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Chapter 1 : CDC - NIOSH Pocket Guide to Chemical Hazards (NPG) Introduction

which of the following is a consequence of organic impairment resultinf from long-term substance use, as opposed to being a consequence of drug toxicity alcohol amnestic disorder Judd has been drinking heavily for a number of years.

The Pocket Guide presents key information and data in abbreviated tabular form for chemicals or substance groupings e. The industrial hygiene information found in the Pocket Guide should help users recognize and control occupational chemical hazards. Background In , NIOSH which is responsible for recommending health and safety standards joined OSHA whose jurisdictions include promulgation and enforcement activities in developing a series of occupational health standards for substances with existing PELs. The Standards Completion Program developed substance-specific draft standards with supporting documentation that contained technical information and recommendations needed for the promulgation of new occupational health regulations. The Pocket Guide was developed to make the technical information in those draft standards more conveniently available to workers, employers, and occupational health professionals. The Pocket Guide is updated periodically to reflect new data regarding the toxicity of various substances and any changes in exposure standards or recommendations. Data Collection and Application The data were collected from a variety of sources, including NIOSH policy documents such as criteria documents and Current Intelligence Bulletins CIBs , and recognized references in the fields of industrial hygiene, occupational medicine, toxicology, and analytical chemistry. NIOSH also recommends appropriate preventive measures to reduce or eliminate the adverse health and safety effects of these hazards. To formulate these recommendations, NIOSH evaluates all known and available medical, biological, engineering, chemical, trade, and other information relevant to the hazard. NIOSH recommendations are published in a variety of documents. Criteria documents recommend workplace exposure limits and appropriate preventive measures to reduce or eliminate adverse health effects and accidental injuries. Current Intelligence Bulletins CIBs are issued to disseminate new scientific information about occupational hazards. A CIB may draw attention to a formerly unrecognized hazard, report new data on a known hazard, or present information on hazard control. Alerts, Special Hazard Reviews, Occupational Hazard Assessments, and Technical Guidelines support and complement the other standards development activities of the Institute. Their purpose is to assess the safety and health problems associated with a given agent or hazard e. Although these documents are not intended to supplant the more comprehensive criteria documents, they are prepared to assist OSHA and MSHA in the formulation of regulations. How to Use This Pocket Guide The Pocket Guide has been designed to provide chemical-specific data to supplement general industrial hygiene knowledge. To maximize the amount of data provided in this limited space, abbreviations and codes have been used extensively. These abbreviations and codes, which have been designed to permit rapid comprehension by the regular user, are discussed for each column in the following subsections. The CAS number, in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized data bases. This agreement was assigned to Symyx Technologies, Inc. For more information visit the Accelrys web siteExternal. Their format is xxxx yyy. The Guide number yyy refers to actions to be taken to stabilize an emergency situation; this information can be found in the Emergency Response Guidebook External Pipeline and Hazardous Materials Safety Adminstration, U. Please note however, that many DOT numbers are not unique for a specific substance. Synonyms and Trade Names This section of each chemical table contains an alphabetical list of common synonyms and trade names for each chemical. This index also includes the primary chemical names for all of the chemicals in the Pocket Guide. The appeals court also vacated new PELs for substances that were not previously regulated. Enforcement of the court decision began on June 30, In addition, there are a number of substances from Table Z-2 e. Appendix D contains a brief discussion of substances included in the Pocket Guide with no established RELs at this time. These criteria formed a tiered approach, preferentially using acute human toxicity data, followed by acute animal inhalation toxicity data, and then by acute animal oral toxicity data to determine a preliminary

updated IDLH value. When relevant acute toxicity data were insufficient or unavailable, NIOSH also considered using chronic toxicity data or an analogy to a chemically similar substance. The purpose for establishing an IDLH value in the Standards Completion Program was to determine the airborne concentration from which a worker could escape without injury or irreversible health effects from an IDLH exposure in the event of the failure of respiratory protection equipment. The IDLH was considered a maximum concentration above which only a highly reliable breathing apparatus providing maximum worker protection should be permitted. In determining IDLH values, NIOSH considered the ability of a worker to escape without loss of life or irreversible health effects along with certain transient effects, such as severe eye or respiratory irritation, disorientation, and incoordination, which could prevent escape. As a safety margin, IDLH values are based on effects that might occur as a consequence of a minute exposure. Physical Description This entry provides a brief description of the appearance and odor of each substance. Notations are made as to whether a substance can be shipped as a liquefied compressed gas or whether it has major use as a pesticide. Chemical and Physical Properties The following abbreviations are used for the chemical and physical properties given for each substance.

Chapter 2 : Lead poisoning - Wikipedia

o No medications have been shown to address the cognitive symptoms of FTD o Much more is known about treatments for Alzheimer's disease than for the other forms of dementia. o Medications may help slow decline, but they do not restore memory function to previous levels.

Occupational exposure has resulted in erethism, with irritability, excitability, excessive shyness, and insomnia as the principal features of a broad-ranging functional disturbance. With continuing exposure, a fine tremor develops, initially involving the hands and later spreading to the eyelids, lips, and tongue, causing violent muscular spasms in the most severe cases. The tremor is reflected in the handwriting which has a characteristic appearance. In milder cases, erethism and tremor regress slowly over a period of years following removal from exposure. Decreased nerve conduction velocity in mercury-exposed workers has been demonstrated. Long-term, low-level exposure has been found to be associated with less pronounced symptoms of erethism, characterized by fatigue, irritability, loss of memory, vivid dreams, and depression WHO, The man affected is easily upset and embarrassed, loses all joy in life and lives in constant fear of being dismissed from his job. He has a sense of timidity and may lose self control before visitors. Thus, if one stops to watch such a man in a factory, he will sometimes throw down his tools and turn in anger on the intruder, saying he cannot work if watched. Occasionally a man is obliged to give up work because he can no longer take orders without losing his temper or, if he is a foreman, because he has no patience with men under him. Drowsiness, depression, loss of memory and insomnia may occur, but hallucinations, delusions and mania are rare. The most characteristic symptom, though it is seldom the first to appear, is mercurial tremor. It is neither as fine nor as regular as that of hyperthyroidism. It may be interrupted every few minutes by coarse jerky movements. It usually begins in the fingers, but the eyelids, lips and tongue are affected early. As it progresses it passes to the arms and legs, so that it becomes very difficult for a man to walk about the workshop, and he may have to be guided to his bench. Signs and symptoms can include red fingers, red toes, red cheeks, sweating, loss of hearing, bleeding from the ears and mouth, loss of appendages such as teeth, hair, and nails, lack of coordination, poor memory, shyness, insomnia, nervousness, tremors, and dizziness. Some medications that can be used for erethism are methylphenidate. It may also be prescribed for off-label use in treatment-resistant cases of lethargy , depression mood , or neural insult. One treatment for mercury poisoning is to admit fresh air to the affected person by having her go outside daily as much as possible. History[edit] Use of inorganic mercury in the form of mercuric nitrate to treat the fur of small animals for the manufacture of felt hats seems to have begun in 17th-century France and from there spread to England by the end of the century with the Huguenots. Similar phenomena had been described in St Petersburg , Russia, in In France, the National Academy of Medicine described the health hazards in , and in a law was passed to protect hatmakers from the risks of mercury exposure. In Britain, mercury poisoning among hatters had become a rarity by the turn of the 20th century. In the United States, where the occupational illness was thoroughly described in New Jersey in , the practice continued until ; mercury poisoning in the hatmaking industries of Danbury, Connecticut gave rise to the expression "Danbury shakes". Hatmakers in Tuscany , Italy, were also affected and exposed workers received financial compensation. Some of the steps in the manufacture of felt hats are illustrated in this image from A man working in hat manufacture with no protective equipment, putting him at risk for mercury poisoning Especially in the 19th century, inorganic mercury in the form of mercuric nitrate was commonly used in the production of felt for hats. The resulting felt was then repeatedly shaped into large cones, shrunk in boiling water and dried. This process was initially kept a trade secret in France, where hatmaking rapidly became a hazardous occupation. At the end of the 17th century the Huguenots carried the secret to England, following the revocation of the Edict of Nantes. Alternatives to mercury use in hatmaking became available by In the United States, a hydrochloride -based process was patented in to obviate the use of mercury, but was ignored. By the turn of the 20th century, mercury poisoning among British hatters had become a rarity. This

groundbreaking paper provided a clinical account of the effects of chronic mercury poisoning among the workforce, coupled with an occupational description of the use of mercuric nitrate during carroting and inhalation of mercury vapour later in the process during finishing, forming and sizing. In , an inspection of 25 firms around Newark conducted by Dr L. It is hard to believe that men of ordinary intelligence could be so indifferent to the ordinary laws of health It does not seem to have occurred to them that all the efforts to keep up wages And when the fact of the workmen in the sizing room, who stand in water, was mentioned, and the simple and inexpensive means by which it could be largely avoided was spoken of, the reply was that it would cost money and hat manufacturers did not care to expend money for such purposes, if they could avoid it. Fell, a former journeyman hatter from Orange who had become a successful manufacturer, was appointed Inspector of Factories in In the late nineteenth century, a pressing health issue among hatters was tuberculosis. This deadly communicable disease was rife in the extremely unhygienic wet and steamy enclosed spaces in which the hatters were expected to work in its annual report for , the New Jersey Bureau of Labor and Industries expressed incredulity at the conditionsâ€”see box. Two-thirds of the recorded deaths of hatters in Newark and Orange between and were caused by pulmonary disease, most often in men under 30 years of age, and elevated death rates from tuberculosis persisted into the twentieth century. Consequently, public health campaigns to prevent tuberculosis spreading from the hatters into the wider community tended to eclipse the issue of mercury poisoning. For instance, in J. In a survey of 11 employers of over a thousand hatters in Newark and Orange, the head of the Bureau of Statistics of New Jersey, William Stainsby, found a lack of awareness of any disease peculiar to hatters apart from tuberculosis and rheumatism though one employer remarked that "work at the trade develops an inordinate craving for strong drink". Nevertheless, trade union campaigns led by the United States Hat Finishers Association, originally formed in never addressed the issue and, unlike in France, no relevant legislation was ever adopted in the United States. Instead, it seems to have been the need for mercury in the war effort that eventually brought to an end the use of mercuric nitrate in U. Public Health Service in , the manufacturers voluntarily agreed to adopt a readily available alternative process using hydrogen peroxide. Mad as a hatter Although the expression "mad as a hatter" was associated with the syndrome, [29] the origin of the phrase is uncertain.

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Chapter 3 : Lead toxicity | Occupational Medicine | Oxford Academic

The European Nordic countries had been reporting on the long-term effects of occupational solvent exposure since the s. 12 As awareness of the dangers of solvent exposure became more evident, occupational exposure rates began to drop in both Europe and the United States (US).

Advanced Search Abstract The main threats to human health from heavy metals are associated with exposure to lead, cadmium, mercury and arsenic. These metals have been extensively studied and their effects on human health regularly reviewed by international bodies such as the WHO. Heavy metals have been used by humans for thousands of years. Although several adverse health effects of heavy metals have been known for a long time, exposure to heavy metals continues, and is even increasing in some parts of the world, in particular in less developed countries, though emissions have declined in most developed countries over the last years. Cadmium compounds are currently mainly used in re-chargeable nickelâ€”cadmium batteries. Cadmium emissions have increased dramatically during the 20th century, one reason being that cadmium-containing products are rarely re-cycled, but often dumped together with household waste. Cigarette smoking is a major source of cadmium exposure. In non-smokers, food is the most important source of cadmium exposure. Recent data indicate that adverse health effects of cadmium exposure may occur at lower exposure levels than previously anticipated, primarily in the form of kidney damage but possibly also bone effects and fractures. Many individuals in Europe already exceed these exposure levels and the margin is very narrow for large groups. Therefore, measures should be taken to reduce cadmium exposure in the general population in order to minimize the risk of adverse health effects. The general population is primarily exposed to mercury via food, fish being a major source of methyl mercury exposure, and dental amalgam. The general population does not face a significant health risk from methyl mercury, although certain groups with high fish consumption may attain blood levels associated with a low risk of neurological damage to adults. Since there is a risk to the fetus in particular, pregnant women should avoid a high intake of certain fish, such as shark, swordfish and tuna; fish such as pike, walleye and bass taken from polluted fresh waters should especially be avoided. There has been a debate on the safety of dental amalgams and claims have been made that mercury from amalgam may cause a variety of diseases. However, there are no studies so far that have been able to show any associations between amalgam fillings and ill health. The general population is exposed to lead from air and food in roughly equal proportions. During the last century, lead emissions to ambient air have caused considerable pollution, mainly due to lead emissions from petrol. Children are particularly susceptible to lead exposure due to high gastrointestinal uptake and the permeable bloodâ€”brain barrier. Blood levels in children should be reduced below the levels so far considered acceptable, recent data indicating that there may be neurotoxic effects of lead at lower levels of exposure than previously anticipated. Although lead in petrol has dramatically decreased over the last decades, thereby reducing environmental exposure, phasing out any remaining uses of lead additives in motor fuels should be encouraged. The use of lead-based paints should be abandoned, and lead should not be used in food containers. In particular, the public should be aware of glazed food containers, which may leach lead into food. Exposure to arsenic is mainly via intake of food and drinking water, food being the most important source in most populations. Long-term exposure to arsenic in drinking-water is mainly related to increased risks of skin cancer, but also some other cancers, as well as other skin lesions such as hyperkeratosis and pigmentation changes. Occupational exposure to arsenic, primarily by inhalation, is causally associated with lung cancer. Clear exposureâ€”response relationships and high risks have been observed. Introduction Although there is no clear definition of what a heavy metal is, density is in most cases taken to be the defining factor. The main threats to human health from heavy metals are associated with exposure to lead, cadmium, mercury and arsenic arsenic is a metalloid, but is usually classified as a heavy metal. Heavy metals have been used in many different areas for thousands of years. Lead has been used for at least years, early applications including building materials, pigments for glazing ceramics, and pipes for

transporting water. In ancient Rome, lead acetate was used to sweeten old wine, and some Romans might have consumed as much as a gram of lead a day. Mercury was allegedly used by the Romans as a salve to alleviate teething pain in infants, and was later from the s to the late s employed as a remedy for syphilis. Although adverse health effects of heavy metals have been known for a long time, exposure to heavy metals continues and is even increasing in some areas. For example, mercury is still used in gold mining in many parts of Latin America. Arsenic is still common in wood preservatives, and tetraethyl lead remains a common additive to petrol, although this use has decreased dramatically in the developed countries. Since the middle of the 19th century, production of heavy metals increased steeply for more than years, with concomitant emissions to the environment Fig. At the end of the 20th century, however, emissions of heavy metals started to decrease in developed countries: Emissions of heavy metals to the environment occur via a wide range of processes and pathways, including to the air e. Atmospheric emissions tend to be of greatest concern in terms of human health, both because of the quantities involved and the widespread dispersion and potential for exposure that often ensues. The spatial distributions of cadmium, lead and mercury emissions to the atmosphere in Europe can be found in the Meteorological Synthesizing Centre-East MSC-E website http: Lead emissions are mainly related to road transport and thus most uniformly distributed over space. Cadmium emissions are primarily associated with non-ferrous metallurgy and fuel combustion, whereas the spatial distribution of anthropogenic mercury emissions reflects mainly the level of coal consumption in different regions. People may be exposed to potentially harmful chemical, physical and biological agents in air, food, water or soil. However, exposure does not result only from the presence of a harmful agent in the environment. The key word in the definition of exposure is contact 2. There must be contact between the agent and the outer boundary of the human body, such as the airways, the skin or the mouth. Exposure is often defined as a function of concentration and time: For exposure to happen, therefore, co-existence of heavy metals and people has to occur see Chapter 1. Cadmium Occurrence, exposure and dose Cadmium occurs naturally in ores together with zinc, lead and copper. Cadmium compounds are used as stabilizers in PVC products, colour pigment, several alloys and, now most commonly, in re-chargeable nickelâ€”cadmium batteries. Metallic cadmium has mostly been used as an anticorrosion agent cadmiation. Cadmium is also present as a pollutant in phosphate fertilizers. Notwithstanding these reductions in Europe, however, cadmium production, consumption and emissions to the environment worldwide have increased dramatically during the 20th century. Cadmium containing products are rarely re-cycled, but frequently dumped together with household waste, thereby contaminating the environment, especially if the waste is incinerated. Natural as well as anthropogenic sources of cadmium, including industrial emissions and the application of fertilizer and sewage sludge to farm land, may lead to contamination of soils, and to increased cadmium uptake by crops and vegetables, grown for human consumption. The uptake process of soil cadmium by plants is enhanced at low pH 4. Biological monitoring of cadmium in the general population has shown that cigarette smoking may cause significant increases in blood cadmium B-Cd levels, the concentrations in smokers being on average 4â€”5 times higher than those in non-smokers 4. Despite evidence of exposure from environmental tobacco smoke 5 , however, this is probably contributing little to total cadmium body burden. Food is the most important source of cadmium exposure in the general non-smoking population in most countries 6. Cadmium is present in most foodstuffs, but concentrations vary greatly, and individual intake also varies considerably due to differences in dietary habits 4. Women usually have lower daily cadmium intakes, because of lower energy consumption than men. Gastrointestinal absorption of cadmium may be influenced by nutritional factors, such as iron status 7. B-Cd generally reflects current exposure, but partly also lifetime body burden 8. The cadmium concentration in urine U-Cd is mainly influenced by the body burden, U-Cd being proportional to the kidney concentration. Smokers and people living in contaminated areas have higher urinary cadmium concentrations, smokers having about twice as high concentrations as non-smokers 4. Health effects Inhalation of cadmium fumes or particles can be life threatening, and although acute pulmonary effects and deaths are uncommon, sporadic cases still occur 9, Cadmium exposure may cause kidney damage. It has been suggested that the tubular

damage is reversible 11 , but there is overwhelming evidence that the cadmium induced tubular damage is indeed irreversible 4. The initial tubular damage may progress to more severe kidney damage, and already in it was reported that some cadmium exposed workers had developed decreased glomerular filtration rate GFR This has been confirmed in later studies of occupationally exposed workers 15, An excess risk of kidney stones, possibly related to an increased excretion of calcium in urine following the tubular damage, has been shown in several studies 4. Recently, an association between cadmium exposure and chronic renal failure [end stage renal disease ESRD] was shown Long-term high cadmium exposure may cause skeletal damage, first reported from Japan, where the itai-itai ouch-ouch disease a combination of osteomalacia and osteoporosis was discovered in the s. The exposure was caused by cadmium-contaminated water used for irrigation of local rice fields. A few studies outside Japan have reported similar findings 4. During recent years, new data have emerged suggesting that also relatively low cadmium exposure may give rise to skeletal damage, evidenced by low bone mineral density osteoporosis and fractures 18â€” Animal experiments have suggested that cadmium may be a risk factor for cardiovascular disease, but studies of humans have not been able to confirm this 4. However, a Japanese study showed an excess risk of cardiovascular mortality in cadmium-exposed persons with signs of tubular kidney damage compared to individuals without kidney damage Cancer The IARC has classified cadmium as a human carcinogen group I on the basis of sufficient evidence in both humans and experimental animals IARC, however, noted that the assessment was based on few studies of lung cancer in occupationally exposed populations, often with imperfect exposure data, and without the capability to consider possible confounding by smoking and other associated exposures such as nickel and arsenic. Cadmium has been associated with prostate cancer, but both positive and negative studies have been published. Early data indicated an association between cadmium exposure and kidney cancer Later studies have not been able clearly to confirm this, but a large multi-centre study showed a borderline significant over-all excess risk of renal-cell cancer, although a negative doseâ€”response relationship did not support a causal relation Furthermore, a population-based multicentre-study of renal cell carcinoma found an excess risk in occupationally exposed persons In summary, the evidence for cadmium as a human carcinogen is rather weak, in particular after oral exposure. Mercury Occurrence, exposure and dose The mercury compound cinnabar HgS , was used in pre-historic cave paintings for red colours, and metallic mercury was known in ancient Greece where it as well as white lead was used as a cosmetic to lighten the skin. In medicine, apart from the previously mentioned use of mercury as a cure for syphilis, mercury compounds have also been used as diuretics [calomel Hg2Cl2], and mercury amalgam is still used for filling teeth in many countries Metallic mercury is used in thermometers, barometers and instruments for measuring blood pressure. A major use of mercury is in the chlor-alkali industry, in the electrochemical process of manufacturing chlorine, where mercury is used as an electrode. The largest occupational group exposed to mercury is dental care staff. Inorganic mercury is converted to organic compounds, such as methyl mercury, which is very stable and accumulates in the food chain. Until the s, methyl mercury was commonly used for control of fungi on seed grain. The general population is primarily exposed to mercury via food, fish being a major source of methyl mercury exposure 27 , and dental amalgam. Several experimental studies have shown that mercury vapour is released from amalgam fillings, and that the release rate may increase by chewing Mercury in urine is primarily related to relatively recent exposure to inorganic compounds, whereas blood mercury may be used to identify exposure to methyl mercury. A number of studies have correlated the number of dental amalgam fillings or amalgam surfaces with the mercury content in tissues from human autopsy, as well as in samples of blood, urine and plasma Mercury in hair may be used to estimate long-term exposure, but potential contamination may make interpretation difficult. Health effects Inorganic mercury Acute mercury exposure may give rise to lung damage.

Chapter 4 : Erethism - Wikipedia

Many studies have been conducted on the occupational exposure and health impact of lead, and the various efforts to prevent health problems caused by lead resulted in the significant decrease in the number of cases of occupational lead poisoning.

Many nonpsychiatric medications can cause neuropsychiatric effects, which range from anxiety to psychosis. Drug-induced psychosis was first diagnosed in the 19th century. Since then, many medications have been associated with this phenomenon. The most commonly implicated nonpsychiatric agents include antiparkinsonian agents, cardiac medications, and corticosteroids. Pharmacists must be familiar with the neuropsychiatric adverse effects of many common prescription and nonprescription medications so that they can educate patients and caregivers about this potential adverse effect and develop strategies to minimize risk. Adverse drug events ADEs affect millions of people each year. ADEs have been identified as the most common cause of postdischarge complications and account for more than 3. Background The term psychosis was first used in the 19th century to describe an abnormal state of mind. Psychosis is marked by the presence of one or more of the following symptoms: Visual hallucinations with or without delirium are most frequently reported; auditory hallucinations, which are less common, are usually accompanied by visual hallucinations. Beta1-adrenergic receptor blockers are known to cause central nervous system CNS effects, including bizarre or vivid dreams, sleep disturbances, delirium, psychosis, and visual hallucinations. Hydrophilic agents such as atenolol are excreted unchanged by the kidneys, whereas lipophilic agents such as propranolol and metoprolol are metabolized by the liver and are believed to cross the blood-brain barrier. The reported incidence of corticosteroid-associated psychiatric reactions ranges from 1. Antibiotics are frequently used and are generally well tolerated, but some antibiotics have been associated with neuropsychiatric adverse effects that are usually less recognized. Symptoms developed within 2 hours to 10 days after therapy initiation and resolved completely upon cessation. The prevalence of new-onset psychosis in HIV-infected patients ranges from 0. Many nonprescription medications can cause psychotic symptoms. Sympathomimetics in most cold products and nasal sprays have been associated with psychotic symptoms, even at usual dosages. A thorough history is needed to help establish a temporal relationship. It is important to determine the onset of psychotic symptoms; medication-induced psychosis is usually related to an increase in dosage or changes to medication regimens, with symptoms appearing within days of drug initiation, dosage change, or discontinuation. In addition, a complete medication history including all prescription and nonprescription drugs, herbal products, and supplements is essential. Illicit drug use and alcohol consumption must be addressed as well. Polypharmacy, especially in the elderly, may be associated with an increased risk of medication-induced psychosis; this population is more likely to be treated for parkinsonism, cardiovascular disease, and other conditions that have the potential to induce psychosis. Awareness of potential drug interactions also is important for preventing medication-induced psychosis. Management Medication-induced psychosis is typically self-limiting, usually resolving within a day in some cases, several days after discontinuation of the offending agent. Typical antipsychotics and most atypical antipsychotics are not recommended for this reason. The most promising medications are the cholinesterase inhibitors rivastigmine and donepezil. Ideally, the patient should be in an environment where he or she can be observed and contained, if necessary, to avoid self-harm or harm to others. Short-term treatment with antipsychotics or benzodiazepines during a period of psychosis may be warranted for patients in danger of harming themselves or others. It is important to be aware of the psychotropic ADEs of many common nonprescription and prescription medications. Educating patients and caregivers about potential ADEs of psychotomimetic drugs and inquiring about ADEs at each patient encounter will aid in the early detection and prevention of medication-induced psychosis. The incidence and severity of adverse events affecting patients after discharge from the hospital. Adverse drug events in the outpatient setting: National surveillance of emergency department visits for outpatient adverse drug events.

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Psychiatric effects of drugs for other disorders. Psychotropic side effects of commonly prescribed medications in the elderly. Prevention, Detection, and Management. American Society of Health-System Pharmacists; American Psychiatric Publishing; A year population-based study of psychosis in Parkinson disease. Turjanski N, Lloyd GG. Psychiatric side-effects of medications: Problems, management, and dilemma. J Neurol Neurosurg Psychiatry. Curr Neurol Neurosci Rep. Toxic neuropsychiatric effects of digoxin at therapeutic serum concentrations. Central nervous system side effects of beta-adrenergic blocking agents with high and low lipid solubility. Visual hallucinations and metoprolol. Steinhart J, Pugh CR. Two patients with schizophrenic-like psychosis after treatment with beta-adrenergic blockers. J Med Case Rep. Neuropsychiatric consequences of cardiovascular medications. Doane J, Stults B. Visual hallucinations related to angiotensin-converting enzyme inhibitor use: J Clin Hypertens Greenwich. Warrington TP, Bostwick M. Psychiatric adverse effects of corticosteroids. Prednisone effects on neurochemistry and behavior. Corticosteroid-related central nervous system side effects. Neurotoxic effects associated with antibiotic use: Br J Clin Pharmacol. Psychiatric emergencies part II: Eur Rev Med Pharmacol Sci. Transient psychotic episode induced by Helicobacter pylori triple therapy treatment. Elahi F, Bhamjee M. A case of clarithromycin psychosis. Pâ€”Treatment of cycloserine induced psychosisâ€”a case series [abstract]. Treatment considerations for psychiatric syndromes associated with HIV infection. Psychotherapeutic agents in older adults. Common prescribed and over-the-counter medications: Brown TM, Stoudemire A. American Psychiatric Press; Nonsteroidal anti-inflammatory drugs and severe psychiatric side effects. Int J Psychiatry Med. Drugs that may cause psychiatric symptoms. Med Lett Drugs Ther. To comment on this article, contact rdavidson uspharmacist.

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Chapter 5 : Nonpsychotropic Medication-Induced Psychosis

The effects of antipsychotic medications on durations of delirium, coma, and hypoactive delirium, as well as on day survival, differed according to age, but the trial may not have been.

After completing this course, the learner will be able to: Introduction Bloodborne pathogens are any pathogenic microorganisms found in the blood or other bodily infectious material that can cause disease in humans. Examples of bloodborne pathogens include hepatitis B virus hepatitis C virus , human immunodeficiency virus HIV , malaria, syphilis, viral hemorrhagic fever, arboviral infections, Creutzfeldt-Jakob disease, and relapsing fever. The three bloodborne pathogens that are the most commonly involved in occupational exposures in healthcare workers are hepatitis B, hepatitis C, and HIV Weber, Rutala, Eron, ; Deuffic-Burbank, Delaroccque-Astagneau, Abitedoul, Healthcare worker exposures and potential exposures to these pathogens are widespread. Some studies have estimated that there are more than , parental exposures suffered by healthcare workers in the US every year and that every year 1 out of 10 healthcare workers in the US suffers a splash exposure or a needle stick injury Karmon, Mehta, Brehm, ; Henderson, The exact number of exposures is not known and part of the problem is under reporting: Almost all healthcare workers are at risk for exposure to bloodborne pathogens, but nurses are the group that is most affected Camacho-Ortiz, Diaz-Rodriguez, Rodriguez-Lopez, et al, ; Yang, Wu, Wang, et al, One serious bloodborne infection can cost more than a million dollars for medications, follow up laboratory testing, clinical evaluation, lost wages, and disability payments. The human costs after an exposure are immeasurable. Employees may experience anger, depression, fear, anxiety, difficulty with sexual relations, trouble sleeping, problems concentrating, and doubts regarding their career choice. The emotional effect can be long lasting, even in a low risk exposure that does not result in infection Green, Griffiths, ; Zhiang, Yu, ; Lee, Botteman, Xanthakos, An exposure to a bloodborne pathogen is defined as: Also, any direct contact to concentrated HIV, hepatitis B, or hepatitis B Direct contact meaning the healthcare worker was not using barrier protection should be considered an exposure. Percutaneous injuries and splash exposures appear to be equally involved Richardson, , and the most common cause of a percutaneous injuries appears to be puncture wounds from hollow bore needles Camacho-Ortiz, Diaz-Rodriguez, Rodriguez-Lopez, ; CDC, Factors that may determine the overall risk for occupational transmission of a bloodborne pathogen include the number of infected individuals in the patient population, the chance of becoming infected after a single blood contact from an infected patient, and the type and number of blood contacts. Most exposures do not result in infection. Following a specific exposure, the risk of infection may vary with factors such as these Bartlett, Weber, ; Kuhar, Henderson, Struble, ; Cosens, Employers should have a system for reporting exposures in order to quickly evaluate the risk of infection, inform the employee about treatments available to help prevent infection, monitor the employee for side effects of treatments, and to determine if infection occurs. Prevention of Exposure Avoiding occupational blood exposures is the primary way to prevent transmission of hepatitis B virus hepatitis C virus, and HIV in health-care settings. However, hepatitis B immunization and postexposure management are integral components of a complete program to prevent infection following bloodborne pathogen exposure and are important elements of workplace safety Heininger, Gambon, Gruber, ; MacCannell, Laramie, Gomaa, Controls are incorporated into the healthcare work setting to avoid or reduce exposure to potentially infectious materials. Healthcare associated transmission is the transmission of microorganisms that is likely to occur in a healthcare setting that can be reduced by using engineered controls, safe injection practices, and safe work practices. Engineering controls are equipment, devices, or instruments that remove or isolate a hazard. Safe injection practices are equipment and practices that allow the performance of injections in an optimally safe manner for patients, healthcare providers, and others that reduce exposure CDC, Work practice controls change practices and procedures to reduce or eliminate risks. Standard Precautions Standard precautions are strategies for protecting healthcare professionals from occupational transmission of organisms. The premise is

that all pre-existing patient infections cannot be identified. Given that, all body fluids and secretions with the exception of sweat should be considered potentially infectious and, barrier precautions should be used routinely to protect the healthcare worker from exposure, Standard precautions apply to nonintact skin and mucous membranes, blood, and all body fluids, secretions, and excretions, except sweat, regardless of whether or not they contain visible blood. Additional precautions are based on highly transmissible or epidemiologically important pathogens. Transmission Based Precautions isolation are airborne, droplet, and contact precautions. New elements of standard precautions have been added. These elements include safe injection practices, and the use of masks and possibly head coverings and gowns for insertion of catheters of injections into spinal or epidural spaces via lumbar puncture Radcliffe, Meites, Briscoe, ; Horlocker, Birnbach, Connis, Safe Injection Practice Nurses sustain the largest proportion of sharps injuries of all healthcare professionals, but laboratory staff, physicians, housekeepers, and other healthcare professionals are also injured Gatto, ; Tso, Athreya, ; de Perio, ; Shiferaw, Abebe, Mihret, ; Wu, Wu, Chou, et al, ; Amuwo, ; CDC, Some of these injuries expose professionals to bloodborne pathogens that can cause infection. Infections with each of these pathogens are potentially life threatening and preventable. Percutaneous injuries can be avoided by eliminating the unnecessary use of needles, using devices with safety features, and promoting education and safe work practices for handling needles and related systems. Since , the use of safety-engineered sharps devices has increased while the use of conventional sharps devices has decreased. Percutaneous injury rates have decreased dramatically, and many studies have proven that the use of safety-engineered devices has significantly decreased the number of needlestick injuries Black, A number of sources have identified the desirable characteristics of safety devices. These characteristics include the following CDC, ;: The device is needleless. The safety feature is an integral part of the device. The device preferably works passively i. The user can easily tell whether the safety feature is activated. The safety feature cannot be deactivated and remains protective through disposal. The device performs reliably. The device is easy to use and practical. The device is safe and effective for patient care. Although each of these characteristics is desirable, some are not feasible, applicable, or available for certain healthcare situations. For example, needles will always be necessary where alternatives for skin penetration are not available. Also, a safety feature that requires activation by the user might be preferable to one that is passive in some cases. Each device must be considered on its own merit and ultimately on its ability to reduce workplace injuries. The desirable characteristics listed here should serve only as a guideline for device design and selection. Sharps should be disposed into a puncture-proof container. There is exposure to percutaneous injuries during procedures where there is opportunity for percutaneous exposure, especially where there is poor visualization, blind suturing, non-dominant hand opposing or next to a sharp, and exposure to bone spicules and metal fragments. Sharp equipment should be disassembled using forceps or other devices. Suturing should always be done with a needle holder, forceps, or other tool. Do not use fingers to hold tissue when suturing or cutting. Never leave sharps on a work field. If used needles or other sharps are left in the work area or are discarded in a sharps container that is not puncture resistant, a needlestick injury may result. Injury may occur when a healthcare professional attempts to transfer blood or other body fluids from a syringe to a specimen container such as a vacuum tube and misses the target. Safe injection practice in hospitals is well established. However, outbreaks of infections with hepatitis b and hepatitis C amongst patients have been traced back to ambulatory care facilities and associated with non-compliance with safe injection practices, identifying the need to define and reinforce safe injection practices in outpatient care settings Branch-Elliman, Weiss, Balter, The reuse of needles, multidose vials, and work areas containing both sterile and contaminated injection supplies contributed to the problem. There was a lack of understanding of aseptic technique, a lack of oversight, and failure to follow up on infection control breeches CDC, ; CDC, The following are safe injection practices recommended by the CDC CDC, , that apply to the use of needles, cannulas that replace needles, and, where applicable intravenous delivery systems. Examples of these include safe injection practices include: Use aseptic technique to avoid contamination of sterile injection equipment. Do not administer medications from a

syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannula and syringes are sterile, single-use items; they should not be reused for another patient nor to access a medication or solution that might be used for a subsequent patient. Use fluid infusion and administration sets i. Use single-dose vials for parenteral medications whenever possible. Do not administer medications from single-dose vials or ampules to multiple patients or combine leftover contents for later use. If multidose vials must be used, both the needle or cannula and syringe used to access the multidose vial must be sterile. Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients. Infection control practices for special lumbar puncture procedures Wear a surgical mask when placing a catheter or injecting material into the spinal canal or subdural space i. Studies have clearly shown that the hands of healthcare workers are often contaminated with microbial flora and that the amount of time spent performing patient care increases the amount of contamination. Handwashing is the most important measure to reduce the transmission of microorganisms Crews, Whaley, Syblik, et al, , and handwashing reduces infection rates, even in high-risk patient populations Edmonds, Macinga, Mays-Suko, Hands should be washed or alcohol-based rubs should be used between patient contacts and after gloves are removed. Hands should be washed after contact with blood, body fluids, secretions, excretions, and contaminated equipment. It may be necessary to wash hands between tasks on the same patient to prevent cross-contamination of different body sites. Improved adherence to hand hygiene i. The CDC is releasing guidelines to improve adherence to hand hygiene in healthcare settings. In addition to traditional handwashing with soap and water, CDC is recommending the use of alcohol-based hand cleansers by healthcare personnel for patient care because they address some of the obstacles that healthcare professionals face when taking care of patients. Handwashing with soap and water remains a sensible strategy for hand hygiene in non-healthcare settings and is recommended by the CDC and other experts. Gloves are an important part of infection control as hand hygiene itself cannot remove all pathogens from the hands or prevent contamination of the hands. However, gloves must be used correctly or they can be a source of contamination and cross infection Fuller, Savage, Besser, The use of gloves does not eliminate the need for hand hygiene. Likewise, the use of hand hygiene does not eliminate the need for gloves. Alcohol-based hand rubs have been proven to be an effective method for hand hygiene Shen, Pan, Sheng, Alcohol-based hand rubs are preferred for hand hygiene in most situations. They require less time to use than soap and water, they remove more bacteria then soap and water, they are easy to use, and they rapidly reduce bacterial contamination on the hands Marra, Edmond, These products have also been shown to be associated with increased compliance by healthcare workers with hand hygiene requirements Ahmed-Lechebed, Cunat, Hartemann, When using an alcohol-based hand rub, apply the product to the palm of one hand and rub hands together, covering all surfaces of hands and fingers, until hands are dry. Note that the volume needed to reduce the number of bacteria on hands varies by product. It does not appear that the formulation influences the effectiveness of these products and a higher alcohol concentration is not necessarily better Edmonds, Macinga, Mays-Suko, Alcohol-based hand rubs significantly reduce the number of microorganisms on skin, are fast acting and cause less skin irritation than repeated washing with soap and water Decreasing skin irritation is important and not only to help increase hand hygiene compliance by healthcare workers. An intact skin prevents the entry of microorganisms.

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Chapter 6 : CEUFast - OSHA: Occupational Exposure to Blood Borne Pathogens-1 hour

Introduction. Delirium is an acute organic brain syndrome characterised by inattention, cognitive impairment and alteration of consciousness. Delirium can be further characterised as hypoactive, hyperactive or mixed. 1 It is important to remember that delirium is the end product of a sequence of insults and injury that lead to a common measurable manifestation of end-organ brain injury.

Summary This report updates U. Public Health Service recommendations for the management of health-care personnel HCP who have occupational exposure to blood and other body fluids that might contain human immunodeficiency virus HIV. Although the principles of exposure management remain unchanged, recommended HIV postexposure prophylaxis PEP regimens have been changed. This report emphasizes adherence to HIV PEP when it is indicated for an exposure, expert consultation in management of exposures, follow-up of exposed workers to improve adherence to PEP, and monitoring for adverse events, including seroconversion. To ensure timely postexposure management and administration of HIV PEP, clinicians should consider occupational exposures as urgent medical concerns. Introduction Although preventing exposures to blood and body fluids is the primary means of preventing occupationally acquired human immunodeficiency virus HIV infection, appropriate postexposure management is an important element of workplace safety. In , the first U. Since publication of the most recent guidelines in , new antiretroviral agents have been approved by the Food and Drug Administration FDA , and additional information has become available regarding the use and safety of HIV PEP. On the basis of this discussion, the PHS working group decided that updated recommendations for the management of occupational exposure to HIV were warranted. This report modifies and expands the list of antiretroviral medications that can be considered for use as PEP. This report also emphasizes prompt management of occupational exposures, selection of tolerable regimens, attention to potential drug interactions involving drugs that could be included in HIV PEP regimens and other medications, consultation with experts for postexposure management strategies especially determining whether an exposure has actually occurred and selection of HIV PEP regimens, use of HIV rapid testing, and counseling and follow-up of exposed personnel. Recommendations on the management of occupational exposures to hepatitis B virus or hepatitis C virus have been published previously 3 and are not included in this report. Recommendations for nonoccupational e. Definition of Health-Care Personnel and Exposure The definitions of health-care personnel HCP and occupational exposures are unchanged from those used in 3. The term HCP refers to all paid and unpaid persons working in health-care settings who have the potential for exposure to infectious materials e. HCP might include, but are not limited to, emergency medical service personnel, dental personnel, laboratory personnel, autopsy personnel, nurses, nursing assistants, physicians, technicians, therapists, pharmacists, students and trainees, contractual staff not employed by the health-care facility, and persons not directly involved in patient care but potentially exposed to blood and body fluids e. The same principles of exposure management could be applied to other workers who have potential for occupational exposure to blood and body fluids in other settings. In addition to blood and visibly bloody body fluids, semen and vaginal secretions also are considered potentially infectious. Although semen and vaginal secretions have been implicated in the sexual transmission of HIV, they have not been implicated in occupational transmission from patients to HCP. The following fluids also are considered potentially infectious: The risk for transmission of HIV infection from these fluids is unknown; the potential risk to HCP from occupational exposures has not been assessed by epidemiologic studies in health-care settings. Feces, nasal secretions, saliva, sputum, sweat, tears, urine, and vomitus are not considered potentially infectious unless they are visibly bloody; the risk for transmission of HIV infection from these fluids and materials is low 7. Any direct contact i. For human bites, clinical evaluation must include the possibility that both the person bitten and the person who inflicted the bite were exposed to bloodborne pathogens. Transmission of HIV infection by this route has been reported rarely, but not after an occupational exposure Risk for Occupational

Transmission of HIV The risks for occupational transmission of HIV have been described; risks vary with the type and severity of exposure 2 , 3 ,7. Although episodes of HIV transmission after nonintact skin exposure have been documented, the average risk for transmission by this route has not been precisely quantified but is estimated to be less than the risk for mucous membrane exposures. The risk for transmission after exposure to fluids or tissues other than HIV-infected blood also has not been quantified but is probably considerably lower than for blood exposures. Epidemiologic and laboratory studies suggest that multiple factors might affect the risk for HIV transmission after an occupational exposure 3. In a retrospective case-control study of HCP who had percutaneous exposure to HIV, increased risk for HIV infection was associated with exposure to a larger quantity of blood from the source person as indicated by 1 a device e. The risk also was increased for exposure to blood from source persons with terminal illness, possibly reflecting either the higher titer of HIV in blood late in the course of acquired immunodeficiency syndrome AIDS or other factors e. A laboratory study that demonstrated that more blood is transferred by deeper injuries and hollow-bore needles lends further support for the observed variation in risk related to blood quantity 3. The use of source-person viral load as a surrogate measure of viral titer for assessing transmission risk has not yet been established. Plasma viral load e. Although a lower viral load e. The recommendations in this report provide guidance for two- or-more drug PEP regimens on the basis of the level of risk for HIV transmission represented by the exposure Tables 1 and 2 ; Appendix. Because all antiretroviral agents have been associated with side effects Table 3 , the toxicity profile of these agents, including the frequency, severity, duration, and reversibility of side effects, is an important consideration in selection of an HIV PEP regimen. The majority of data concerning adverse events have been reported primarily for persons with established HIV infection receiving prolonged antiretroviral therapy and therefore might not reflect the experience of uninfected persons who take PEP. Side effects have been reported frequently by persons taking antiretroviral agents as PEP In multiple instances, a substantial range: The symptom reported most frequently was nausea Because side effects are frequent and particularly because they are cited as a major reason for not completing PEP regimens as prescribed, the selection of regimens should be heavily influenced toward those that are tolerable for short-term use. In addition, all approved antiretroviral agents might have potentially serious drug interactions when used with certain other drugs, requiring careful evaluation of concomitant medications, including over-the-counter medications and supplements e. Information regarding potential drug interactions has been published 13, Because of interactions, certain drugs should not be administered concomitantly with PIs or with efavirenz EFV Tables 4 and 5. Consultation with a pharmacist might be considered. Guidelines for treating HIV infection, a condition typically involving a high total body burden of HIV, recommend use of three or more drugs 13,14 ; however, the applicability of these recommendations to PEP is unknown. Among HIV-infected patients, combination regimens with three or more antiretroviral agents have proved superior to monotherapy and dual-therapy regimens in reducing HIV viral load, reducing incidence of opportunistic infections and death, and delaying onset of drug resistance 13, In theory, a combination of drugs with activity at different stages in the viral replication cycle e. Although use of a three- or more drug regimen might be justified for exposures that pose an increased risk for transmission, whether the potential added toxicity of a third or fourth drug is justified for lower-risk exposures is uncertain, especially in the absence of data supporting increased efficacy of more drugs in the context of occupational PEP. Offering a two-drug regimen is a viable option, primarily because the benefit of completing a full course of this regimen exceeds the benefit of adding the third agent and risking noncompletion For these reasons, the recommendations in this report provide guidance for two- and three- or more drug PEP regimens on the basis of the level of risk for HIV transmission represented by the exposure Tables 1 and 2 ; Appendix. Resistance to Antiretroviral Agents Known or suspected resistance of the source virus to antiretroviral agents, particularly those that might be included in a PEP regimen, is a concern for persons making decisions about PEP Drug resistance to all available antiretroviral agents has been reported, and cross-resistance within drug classes is frequent Although occupational transmission of drug-resistant HIV strains has been reported despite PEP with combination drug regimens 36, , the effect of exposure to a

resistant virus on transmission and transmissibility is not well understood. Since publication of the previous guidelines, an additional report of an occupational HIV seroconversion despite combination HIV PEP has been published Table 6 38 , bringing the total number of reports worldwide to six. The exposure was a percutaneous injury sustained by a nurse performing a phlebotomy on a heavily treatment-experienced patient. Genotypic resistance testing performed within 1 month of the exposure suggested resistance to ZDV and 3TC. The worker was referred to a hospital where the regimen was changed within 6 hours of the exposure to didanosine ddI , d4T, and NVP because of concerns regarding possible drug resistance to certain or all of the components of the initial PEP regimen. The exposed worker stopped ddI after 8 days because of symptoms but continued to take d4T and NVP, stopping at day 24 because of a generalized macular pruritic rash and mild thrombocytopenia. Seroconversion was documented at 3 months. Sequencing of viruses from the source and exposed worker demonstrated their close relatedness. Virus from the worker demonstrated the same resistance patterns as those in the source patient. Empiric decisions regarding the presence of antiretroviral drug resistance are often difficult because patients frequently take more than one antiretroviral agent. However, resistance testing of the source virus at the time of an exposure is impractical because the results will not be available in time to influence the choice of the initial PEP regimen. No data suggest that modification of a PEP regimen after resistance testing results become available usually weeks improves efficacy of PEP Antiretroviral Drugs During Pregnancy Data regarding the potential effects of antiretroviral drugs on the developing fetus or neonate are limited 3. The relevance of animal data to humans is unknown; however, because teratogenic effects were reported among primates at drug exposures similar to those representing human therapeutic exposure, pregnant women should not use efavirenz EFV. Indinavir IDV is associated with infrequent side effects in adults i. Because the half-life of IDV in adults is short, these concerns might be relevant only if the drug is administered shortly before delivery. Other concerns regarding use of PEP during pregnancy have been raised by reports of mitochondrial dysfunction leading to neurologic disease and death among uninfected children whose mothers had taken antiretroviral drugs to prevent perinatal HIV transmission and of fatal and nonfatal lactic acidosis in pregnant women treated throughout gestation with a combination of d4T and ddI 3. All physicians participating in these focus groups had managed occupational exposures to blood or body fluids. They cited three challenges in exposure management most frequently: A total of 28, exposures to blood and body fluids were reported by these hospitals CDC, unpublished data, For all 25, exposures with known sources, 1, 5. The annual median time to initiation of PEP was consistent 2 hours. Goldschmidt, PEPline, personal communication, However, occupational exposures will continue to occur, and PEP will remain an important element of exposure management. These recommendations are based on the risk for HIV infection after different types of exposure and on limited data regarding efficacy and toxicity of PEP. Although concerns have been expressed regarding HIV-negative sources being in the window period for seroconversion, no case of transmission involving an exposure source during the window period has been reported in the United States Because of the complexity of selecting HIV PEP regimens, when possible, these recommendations should be implemented in consultation with persons having expertise in antiretroviral therapy and HIV transmission. Reevaluation of exposed HCP should be strongly encouraged within 72 hours postexposure, especially as additional information about the exposure or source person becomes available. If a question exists concerning which antiretroviral drugs to use, or whether to use a basic or expanded regimen, the basic regimen should be started immediately rather than delay PEP administration. The optimal duration of PEP is unknown. Because 4 weeks of ZDV appeared protective in occupational and animal studies, PEP should be administered for 4 weeks, if tolerated Because PEP is potentially toxic, its use is not justified for exposures that pose a negligible risk for transmission Tables 1 and 2. The initial HIV PEP regimens recommended in these guidelines should be viewed as suggestions that can be changed if additional information is obtained concerning the source of the occupational exposure e. Given the complexity of choosing and administering HIV PEP, whenever possible, consultation with an infectious diseases consultant or another physician who has experience with antiretroviral agents is recommended, but it should not delay

timely initiation of PEP. If this information is not immediately available, initiation of PEP, if indicated, should not be delayed; changes in the regimen can be made after PEP has started, as appropriate. For HCP who initiate PEP, re-evaluation of the exposed person should occur within 72 hours postexposure, especially if additional information about the exposure or source person becomes available. In the previous PHS guidelines, a combination of d4T and ddI was considered one of the first-choice PEP regimens; however, this regimen is no longer recommended because of concerns about toxicity especially neuropathy and pancreatitis and the availability of more tolerable alternative regimens 3. The addition of a third or even a fourth drug should be considered for exposures that pose an increased risk for transmission or that involve a source in whom antiretroviral drug resistance is likely. The addition of a third drug for PEP after a high-risk exposure is based on demonstrated effectiveness in reducing viral burden in HIV-infected persons. However, no definitive data exist that demonstrate increased efficacy of three- compared with two-drug HIV PEP regimens. Caution is advised when EFV is used in women of childbearing age because of the risk of teratogenicity. Drugs that may be considered as alternatives to the expanded regimens, with warnings about side effects and other adverse events, are EFV or PIs as noted in the Appendix in combination with ddl and either 3TC or FTC. The fusion inhibitor enfuvirtide T20 has theoretic benefits for use in PEP because its activity occurs before viral-host cell integration; however, it is not recommended for routine HIV PEP because of the mode of administration subcutaneous injection twice daily. Furthermore, use of T20 has the potential for production of anti-T20 antibodies that cross react with HIV gp A confirmatory Western blot test would be expected to be negative in such cases.

Chapter 7 : Evaluation and management of lead exposure

Workers found to have a confirmed blood lead at this level or greater need only be removed from work having a daily 8 hour TWA exposure to lead at or above ug/m(3). Workers so removed are to be returned to work when their blood lead levels are at or below 60 ug/ g of whole blood.

Solubility and pH appear to be the primary determinants of the capacity of individual chromium compounds to elicit an allergic response [Polak, Turk et al. Penetration of the skin will cause painless erosive ulceration "chrome holes" with delayed healing. These commonly occur on the fingers, knuckles, and forearms. The characteristic chrome sore begins as a papule, forming an ulcer with raised hard edges. Ulcers can penetrate deep into soft tissue or become the site of secondary infection, but are not known to lead to malignancy [Deng, Fleeger et al. In addition, occupational exposure Cr VI compounds has been associated with effects on the skin, nasal septum, and eardrum [Gibb, Lees et al. Chromium is one of the most common skin sensitizers and often causes skin sensitizing effect in the general public. A possible source of chromium exposure is waste dumps for chromate-producing plants causing local air or water pollution. Baetjer was one of the first to review the literature presented prior to on the occurrence of cancer in chromate-exposed workers [Baetjer]. The first epidemiological study of chromate production workers in the United States that demonstrated an association with lung cancer was conducted with 1, workers in seven plants engaged in the extraction of chromates from ore from to The percentage death due to cancer of the respiratory system was In another key epidemiological study involving workers at a chromate production plant who had worked at the plant for more than 1 year from to , the percentage of deaths due to lung cancer was Studies of workers in the chromium pigment, chrome-plating, and ferrochromium industries showed a statistically significant association between worker exposure to Cr VI and lung cancer [Langard and Norseth ; Sheffet, Thind et al. In addition to lung cancer, a number of epidemiological studies of workers in chromate industries also showed significantly increased risk for nasal and sinus cancers [ATSDR]. On the basis of these and other studies, the U. Lung cancer risk in relation to airborne levels of Cr VI was analyzed for chromium chemical production workers and a dose-response relationship was observed in that long-term workers had a higher lung cancer risk than short-term workers [Hayes, Lilienfeld et al. An analysis of lung cancer risk suggests a potential excess risk of death from lung cancer among U. More recent studies also disclosed excess risk of lung cancer death resulting from occupational exposure to Cr VI compounds [Gibb, Lees et al. Stratified analysis of lung cancer mortality showed a trend of increasing mortality with higher cumulative exposure levels. The analyses stratified by duration of employment and time since first exposure indicate a consistency of results among those employed the longest and with the longest elapsed time since first exposure. The latter suggests a latency period of approximately years, which is compatible with other research [Luippold, Mundt et al. The toxicology of Cr VI does not reside with the elemental form. Epidemiological evidence strongly points to Cr VI as the agent in carcinogenesis. Solubility and other characteristics of chromium, such as size, crystal modification, surface charge, and the ability to be phagocytized, compounds might be important in determining cancer risk [Norseth ; Langard ; Gad]. In addition to the occupational studies, a retrospective environmental epidemiological study was conducted in residents of a county in Sweden where two ferrochromium alloy industries are located. No indication was found that residence near these industries is associated with an increased risk of lung cancer [Axelsson, Rylander et al. The toxicity of chromium within the cell may result from damage to cellular components during the hexavalent to trivalent chromium reduction process, by generation of free radicals, including DNA damage [ATSDR]. Recent studies indicate a biological relevance of non-oxidative mechanisms in Cr VI carcinogenesis [Zhitkovich, Song et al. Although glomerular injury has been noted in chromium workers, the predominant renal injury is tubular, with low doses acting specifically on the proximal convoluted tubules. Injury to the brush border membrane is a feature of chromate nephropathy [Kirschbaum, Sprinkel et al. Severe poisoning can lead to acute tubular necrosis and acute renal failure [Sharma, Singhal et

al. Low-dose chronic Cr VI exposure typically results only in transient renal effects. No renal impairment based on urinary albumin, retinol binding protein, and renal tubular antigens was found in workers employed in the ferrochromium production industry [Foa, Riboldi et al. Hepatic Effects Cr VI has been reported to cause severe liver effects in four of five workers exposed to chromium trioxide in the chrome plating industry. The reported liver effects include derangement of the liver cells, necrosis, lymphocytic and histocytic infiltration, and increases in Kupffer cells [Pascale, Waldstein et al. Cases of hepatic effects after oral exposure to Cr VI compounds have also been reported. Elevated liver enzyme levels were reported flowing ingestion of mL solution containing Gastrointestinal Effects In a study of 97 workers from a chrome plant exposed to a mixture of insoluble chromite ore containing Cr III and soluble Cr VI as sodium chromate and dichromate, gastrointestinal radiography revealed that 10 of the workers had ulcer formation, and of these, six had hypertrophic gastritis. Nearly all of the workers breathed through the mouth while at work and swallowed the chromate dust, thereby directly exposing the gastrointestinal mucosa [Mancuso]. Most of the previous studies reporting gastrointestinal effects, however, did not compare the workers with appropriate controls. Cases of gastrointestinal effects after oral exposure to Cr VI compounds have also been reported. In one study, a year-old boy who died after ingesting 7. Autopsy revealed gastrointestinal ulceration [Kaufman, DiNicola et al. In another study, a year-old man died of gastrointestinal hemorrhage after ingesting 4. Cardiovascular Effects Case reports of humans who died after ingesting Cr VI compounds have described cardiovascular effects as part of the sequelae leading to death. A month-old boy who ingested an unknown amount of sodium dichromate died of cardiopulmonary arrest. Autopsy revealed early hypoxic changes in the myocardium [Ellis, Brouhard et al. A year-old woman developed cardiovascular collapse and shock within a few hours following ingestion of 50 mL chromic acid [Loubieres, de Lassence et al. A woman ingested ml of leather tanning solution containing 48 grams of basic chromium sulphate CrOHSO4. The patient died of cardiogenic shock, complicated by pancreatitis and gut mucosal necrosis and hemorrhage [van Heerden, Jenkins et al. A year-old male developed hypotension, ventricular arrhythmias, severe respiratory distress, and metabolic acidosis after ingesting an unknown amount of a liquid wood preservative containing chromium trioxide, arsenic pentoxide, and copper oxide [Hay, Derazon et al. Hematological Effects Cases of hematological effects have been reported in humans after the ingestion of lethal or sublethal doses of Cr VI compounds. In a case of an year-old woman who ingested a few grams of potassium dichromate, decreased hemoglobin content and hematocrit, and increased total white blood cell counts, reticulocyte counts, and plasma hemoglobin were found 4 days after ingestion. These effects were indicative of intravascular hemolysis [Sharma, Singhal et al. Reproductive and Developmental Effects One study showed wives of stainless steel welders were at higher risk of spontaneous abortions [Bonde, Olsen et al. The more recent study [Hjollund, Bonde et al. No data were located regarding chromium in adverse human developmental effects. Adverse developmental effects in animals include greater incidence of post-implantation loss, decreased fetal body weight, reduced ossification, and decreased number of live fetuses. Genotoxic and Mutagenic Effects The mechanism of chromium-induced genotoxicity is not fully understood. Chromium seems to exert its genetic effects by binding directly to DNA. A recent clinical study reported strong DNA oxidative damage from the urinary samples of the patient who ingested 2 to 3 grams of potassium dichromate in a suicide attempt [Hantson, Van Caenegem et al. Another study showed an involvement of the oxidative damage pathway in the mechanism of toxicity of chromium in occupationally exposed individuals [Goulart, Batoreu et al. Cr VI compounds are clearly mutagenic in the majority of experimental situations [De Flora, Bagnasco et al. It has caused chromosome aberrations in mammalian cells and has been associated with increased frequencies of chromosome aberrations in lymphocytes from chromate production workers. Increases in sister chromatid exchanges were seen in lymphocytes from workers exposed to chromium, cobalt, and nickel dusts [WHO ; Meditext]. Other Effects In a chrome plating plant where poor exhaust resulted in excessively high concentration of chromium trioxide fumes, workers experienced symptoms of dizziness, headache, and weakness when working over the chromate tanks [Lieberman]. Erosion and discoloration of the teeth may occur with Cr VI compounds exposure. In

addition, papillomas of the oral cavity and larynx have been reported in workers exposed to high air concentration of Cr VI [Hathaway, Proctor et al. Severe corneal injury may result from ocular contact with solid or concentrated solutions of chromic acid and other Cr VI compound [Grant]. Key Points When inhaled, chromium compounds are respiratory tract irritants and can cause pulmonary sensitization. Chronic inhalation of Cr VI compounds increases the risk of lung, nasal, and sinus cancer. Severe dermatitis and usually painless skin ulcers can result from contact with Cr VI compounds. Chromium compounds can be sensitizers as well as irritants. Occupational exposure to Cr VI compounds in a number of industries has been associated with increased risk of respiratory system cancers. Latency for Cr VI -induced lung cancer can be greater than 20 years. Some studies indicated that reversible renal tubular damage can occur after low-dose, chronic Cr VI exposure. Occupational exposure to Cr III does not appear to be associated with renal effects. Cr VI compounds can cause mild to severe liver abnormalities. Some Cr VI compounds, such as potassium dichromate and chromium trioxide, are caustic and irritating to gastrointestinal mucosal tissue. Ingestion of a lethal dose of chromate can result in cardiovascular collapse. Oral exposure to Cr VI compounds may result in hematological toxicity. Potential reproductive effects of chromium in humans have not been adequately investigated. Data indicate that Cr VI compounds are teratogenic in animals. Cr VI compounds induced DNA damage, gene mutation, sister chromatid exchange, chromosomal aberrations in a number of targets, including animal cells in vivo and animal and human cells in vitro.

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Chapter 8 : Hazards of heavy metal contamination | British Medical Bulletin | Oxford Academic

Delirium is considered a multifactorial disorder and many different pathways to its occurrence have been postulated 30,31 resulting in many hypotheses. 31 The fact that the average of 11 risk factors are present at the same time in ICU patients with delirium 2 suggests the involvement of multiple pathways in its development. Therefore, it seems.

Upon completion of this section, you will be able to identify the health effects of chronic cadmium exposure, and discuss the factors leading to the development of renal disease associated with chronic low-level cadmium exposure. Introduction This section describes the health effects that have been found in some individuals who have been exposed chronically to high levels of cadmium. As stated before, this can include groups of workers, people living in areas with high levels of environmental cadmium, and special exposure scenarios such as hobbies. Respiratory Effects Most studies have associated chronic occupational exposure to cadmium fumes and dusts with increased risk of chronic obstructive lung disease and emphysema, but some studies reported no such association Hendrick ; ATSDR Study limitations, such as small sample size, lack of suitable cohorts, and failure to control for smoking and other confounding effects, render the association uncertain. There are also reports that respiratory effects caused by occupational exposure can reverse themselves if exposure stops ATSDR The most recent Mannino et al. The authors conclude that cadmium might be important in the development of tobacco related lung disease. Further work needs to be done on this topic. Chronic cadmium inhalation is also suspected to be a possible cause of lung cancer Sorhan and Esmen ; Verougstratete et al. Other respiratory effects of chronic occupational exposure to cadmium include chronic rhinitis, destruction of the olfactory epithelium with subsequent anosmia as well as the development of bronchitis ATSDR ; Drebler Cardiovascular Effects In animals, chronic ingestion of cadmium causes increased systolic blood pressure in the absence of significant renal disease. Such pressor effects have been linked to depressed blood and tissue levels of atrial natriuretic peptide, increased blood levels of aldosterone, and retention of sodium and water ATSDR This led to a hypothesis that cadmium exposure in humans might be related to hypertension. Several studies have looked at this topic. The Cadmibel study, a prospective population study looking at the health effects of low-level environmental exposure to cadmium in the general population, found no effect of cadmium on the blood pressure of study subjects Stassen J et al. A recent follow-up of the original Cadmibel cohort, the PheeCad study found the same result Staessen J et al. However, recent studies Navas-Acien et al. These studies found an association with cadmium exposure and the development of peripheral artery disease. In fact, the effect of smoking on peripheral artery disease decreased after adjustment for cadmium levels suggesting that the effect of smoking on the development of peripheral artery disease may be partially mediated by cadmium. Renal Effects The kidney is the principal organ targeted by chronic exposure to cadmium. Cadmium nephrotoxicity may follow chronic inhalation or ingestion. Data from human studies suggest a latency period of approximately 10 years before clinical onset of renal damage, depending on intensity of exposure. However, subtle alterations of renal function have been described after acute exposure in animals, and there are rare reports of renal cortical necrosis after acute high-dose exposure in humans. Classically, chronic cadmium exposure is associated with progressive renal tubular dysfunction. In the final stages of cadmium nephropathy, glycosuria, wasting of calcium and phosphate, and altered calcium metabolism with secondary effects on the skeleton of osteoporosis and osteomalacia are seen Roels et al. Other experts believe that the renal tubular dysfunction associated with cadmium is irreversible Iwata et al. Cadmium nephropathy is an important determinant of mortality in cadmium workers. Toxic effects on the kidney are dose-related Mueller et al. A number of studies over the years have looked at the effects of cadmium on the kidney in the environmentally exposed including Cadmibel Buchet et al. These studies have found that even very low-levels of cadmium may have adverse effects on the kidney. However, at this time, it is not known if these early subclinical changes in kidney biomarkers associated with low levels of environmental cadmium exposure have any correlation with continued decline in renal function to clinical

levels of concern Noonan et al. Recent studies in Japan estimate that the lifetime tolerable dose of cadmium is 2. There is a very low margin of safety between reaching the critical renal concentration and body burdens found in smokers Satarug and Moore Recent work also suggests that exposed children might be a susceptible population Trzcinka-Ochocka et al. At moderate, usual occupational levels of exposure, increased excretion of high-molecular-weight proteins, such as albumin and transferrin, are early signs of glomerular damage from cadmium. Once begun, the glomerular damage is believed to be irreversible and the degree of damage is dose-dependent Jarup The glomerular filtration rate GFR declines slowly but progressively, suggesting that cadmium accelerates the normal age-related decline in renal function. Clinical uremia is rare, but decreased filtration reserve capacity can be demonstrated in cadmium workers with normal baseline GFR and serum creatinine. Cadmium exposure may also potentiate the development of glomerulopathy in diabetic populations Buchet et al. Sufficient cadmium exposure can also lead to decreased GFR and chronic renal failure manifested by: