pdf>

<http://www.cdc.gov/niosh/docs/wp-solutions/2006-148/>

<http://www.cdc.gov/niosh/docs/2006-117/>

CHEMICAL HAZARDS

Healthcare workers may be exposed to a wide variety of potentially toxic chemicals. Exposures can occur either during accidents or during normal working conditions. The effects may range from minor skin irritation to possible mutagenic effects, chronic disease (e.g. occupational asthma) or adverse reproductive outcomes. OHS should have access to clinical toxicology, appropriate industrial hygiene monitoring, environmental control methodology, and recommended and/or regulatory exposure levels. Material Safety Data Sheets (MSDS), computerized databases and poison control centers may be helpful in obtaining information regarding chemical exposures.

<http://www.cdc.gov/niosh/npg/>

<http://www.osha.gov/web/dep/chemicaldata/#target>

<http://www.acgih.org/sitemap.htm>

Many databases are now available to provide toxicologic and other useful information on chemical substances. Extensive research is available through TOXNET. Poison control centers (1-800-222-1222) are often very helpful in providing information on the treatment of occupational chemical exposures. Many states have passed "Right to Know" legislation requiring worker education about hazardous substances in collection of health hazard data. Because employee knowledge of hazards and safe work habits is essential to prevent occupational illness, each institution should develop educational policies to ensure that workers are familiar with potential hazards and encourage workers to follow safe work practices. OSHA's Hazard Communication Standard (CFR 1919.1200) requires employers to make employees aware of hazards to which they may be exposed through the use of labels, material safety data sheets, and training programs. Proper emergency procedures must be developed and effective safety equipment made available. If respirators are required, OHS should ensure that workers are properly trained to use them. Fit-testing, proper care of respirators, and surveillance require input from OHS. MSDS should be readily available at the worksite as well as at Occupational Health. Hazard information should be communicated through labels, formal training programs, and a written hazard communication program. Employee training should encompass the following: 1) How to access and utilize available hazard information (read and interpret labels and MSDS); 2) Identification and characteristics of hazards present at the worksite; 3) Employee protection plan detailing the use of personal protective equipment, safe work practices, and engineering controls. Proper glove and respirators selection should be stressed.

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=TESTIMONIES&p_id=349

<http://www.osha.gov/SLTC/carcinogens/index.html>

http://www.osha.gov/dts/chemicalsampling/toc/toc_chemsamp.html

<http://www.atsdr.cdc.gov/>

<http://www.atsdr.cdc.gov/MHMI/mmg.html>

<http://toxnet.nlm.nih.gov/>

Specific chemical exposures:

Latex Hypersensitivity

Allergic responses to latex materials have been identified as a substantial issue for healthcare providers and their patients. The response is varied and may rarely be fatal. The delayed hypersensitivity reaction (Type IV) appears as an eczematous local contact allergic dermatitis. It is usually not due to latex itself but primarily to chemicals added to accelerate curing of rubber during glove manufacturing. Immediate hypersensitivity (Type I) is a local and systemic allergic response to natural rubber latex protein that is associated with rapid onset of urticaria, which may progress to rhinitis, respiratory symptoms, angioedema or asthma. Exposure leading to these symptoms may occur by direct contact or by inhalation of aerosolized latex. Latex dust may be difficult to eliminate once it has permeated carpeting, furniture and ductwork. Immediate hypersensitivity responses are mediated by IgE, and may be diagnosed with IgE RAST serum testing or (under carefully monitored circumstances) skin prick testing with natural latex. Information about latex allergy should be disseminated to healthcare employees, students, ancillary personnel and patients. Facilities should identify latex containing products (gloves, condoms, catheters, balloons, tourniquets, anesthesia equipment, respirator bellows, airways, etc.) Appropriate evaluation, restrictions and reasonable accommodations if indicated, should be

provided to the potentially affected employee. OHS staff should know that many other agents cause asthma in health care workers

A latex allergy policy can facilitate the proper establishment of latex safe environments to meet the needs of patients and employees. This policy should address purchasing, admitting, education, latex safe areas and signage, as well as patient care issues. The major latex reduction methods to consider are conversion to powder-free latex gloves, which significantly reduce latex aerosolization, or conversion to non-latex gloves.

<http://www.osha.gov/SLTC/latexallergy/index.html>

<http://www.cdc.gov/niosh/topics/latex/>

<http://www.spinabifidaassociation.org/atf/cf/%7BEED435C8-F1A0-4A16-B4D8-A713BBCD9CE4%7D/2007%20Latex%20Lists.pdf>

Disinfectants

Exposure to disinfectants and cleaning solutions is a common cause of chemical injuries among medical center employees, with housekeepers and maintenance workers at greatest risk. Glutaraldehyde irritates skin and mucous membranes and may cause allergic contact dermatitis, rhinitis, and asthma. Perchloroacetic acid causes similar problems. Bleach is an irritant and, in high concentrations, may cause burns of the skin, mucous membranes and eyes. The use of soaps in handwashing is a common cause of skin irritation and less commonly contact dermatitis among nursing and medical staff. The recently published CDC guidelines on handwashing emphasize the use of disinfectants and skin protecting lotions to prevent irritant contact dermatitis. Regulatory inventory review is necessary for proper product control and safety.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a2.htm>

http://www.steriloxtechnologies.com/PDFs/Guideline_for_Selection_Use.pdf

Ethylene oxide

Ethylene oxide is a colorless gas used to sterilize temperature sensitive, medical instruments. It has a distinctive sweet odor, but the average odor threshold is relatively high. Ethylene oxide is regulated by OSHA as a carcinogen. Medical surveillance is required for employees with exposure over the action level. The area of highest exposure risk is in central sterilization areas, and risk reduction requires engineering controls and continuous or periodic air monitoring (preferably with an alarm system) as well as good work practices. Instruments sterilized with ethylene oxide must be aerated in aeration cabinets before they are used. Ethylene oxide exposure most commonly occurs via dermal absorption or inhalation so appropriate PPE is indicated. Medical surveillance (OSHA) may also be indicated in light of the known association of ethylene oxide with increased spontaneous abortion, mutagenicity, carcinogenicity (stomach, leukemia and other hematopoietic cancers) and neurotoxicity at higher exposure levels. It is unclear whether lower level exposure settings require ongoing medical surveillance. If done, surveillance should focus on the hematopoietic, reproductive, renal, and nervous systems.

<http://www.osha.gov/SLTC/ethyleneoxide/index.html>

Formaldehyde

Exposure risk areas include autopsy rooms, pathology laboratories and dialysis units. Exposure

also occurs in endoscopy and surgical facilities. If action levels are exceeded, preplacement and periodic examinations should include baseline and periodic pulmonary, dermal, and hepatic evaluations. PPE (including appropriate gloves) should be available in areas where spills are likely and should include spill absorbent materials and appropriate personal protective equipment. Odor is not a reliable warning for the presence of formaldehyde, because the ability to smell formaldehyde is quickly extinguished.

<http://www.osha.gov/SLTC/formaldehyde/index.html>

Glutaraldehyde

Glutaraldehyde is a commonly used solution for cold sterilization. Absorption may occur by inhalation, dermal contact or ingestion. Ventilation controls are important. Allergic eczema and mucous membrane irritation in humans, as well as fetotoxicity and laboratory mice indicate the need for PPE. Environmental monitoring and control of exposures is important to prevent health problems. Glutaraldehyde solutions must be dated so that proper exchange of the solution can occur before it loses its bactericidal effectiveness.

<http://www.cdc.gov/niosh/topics/glutaraldehyde/>

http://www.osha.gov/dts/chemicalsampling/data/CH_243400.html

<http://www.osha.gov/SLTC/etools/hospital/hazards/glutaraldehyde/glut.html>

Asbestos

OSHA requires surveillance and recordkeeping for workers with current exposure. Although controversial, OSHA regulations do not require ongoing medical surveillance once the hazard has been remediated. This is nevertheless recommended in good occupational medical practice. Asbestos is still frequently encountered during routine maintenance activities, renovation projects, and demolition for new construction. Workers should work in a sealed environment using appropriate PPE. Periodic air sampling is required to document the level exposure. Medical surveillance activities should include reinforcement of good work habits. Smoking cessation should be emphasized. Regulations guiding the removal and management of asbestos fall under both EPA and OSHA compliance constraints.

<http://www.osha.gov/SLTC/asbestos/index.html>

<http://www.cdc.gov/niosh/topics/asbestos/>

Mercury

Mercury is present in various laboratories and some physical plant instruments and switches. It may also be present in gastrointestinal equipment and supplies, blood pressure measurement devices/sphygmomanometers, plumbing systems, batteries and fluorescent bulbs. Laboratory fixatives and reagents should be certified mercury free. Many chemical analyses report no mercury at the lowest concentration detectable: in these cases the detection limit should be specified. While many health care institutions still use mercury thermometers or blood-pressure devices, physical plant and safety personnel must remain knowledgeable regarding the cleanup of spills. Personnel should receive training in the hazard of mercury exposure and importance of reporting spills promptly. Personnel involved in the cleanup of spills should have training and use respirator and appropriate PPE. Safe and accurate substitutes for mercury thermometers and

blood-pressure devices do exist.

There is a memorandum of understanding between the US EPA and American Hospital Association seeking virtual elimination of Mercury from the hospital waste system.

<http://www.noharm.org/us/mercury/resources>

<http://www.epa.gov/glnpo/bnsdocs/merchealth/>

http://www.who.int/water_sanitation_health/medicalwaste/mercurypolpaper.pdf

Anesthetic Gases

Possible adverse effects among personnel heavily exposed to anesthetic agents include hepatotoxicity, reproductive hazards and perceptual, cognitive and motor skill impairment. Meticulous attention to safe work practices and proper use and maintenance of mandated anesthetic gas scavenging systems will greatly reduce potential for exposure. Area and personal monitoring are necessary to assure adequate control: Anesthesia personnel should not identify gases by smell. Room ventilation turnover and local exhaust ventilation should meet mandated guidelines. Equipment should be checked routinely for trace anesthetic gas levels

<http://www.cdc.gov/niosh/docs/2007-151/>

<http://www.cdc.gov/niosh/77-140.html>

<http://www.osha.gov/dts/osta/anestheticgases/index.html>

<http://www.osha.gov/SLTC/wasteanestheticgases/index.html>

<http://www.osha.gov/SLTC/wasteanestheticgases/solutions.html>

Methyl Methacrylate

Methyl methacrylate is an acrylic substance used as a cement for dental and orthopedic implants. It is compounded by mixing a powder and liquids that are provided separately and has been associated with mucous membrane irritation and headache in operating room personnel. It is known to cause both allergic dermatitis and asthma. Degenerative liver changes have been reported in animals. Exhaust ventilation from the site of use and mixing in a closed container with attached exhaust are instrumental in limiting exposure. Some acrylics now undergo ultraviolet curing. This has been reported associated with a photosensitization hazard though poorly described.

http://www.osha.gov/dts/chemicalsampling/data/CH_254400.html

<http://www.cdc.gov/niosh/hcwold5b.html>

<http://www.epa.gov/ttn/atw/hlthef/methylme.html>

Hazardous Drugs

Many pharmaceutical agents have been reported to be carcinogenic, mutagenic or teratogenic in animal studies and limited human studies. Studies of occupational exposures have shown detectable levels of antineoplastic and other drugs, such as Pentamidine and Ribavirin, in the air

of hospital pharmacies with no ventilation hoods, and in patient rooms with no environmental control measures. Pharmacy personnel and nurses working with chemotherapeutic drugs have been reported to have increased sister chromatid exchanges, chromosomal gaps, and mutagenic agents in their urine. More recently trace quantities have been demonstrated even in facilities with appropriate engineering controls though the problem is usually attributed to poor maintenance and work practices. Each institution should develop policies consistent with OSHA guidelines designed to ensure the safety of personnel dealing with cytotoxic (antineoplastic) and other hazardous drugs.

Nurses and pharmacists are particularly susceptible to exposure to antineoplastic agents, but potential exposure to other employees, such as housekeepers handling contaminated linens, should not be overlooked. Education and strict adherence to good technique are necessary to limit exposure. Pharmacists should use vertical exhaust hoods and wear appropriate PPE. Nursing staff must practice meticulous technique to avoid spills, leaks and accidental needlestick injuries. Both skin absorption and inhalation exposure can be limited in these ways. NIOSH and OSHA recommend that personnel involved with preparation and administration of antineoplastics should be included in medical monitoring programs focusing on hematologic and reproductive systems. Employees should be encouraged to report known or suspected breaches in protection or inadvertent exposures, which warrant immediate evaluation and follow-up with a significantly higher likelihood of measurable injury/disease than would result from periodic testing.

<http://www.cdc.gov/niosh/topics/hazdrug/>

<http://www.cdc.gov/niosh/topics/antineoplastic/>

<http://www.osha.gov/SLTC/hazardousdrugs/index.html>

<http://www.cdc.gov/niosh/docs/2004-165/>

Lead and Cadmium

Alloys containing lead and cadmium are frequently encountered in cancer radiation therapy centers. Although these compounds generally present little in the way of fume hazards, processes such as grinding and filing may introduce lead and cadmium dust into the working environment. Proper work hygiene is essential to minimize the potential hazards. There are extensive OSHA medical surveillance guidelines covering lead and cadmium.

<http://www.osha.gov/SLTC/lead/index.html>

<http://www.osha.gov/SLTC/cadmium/index.html>

Nitric Oxide

Nitric oxide was approved by the FDA in 1999 for use as a vasodilator in the treatment of hypoxic respiratory failure in full and near term infants. It is a colorless, essentially odorless gas with a very narrow therapeutic window for patients. Acute exposure effects include mucous membrane irritation and drowsiness. More serious effects include methemoglobinemia, delayed pulmonary toxicity and damage and central nervous system effects. Exposed employees may be relatively asymptomatic at the time of exposure and take as long as 72 hours to manifest clinical symptoms. OSHA classifies nitric oxide as a highly hazardous substance.

http://www.osha.gov/dts/chemicalsampling/data/CH_256700.html

<http://www.cdc.gov/niosh/npg/npgd0448.html>

<http://www.sciencedirect.com/science/journal/10898603>

Other hazardous chemicals (NIOSH)

Peracetic acid

<http://www.cdc.gov/niosh/hcwold5b.html>

Solvents

<http://www.cdc.gov/niosh/hcwold5b.html>

Quaternary ammonium compounds

<http://www.ncbi.nlm.nih.gov/pubmed/11007347>

<http://www.inchem.org/documents/pims/chemical/pimg022.htm>

Freon

<http://www.cdc.gov/niosh/hcwold5b.html>

HAZARDS RELATED TO THE GENERAL MEDICAL CENTER ENVIRONMENT

Environmental Surveillance and Control

Because Healthcare workers may be exposed to a number of potential hazards, the environmental control program must be able to identify potential hazards, evaluate the nature and extent of the exposure and recommend effective control measures. Specific training and policies should meet OSHA, EPA, CDC and other governmental requirements and guidelines.

Areas of particular concern include:

- 1) Ventilation, including routine inspection and servicing of laminar flow hoods, heating, ventilation, air conditioning, and humidification units, etc.
- 2) Confined space entry.
- 3) Medical waste management and disposal.
- 4) Electromagnetic radiation and radioisotopes.
- 5) Ergonomic issues, including selection and modification of office equipment, lifts and hoists, etc.
- 6) Proper hygiene practices around chemical substances.
- 7) Proper procedures where exposures to blood or body fluids may occur.
- 8) Noise exposure.

Waste management

Waste management, while costly, impacts the health of employees, patients and visitors. It may also result in regulatory violations and fines. Although a full discussion of this topic is outside the scope of this document, minimizing harm to the environment is an important issue. There are also direct and obvious benefits to employees: reducing the amount of waste that has to be collected and treated as hazardous or infectious, which reduces risk of employee exposure as well as decreases the frequency and intensity of lifting and sorting waste. Goals of effective waste management include reduced environmental impact, increased patient safety, increased patient confidentiality, decreased operating costs, enhanced public image for Healthcare and improved employee morale.

http://www.healthcarewaste.org/en/340_manag_medium.html

<http://www.noharm.org/>

http://www.sustainablehospitals.org/cgi-bin/DB_Index.cgi

<http://www.epa.gov/oppt/library/pubs/archive/acct-archive/pubs/hospitalreport.pdf>

Reproductive hazards

Policies for employee education regarding potential exposures to teratogenic agents (e.g., chemotherapeutic agents and the antiviral agent Ribavirin) and appropriate safety measures should be developed. Corporation and communication with the employee's obstetrician is important.

Many work assignments in a hospital setting entail potential exposures of special concern to pregnant personnel. Infectious exposures, such as cytomegalovirus, parvovirus B19, measles, rubella and others are well established to cause fetal harm among susceptible individuals. Heavy exposures to anesthetic gases and chemotherapeutic agents have also been associated with adverse pregnancy outcomes in some studies. There does not appear to be adequate evidence for adverse pregnancy outcomes among pregnant personnel exposed to MRI, nitric oxide, or among those who work under present-day conditions as x-ray technicians. Currently applicable CDC infection control guidelines for infectious agents, NIOSH and OSHA procedural guidelines for handling chemical agents, and OSHA and NRC standards for monitoring and managing radiation exposure are protective of pregnant personnel, and must be strictly enforced.

Six viruses of special concern to pregnant women are cytomegalovirus, herpes simplex, measles, parvovirus B19, rubella, and varicella zoster.

Cytomegalovirus (CMV) infection during pregnancy may be associated with hearing loss in the newborn or with the congenital CMV syndrome, which may affect multiple organ systems. CMV may be shed by CMV-infected infants or children, or by CMV-infected immunocompromised patients. Studies have shown, however, that the rate of primary CMV infection among those who care for such patients is no higher than the rate among those without such patient contact. Studies in areas with a high CMV prevalence among patients have also shown that healthcare workers do not have higher CMV transmission rates than non-healthcare workers. Although most fetal infections follow primary infection of the mother, some fetal infections have occurred following reactivation of old infection in the mother or reinfection of the mother. There is no clear evidence that reassignment of CMV-negative pregnant personnel to areas of less patient contact confers protection to such personnel. Assiduous adherence to handwashing and to Standard Precautions is necessary for pregnant healthcare workers caring for CMV-infected patients.

Herpes simplex (HSV) infection during pregnancy has been associated with mucocutaneous lesions, sepsis, encephalitis, and rarely congenital malformations. Herpes simplex infection from patient care activities is unlikely. Pregnant personnel caring for patients with HSV infections should adhere to handwashing and Standard Precautions.

Measles exposure during pregnancy has been associated with spontaneous abortion and with prematurity. Measles is transmitted by large droplets and via the airborne route. Measles vaccine is protective, and two doses administered subsequent to the first birthday are considered adequate evidence of immunity. Patients with measles should be cared for by vaccinated personnel under airborne precautions. Non-immune pregnant personnel should not care for patients with measles.

Rubella exposure during pregnancy may cause the rubella congenital syndrome, which affects multiple organ systems. Rubella is spread via respiratory droplets, or (in the case of infants with congenital rubella) by contact. Women immune to rubella by vaccination are not at risk of adverse events if exposed during pregnancy. Patients with rubella should be cared for by

vaccinated personnel under droplet and contact precautions. Non-immune pregnant personnel should not care for patients with rubella or with the congenital rubella syndrome.

Varicella zoster (VZV) (the virus which causes chicken pox and herpes zoster) may cause fetal malformations when a non-immune pregnant mother is exposed. VZV is spread by contact or via the airborne route. Patients with chicken pox or with herpes zoster should be cared for by personnel with established serological immunity using contact and airborne precautions. Non-immune pregnant personnel should not care for patients with chicken pox or herpes zoster.

Parvovirus B19, the cause of fifth disease, may cause fetal death if exposure occurs during the first half of pregnancy. Infection is spread by large respiratory droplets and close contact. While rare, transmissions of parvovirus to healthcare workers have been documented. Droplet precautions must be employed during care of patients with parvovirus infection.

Building Associated Illness/Indoor Air Quality

Healthcare facilities must develop an indoor environmental program to ensure a healthy building environment. Central to this mission is the use of ventilation standards, development of good operations and maintenance procedures, establishment of construction and remediation standards and effective management of moisture, mold, and other indoor environmental problems. At present the American Institute of Architects (AIA) maintains recommendations for hospital ventilation that differ from those of the American Society for Heating, Refrigerating, and Air conditioning Engineers, but those standards are under alignment. Hospital ventilation systems are usually far more complex than those of office buildings, hotels, or schools because of the multiple uses and locations, including operating rooms, bone marrow transplant units, and sterilization areas. Systems in hospitals degrade, and construction management requires the development of formal approaches to controlling bioaerosols release in health care. In addition, water intrusion, from construction or systems failure, is not infrequent and requires structured responses

Indoor air quality (IAQ) complaints must be properly evaluated in a timely fashion. Facilities are generally more successful if they have a defined procedure including ways of reporting complaints, designated responders, and a formal approach to providing feedback. Assessment of individuals and of the environment may occur in parallel but require very different skills. Clinicians should assess staff, patients, or visitors to determine whether symptoms may represent building-related disease or irritant symptoms and differentiate between illness to chemical the exposures (e.g., off gassing of carpet, tobacco smoke, combustion products), inadequate ventilation, and illness of microbiologic origin. In many situations, psychosocial factors, including job satisfaction and work organization, contribute to the perception of discomfort and disease. The primary environmental assessment generally requires an engineering assessment of the systems and, often, an industrial hygiene assessment of potential sources. In general, quantitative sampling should be limited to the specific contaminants suspected by the environmental and medical assessments, with a very clear justification for sample collection. Detailed reporting of findings should be made to management and to the affected employees.

<http://www.osha.gov/SLTC/indoorairquality/index.html>

<http://www.epa.gov/iaq/molds/>

<http://www.epa.gov/iaq/pubs/hpguide.html>

<http://www.cdc.gov/niosh/topics/noise/>

<http://www.cdc.gov/niosh/topics/heatstress/>

VIOLENCE PREVENTION

Violence represents a common problem in healthcare. In general 12% to 14% of health care workers in the US experience at least one assault each year, and more assaults occur in healthcare than in any other industry in North America, though the rates of fatal assault are higher in some (cab drivers) and the incidence of deaths is higher in others (construction). NIOSH has classified violence by perpetrator, as a more useful approach. Type 1 violence represents that by clients (students on teachers, patients on providers, prisoners on guards), type 2 criminal, type 3 family/spouse, and type 4 coworkers. Programs for different kinds of violence prevention may require somewhat different approaches although response protocols often have substantial overlaps. Under-reporting of incidents is recognized as quite dramatic with only one in fifteen incidents leading to injuries reported to both security and workers compensation systems.

The vast majority of events in health care represent patient assaults on providers. High risk occupations include nursing (RN, LPN, and NA) and police and security staff. High risk locations include mental health, geriatrics, and emergency rooms. In general, the more intense the contact with patients, the higher the risk of assault. Intervention programs with documented effectiveness include education, flagging/warning of patients who have previously assaulted, and environmental intervention including wall colors, music, development of zero-tolerance policies, and plastic table ware.

Rates of co-worker assaults are lower than in general industry. Still, stressful working conditions and organization conflict are clearly associated with a wide- range of violence, ranging from passive aggressive behavior, including information withholding, to assault and battery with deadly weapons. Interventions include education, stress management, staffing improvement, supervisor training and support, and reporting.

OSHA has published and updated guidelines for the prevention of violence in healthcare. These guidelines address education and training, policy development, environmental management, and response procedures. NIOSH similarly has guidance for violence prevention in the work place. A standard free training tool has evolved in the Veterans Health Administration from the original work on violence prevention in health care developed in the late 1970s. That program served as the core of many of the currently commercially available programs. No side-to-side comparisons of program effectiveness have been undertaken.

Effective programs require careful assessment of an organizations needs, location, and staffing and patients. Model policies should address the following major program elements

- Zero tolerance
Some policies explicitly state that no violence of any kind will be tolerated. Essential is the establishment of a clear definition of violent acts, clarity on consequences, and an institutional strategy for implementation. "Zero tolerance" approaches have been misused, in a number of settings, so that careful implementation is necessary including focusing on passive-aggressive behavior and provocation
- Violence prevention through environmental design
The concept of defensible space, so effective elsewhere, is less useful in healthcare since contact between providers and patients is essential. Understanding the function of space, symbolically and practically, and how to use barriers, doorways, and privacy is essential.
- Education and training
Initial awareness, acquisition of specific skills, and retraining in some defined frequency is important. Skills in de-escalating conflict, in personal safety (breaking holds), and reporting must be acquired.
- Patient assessment and warning

One well-documented, very effective approach to reducing the frequency and severity of repeat assaults is to warn healthcare workers of prior assaults. This may occur through flags in an electronic medical record or some physical marker on paper charts. This approach requires the presence of a multidisciplinary committee, usually under senior clinical leadership, that reviews patient histories, evaluates the adequacy of medical care, and decides on the presence of a flag and its likely duration (time to re-review)

- Threat Assessment

Facilities must have resources to address the degree of real threat, both from patients and from staff and co-workers. Threat assessment training is available from several organizations.

- Incident Response

Alarms and warnings are essential to notification. These range from minor signage (raising a red folder in a public space) to use of emergency call buttons and cell phones with speed-dial systems. Facility wide announcements ("code orange") are standard.

Facilities tend to rely on therapeutic or police containment. The former requires a three-sift approach with at least three people per incident who use passive force and weight to bring a patient under control. Police force is self-explanatory. The former is far more respectful of patient care and ethics but requires a very degree of training, scheduling coordination, and ongoing attention.

- Post-incident management

Post-incident management approaches to the prevention of long-term consequences are available to patients/employees and bystanders. Victims may develop acute stress reactions, and warrant clinical treatment, or post-traumatic disorders. Critical incident stress debriefing has been shown, meanwhile, to perform at least no better than no treatment if not worse. A psychohygiene approach has been developed for bystanders.

- Reporting and surveillance

Facilities should develop some approach to reporting, which may include electronic/remote call buttons, cell phone, and beepers. Reporting should lead to some structured response. Facilities should develop a system whereby they can collect information from both workers compensation and security/police reports to track incident frequency, locations, and perpetrators, in an attempt to evaluate program effectiveness

<http://www.cdc.gov/niosh/topics/violence/>

<http://www.osha.gov/SLTC/workplaceviolence/index.html>

<http://www.vethealth.cio.med.va.gov/osh/violence-prevention.htm>