Major Exposure Hazards for the Frequent Flyer Business Traveler

by

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ABSTRACT

The increase in business globalization has lead to a rise in the number of frequent flyer business travelers. The aircraft serves as the business traveler's worksite and contributes to exposure to various hazards. This paper presents the major hazards faced by the frequent flyer business traveler and discusses the key roles that the occupational and environmental health nurse has in identifying and preventing the adverse health effects associated with these exposures. Recommendations for practice are correlated with the classifications of biological/infectious, chemical, enviromechanical, physical, and psychosocial hazards, along with recommendations for prevention based on pre-existing risk factors. Specific tools and source lists of practice resources are also provided.

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CHAPTER 1

INTRODUCTION

Globalization is the process of increasing the connections and interdependence of world business. Technological advances have increased the speed and efficiency of business communication and travel. The expansion of Internet access has dramatically improved business communication. Air travel technological advances and accessibility have resulted in the acceptance of travel as a typical job characteristic. Economic factors that contributed to the growth in United States international air travel through 2000 include *Open Skies* deregulation agreements, air carrier alliances, strong economic growth, and increasing trade. In characterizing phases of economic history, this trend of globalization characterizes the political, economic, and cultural environment of the period in which we now live.

The United States Bureau of Transportation Statistics (2003) noted a 69% increase in air travel between 1990 and 2000. In addition, passengers tended to journey to more distant destinations. The terrorist attacks of September 11, 2001 resulted in increased security inspections which dramatically increased trip duration. Since September 11th, there has been a 13% decrease in travelers, although the statistics have been fluctuating. Nevertheless, the Occupational and Environmental Health Nurse (OEHN) continues to work with global travelers, whose workplace is the aircraft, with associated travel health promotion and

protection issues such as stress prevention and hazard exposure awareness. For this workplace, there are specific problems related to environmental risks and the characteristics of the business traveler. Environmental risks are based on the hazard classifications of biological/infectious, chemical, enviromechanical, physical, and psychosocial. Business traveler issues are based on the personal pre-existing risk factors and the occupational job characteristics such as industry type and international locations with associated political and economic influences. Traveling wisely can be defined as the ability of the worker to consider health and safety issues as an essential part of travel arrangements, to be aware of preventable consequences of air travel hazards, and to arrive at the global destination ready to make critical business decisions. Traveling wisely involves both awareness and behavioral changes. For many businesses, the ability to travel wisely has become a core competency that is an integral part of the employee's job description.

Rogers and Reilly (2000) found that the trend toward globalization is the primary reason to conduct research and add to the studies examining the physical and psychosocial health problems of international business travelers. The *Travel Industry® Dictionary* (2003) defines the *frequent flyer* as "the business person who travels often by air, especially on one airline, and is enrolled in an airline's frequent flyer program" (¶ 1). Although there are data on the health of the business traveler, researchers must now organize it into a relevant, concise form, and expand it to the frequent flyer business traveler. This organized data will be helpful to the OEHN in planning appropriate interventions.

When dealing with any hazard, worker awareness contributes to worker safety. The purpose of this paper is to present the major hazards faced by the frequent flyer business traveler and discuss the key roles that the occupational and environmental health nurse has in identifying and preventing the adverse health effects associated with these exposures.

CHAPTER 2

LITERATURE REVIEW

Introduction

This section presents a critical review of the recent literature on the hazards faced by the frequent flyer business traveler. The hazards are discussed using the classifications of biological/infectious, chemical, enviromechanical, physical, and psychosocial, and the pre-existing risk factors of diabetes, cardiac disease, respiratory disease, pregnancy, and hypersensitivity disease.

Biological/Infectious Hazards

The National Environmental Education and Training Foundation (NEETF) (1998) defines biological and infectious hazards as agents such as bacteria, viruses, fungi, or parasites that may be transmitted via contact with infected persons or contaminated body fluids. Hazard sources include contaminated drinking water, improper sewage or waste disposal, or air that is filtered through dirty heating and cooling systems. Biological/infectious hazards found in aircraft cabins include aeroallergens, infectious agents, biological toxins, and biological irritants.

The National Research Council (NRC) (2002) identifies the main biological contaminants of the aircraft cabin air as allergens and infectious agents. There are few studies documenting allergic response to aeroallergens in aircraft, but the most common researched cabin allergens are cat allergens, dust mite allergens, and peanuts.

A passenger experiencing an allergic response that could progress to life-threatening anaphylactic shock has limited access to medical intervention on an airline. Peanut allergens have been the focus of studies related to hypersensitivity responses on aircraft. Sicherer, Furlong, DeSimone, and Sampson (1999) found that airline passengers rarely notify aircraft personnel of allergic reactions to peanuts although the reactions can be severe enough to require medication. This study characterized the potential routes of accidental exposure as ingestion, inhalation, or skin absorption.

There is a higher risk of infectious disease transmission for the international traveler because the passenger is confined in close quarters for long periods. The risk has multiplied with the increase of travel to tropical sites which represent a serious risk of infectious disease. Planes designed after 1980 recycle up to 50% of cabin air. The recycled air passes through High Efficiency Particulate Air (HEPA) filters that remove airborne pathogens. Federal Aviation Administration (FAA) regulations require that air carriers "provide the equivalent of at least ten cubic feet of air per minute per occupant, a ventilation rate that is consistent with recommendations for other public environments that are not as difficult to supply" (Jordan, 2003, ¶4).

Aircraft designers have included HEPA filters or particulate filters in new designs and in re-tooling planes built before 1980. HEPA filters are especially effective in preventing viruses, bacteria, and fungi from entering the aircraft. According to the World Health Organization (WHO) (1998), filter systems in commercial aircraft have proven to be effective against infectious disease. They

also indicated that risk increases the closer a passenger is to the person with the disease.

Several studies focused on cabin air and disease transmission. Brown, Rushton, Shuker, Capleton, Stevens, and Warren (2001) described the 2000 *Air Travel and Health* study conducted by United Kingdom Science and Technology Sub-Committee that resulted in a staged program of research into these issues. The key areas of concern for aircraft passenger and crew health were deep vein thrombosis (DVT), aircraft cabin air quality, pesticide exposure, humidity, infectious disease transmission, cosmic radiation exposure, and jet lag. According to Hemmings (2001), the United Kingdom *Health in Aircraft Cabins* study identified and assessed the available research on each of these issues and ranked transmission of infection as a moderate priority.

The major studies on infectious disease transmission focused on tuberculosis, meningitis, influenza, and the common cold. The Centers for Disease Control and Prevention (CDC) (2003d) conducted epidemiological investigations and found that tuberculosis (TB) was transmitted to four passengers during a nine-hour flight. The findings suggested that TB transmission was greater on long flights and the risk increased the closer the passenger was to the infected person. The CDC (1995) also noted that commercial aircraft TB transmission risk was no greater than that of any other confined space or mode of transportation, given the same exposure duration.

WHO (2002a) agreed with the CDC that although unlikely, there was a risk of exposure based on proximity to the disease source. In the document,

Tuberculosis and Air Travel, WHO summarized seven investigations and found that *M. tuberculosis* transmission was possible during a flight of at least eight hours.

N. meningitides is another pathogen that may be spread via aircraft air. The CDC defines a case of air travel associated meningococcal disease as "a patient who meets the case definition of meningococcal disease, within 14 days of travel on a flight of at least 8 hours duration" (CDC, 2003b, ¶1; CDC, 2001, p. 485). While only 12 cases per year were confirmed and more data need to be studied, the CDC acknowledged that recommendations are needed. WHO (2002a) focused on populations of greater meningitis risk, such as the Haj pilgrimage in Saudi Arabia.

There is also a risk of transmission of other respiratory diseases. According to WHO (2002a), the risk of influenza transmission increases the closer the passenger is to the infected person. Waiting at the gate with the ventilation system switched off exacerbates the problem for the passengers. In a study on the common cold, Zitter, Mazonson, Miller, Holley, and Balms (2002) found that the prevalence of upper respiratory tract infections (URI) did not increase with the recirculation of aircraft cabin air. They acknowledged that the study population was limited to passengers flying from three United States airports and recommended further investigation.

Biological toxins are poisonous substances produced by a living organism such as a plant, animal, fungi, or bacteria that adversely affects other organisms. Endotoxins are biological toxins that are a part of the bacterial structure and

become toxic when the bacteria are destroyed. Endotoxins can cause respiratory inflammation when they occur in water or dust. The National Institute for Occupational Safety and Health (NIOSH) anticipates that its ongoing study conducted by Waters, Bloom, and Grajewski (2001) on aircraft cabin endotoxins will yield significant data.

A biological irritant is a substance derived from living organisms and their products that causes an irritating, reversible effect on the skin, eyes, and mucous membranes. Examples are microbial volatile organic compounds (MVOC), which cause unpleasant or annoying odors. The NRC (2002) described carbon dioxide and body effluents as biological irritants that may give the perception that there is insufficient fresh air and that a pre-existing respiratory symptom is being aggravated.

Chemical Hazards

A chemical hazard is the "exposure to any chemical, which in acute concentrations, has a toxic effect" (DiNardi, 2003, p.1255). Aircraft chemical hazards can be external or internal and are affected by ground conditions and different altitudes.

External contaminants of the ambient air when the aircraft is on the ground consist of urban air pollution and local airport sources. The aircraft encounters air pollution in varying degrees with ascent and descent. The concentration of the contaminant multiplied by the duration of the exposure defines the actual dose of the contaminant. The Environmental Protection Agency (EPA) (2003c) collects and publishes state-specific aggregate statistics on urban

pollution. In order to identify local airport sources, the FAA (2002) Office of Environment and Energy developed the *Emissions and Dispersion Modeling System* (EDMS), a Windows™-based simulation tool that helps assess the effect of aviation sources on local air quality. This system inventoried emissions of aircraft and other airport sources and developed model air dispersion systems.

According to the Airliner Cabin Environment Report Response Team (ACERRT) (2002), the current minimum levels of carbon monoxide (CO) and carbon dioxide (CO_2) are good indicators of overall air quality. The EPA (1999) identified the five major air pollutants emitted from commercial jet aircraft as volatile organic compounds (VOC), carbon monoxide (CO), oxides of nitrogen (NO_x), particulates (PM) and sulfur dioxide (SO_2). EPA (2003a) conducted studies of ten commercial airports and found a potential for commercial aircraft emissions to increase air pollution. Although aircraft cabin air has been contaminated through the Environmental Control System (ECS), the NRC (2002) found no data that identified specific contaminants.

Wechsler and Shields (1997) found that the main contaminant in higher altitudes is ozone (O_3) which causes direct human health effects and indirectly produces irritating contaminants when combined with chemicals in the aircraft. FAA regulations require that the airplane cabin ozone concentration during flight must be shown not to exceed "0.25 parts per million by volume at any time above flight level 320 (32,000 feet), and 0.1 parts per million by volume time-weighted average during any 3-hour interval above flight level 270 (27,000 feet)" (United States House of Representatives: Subcommittee on Aviation, 2003, ¶13). Health

effects of ozone exposure include airway irritation and reduced lung function. Overexposure to ozone can affect airway linings, causing respiratory symptoms or a decrease in the protective mechanism characteristics of the airway lining.

The NRC (2002) review of recent National Academy of Science studies found that there is no evidence that the ozone concentration standard is regularly being met. The accuracy of previous studies is suspect because of the methods used, small samples, and equipment quality. Real time, regularly scheduled O_3 aircraft cabin monitoring must be an integral part of any research.

Internal (within the aircraft itself) chemical hazard sources can be very similar to those of a building environment and can be reflective of "sick building syndrome (SBS)" or "building related illness (BRI)" (EPA, 1991a). Internal aircraft chemical hazards can be categorized in relation to the passengers themselves, aircraft component materials, cleaning agents, and disinsection pesticides.

The NRC (2002) identified the passengers as the primary source of cabin carbon dioxide, the marker for ventilation adequacy. Dumyahn, Spengler, Burge, and Muilenburg (2000) identified passenger sources of VOC as bioeffluents, the use of cosmetics, and the consumption of distilled spirits.

According to the NRC (2002), aircraft component materials consist of lightweight plastics, which are a source of plasticizers, anticorrosive or antimicrobial coatings, and VOC from foaming agents or plastic resins. Although concentrations may be within normal limits, Cometto-Munoz (2001) noted that mixtures can affect air quality perception and irritate the senses. Fang, Clausen,

and Fanger (1998) conducted a series of sensory perception tests in which subjects evaluated the quality of various air samples at different temperatures and humidity. They found that increased temperature and humidity were associated with deterioration in perceived air quality.

There are few published data available on the hazards of cleaning agents and dust specific to aircraft. Asthma and pulmonary function changes in the workplace have been associated with workplace exposures to cleaning compounds. Some building air quality studies are being applied to cleaning agents and dust. Kildeso and Schneider (2001) found preliminary observations that dust can adversely affect the airways, skin, and eyes of occupants.

Disinsection is an interesting chemical hazard because of its associated geopolitical issues. The CDC (2003a) described this practice as spraying insect killer in the interior of an aircraft passenger compartment with passengers on board. The United States officially ended this practice in 1979 when the CDC published the final rule to drop the routine spraying requirements for aircraft arriving in the U.S. The EPA (1996) issued regulations regarding pesticide products used to disinsect aircraft.

WHO (2002a) authorized disinsection as a public health measure in *WHO 1969 International Health Regulations* to prevent the introduction of vector borne infection into the aircraft. WHO recommended that aircraft disinsection methods be "blocks away, pre-flight, top-of-descent spraying, on-arrival, and residual spraying" (Gratz, Steffen, & Cocksedge, 2000, p. 997). Blocks away disinsection refers to insecticide applied as the brake blocks are removed from the airplane

wheels in anticipation of leaving the gate. Pre-flight disinsection is a regular application of residual insecticide to all surfaces except in the food preparation area, and top-of-descent spraying refers to an in-flight treatment shortly before landing. On-arrival spraying is performed at the gate with the passengers remaining seated for five minutes and the aircraft door open. The pesticide sprays are composed of a propellant, a solvent, and the active ingredient which is a residual or non-residual pesticide. The most common active ingredient belongs to a class of pesticides called pyrethroids. Permethrin is a residual pesticide because it kills insects that enter the cabin between spraying and departure. It also has a repellant effect, which discourages insects from entering the cabin. *D*-phenothrin is a non-residual pesticide because it only kills insects present in the cabin at the time of the spraying.

Although the literature is not specific as to aircraft exposures to pesticides, it is reasonable to assume that if pesticide spraying were performed while passengers and crew are on board, they may have inhalation and dermal exposures. WHO (2002a) indicated that there is no evidence of a causal relationship between disinsection pesticide exposure and the development of symptoms as long as application is made according to label directions. This however assumes that the person performing the pesticide application can read, understand the directions, and has the proper equipment.

Enviromechanical Hazards

The NEETF (1998) defined enviromechanical hazards as "the factors encountered in the work environment that cause or potentiate accidents, injuries,

strain or discomfort" (p. 40). Edwards (1990) suggested that the aircraft cabin is a system and may be viewed using a systematic framework such as the software, hardware, environment, and liveware (SHEL) model. The environment is made up of three parts. The software component consists of the procedures linked with the operation and management of the cabin. Hardware is an actual item such as a seat or emergency equipment. Liveware includes the passengers and crew. The components are highly interactive, and changing one component affects the other two. An example of this enviromechanical model is the passenger (liveware) with a history of DVT who requires a change in the rule of staying seated (software), and finally requires a seat (hardware) change to business class.

The Occupational Safety and Health Administration (OSHA) (2000) characterizes a musculoskeletal disorder (MSD) as a "disturbance in the normal functioning of muscles, nerves, tendons, ligaments, joints, cartilage, blood vessels or spinal discs" (p. 14). Enviromechanical hazards, such as the risk factors of force, awkward postures, vibration, repetition, and contact stress, may cause MSDs at work.

The frequent flyer business traveler is the ideal candidate for MSDs caused by enviromechanical hazards because of the nature of the trip. Johns Hopkins University (2003) noted that incorrect lifting of heavy, unwieldy luggage combined with long term cramped seating causes or aggravates MSDs. Awkward postures associated with handling heavy luggage are especially problematic for the frequent flyer business traveler. However, many business travelers attempt to carry on all luggage to prevent lost suitcases and avoid the protracted baggage

claim. Quantity, size, and weight restrictions average up to fifty pounds per bag depending on the carrier, but airlines routinely waive for the frequent flyer business traveler. The repetitive lifts of luggage during the security checkpoints, the extended standing, and the hurrying long distances to the gate accentuate the time that the traveler has to carry this heavy load. In addition, the traveler must navigate down narrow aisles and lift, twist, and raise the heavy baggage into the overhead compartment. OSHA (2003a) determined that the postures of professional baggage handlers were so awkward that they created an eTool, *Baggage Handling Ergonomics,* to promote safe lifting. The frequent flyer business traveler would benefit from a similar tool that addresses the specific issues of proper packing, weight limitations of overhead compartments, and lifting techniques. Additionally, MSDs are exacerbated by mandatory immobility for non-stop flight periods of up to 15 hours, fatigue, stress, and inadequate hotel beds.

Air travel exposes the worker to non-specific vibration from the exterior atmosphere and from interior noise resulting from the operation of the aircraft engines. According to Pieren (1997), aircraft vibration sources are mechanical and aerodynamic, with whole body vibration causing disease processes related to neuromuscular changes. Bongers, Hulshof, Dijkstra, Boshuizen, Groenhout, and Valken (1990) studied exposure to whole body vibration using a variety of vehicles including helicopters. They found the daily average of hours of helicopter flight relates to temporary back pain whereas chronic back pain relates to total flight hours, with its cumulative vibration dose.

There are few applicable data on the ergonomic stressors of repetition and contact stress as movement is limited during flight. There may be repetition issues from use of laptop computers, but these are not necessarily related to air travel.

NIOSH defined trauma as "an injury or wound to a living body caused by the application of external force or violence. Acute trauma can occur with the sudden, one-time application of force or violence that causes immediate damage to a living body" (NIOSH, 2003, ¶1-2). Examples of traumatic injuries on an aircraft are those that result from falling overhead baggage or turbulence-related slips, trips, or falls. Overhead compartment baggage can shift during take-off, landing, or turbulence. Rozmaryn (1998) emphasized that the designers of overhead baggage compartments base their plans on a certain capacity, and overloading may cause the latches to fail even if secured according to specifications.

Turbulence is instability in the atmosphere and can occur unexpectedly. The FAA (2003g) identified in-flight turbulence as the leading cause of injuries in non-fatal accidents. In 1995, the FAA (2003d; 2001b) issued a public advisory to airlines urging passengers to use seat belts as a rule whenever seated and began *Safer Skies* in 1998 to determine accident root causes and prevention strategies. The FAA (2001a) team, *Partners in Cabin Safety*, developed the *Turbulence Happens* public education campaign to encourage passengers to wear their seatbelts at all times.

Another part of the work environment that can cause injuries, strain, or discomfort is the passenger seat itself. Two standard industry terms describe the

seat, pitch and width. Pitch is seat-to-seat spacing, measuring from one row to the next at the same position on two seats, one behind the other. Width is the distance between the two armrests. In an airline passenger seat, pitch and width are 32 inches and 17 inches, respectively. For comparison purposes, an Amtrak long distance train passenger seat has a pitch and width of 51 inches and 23 inches (Consumers Union, 2003).

Appendix A compares the dimensions of an airline passenger economy class seat to an office chair, using available literature and actual measurements taken during a routine flight. Since the role of an OEHN frequently involves ergonomic evaluations, this chart is a representation of the potential spatial problems the business traveler encounters. Using these measurements, the OEHN can view the root causes for ergonomic issues and suggest strategies. For example, the OEHN observes that the pitch is small and restricts movement in the traveler who is 72 inches tall. The OEHN suggests strategies such as walking in the cabin when possible or performing chair stretches to promote circulation. Using the analogy that the passenger seat and surrounding area represent the worksite for the business traveler, Appendix B utilizes the OSHA (2003c) e-Tool, *Computer Workstations,* to identify criteria for evaluation, potential hazards, and findings specific to this airline passenger economy class workstation. Although intended for the office setting, this tool it is applicable to the OEHN's awareness of aircraft enviromechanical hazards.

Medlineplus (2003) defined deep vein thrombosis (DVT) as the formation of a blood clot (thrombus) in veins located deep within the muscles of the

extremities, leading to partial or complete circulation blockage. This clot may break off (embolize), travel through the blood stream, and lodge in the brain, lungs, or heart, causing severe damage to that organ.

According to Ball (2003), there is a greater probability that DVT will develop in flight because the body responds directly to significant changes in the aircraft environment, including decreased air pressure, decreased oxygen, lower humidity, restricted movement, and cramped seating. Increased business travel with longer non-stop flights compounds this exposure risk potential. Some predisposing risk factors linked to DVT include obesity, chronic heart disease, diabetes, hormone therapy, cancer, previous DVT history, and pregnancy. However, Mendis, Yach, and Alwan (2002) found that the only research data on pre-existing risk factors for DVT relate to dehydration and relative hypoxia.

Symington and Stack (1977) used the term *economy class syndrome.* Unfortunately, this promoted the interpretation that DVT did not occur in business or first class air travelers or in travelers using other forms of long-distance transportation. DVT is not a disease related to those who can only afford cheaper modes of transportation. Bagshaw (2001) coined the more appropriate term, *traveler's thrombosis.*

Because there are numerous studies of DVT, this paper highlights only key research. According to WHO (2002a), circulatory stasis is a predisposing factor for the development of DVT. The World Health Organization (2002b) Research into Global Hazards of Travel (WRIGHT) is a project investigating air travel and DVT. The project was initiated to coordinate the many studies on this

subject and to increase the quality of the reporting. It is anticipated that by promoting quality control, the WRIGHT project can answer key questions, such as the extent of the association of DVT with air travel, the causal mechanisms involved, and potential preventive strategies.

According to the American Heart Association (2002), the LONFLIT series is one of the largest and most important studies of DVT related to long flights. In the LONFLIT 1 study, Belcaro, Geroulakos, Nicolaides, Myers, and Winford (2001b) found that the incidence of DVT was 4-6% in flights of more than 10 hours. In LONFLIT 2, Belcaro et al. (2001b) applied the same data to a long flight population wearing elastic stockings. The incidence of DVT was 18.75 times lower than in the control population when subjects were wearing stockings. With the LONFLIT 3 study, Belcaro (2001a) evaluated how well aspirin and heparin prevented DVT in high-risk individuals, who were identified as people with cardiovascular disease and taking cardiac medication. Aspirin had little positive effect and some undesirable side effects, while heparin was very effective in reducing incidence of DVT. In LONFLIT 4, Cesarone, Belcaro, Errichi, Nicolaides, Geroulakos, and Ippolito (2003) evaluated low to medium-risk subjects for edema and its control with specific flight stockings in long-haul flights. The low to medium risk population had no cardiovascular disease and did not use medications. Use of below-knee, *Scholl Flight Socks* was effective in controlling edema and in reducing the incidence of DVT in low to medium-risk subjects, during long-haul flights of 7 to 11 hours.

Dimberg, Mundt, Sulsky, and Liese (2001) found no association between DVT and corporate air travel. Although they studied almost 5000 international business travelers using insurance claims data, the rarity of DVT yields very small numbers and indicated the need for more research.

Physical Hazards

NEETF (1998) defined physical hazards as agents within the work environment that can cause tissue trauma. This section will address the physical hazards of cabin air pressure, relative humidity, temperature, radiation, and noise. The NRC (2002) related that the aircraft environmental control system (ECS) is unique from most other systems such as building maintenance and ground transportation vehicles because it must be able to operate in extremes of temperature, ambient air quality, and air pressures.

The primary purpose of the pressurization of air cabins is to maintain the partial pressure of oxygen (PO_2). The NRC (2002) defined the partial pressure of oxygen as the pressure exerted by the oxygen in the air if oxygen were the only chemical component of air. The FAA (2003a) mandated that under normal operating conditions, pressurized cabins must provide a cabin pressure altitude not to exceed the pressure found at an altitude of 8,000 feet. Even at this altitude, the air contained within the ears, sinuses, and gastrointestinal tract may expand by 25%. According to Bentz and Hughes (2002), barotrauma refers to the injury that occurs when the pressure of an air-containing space does not equalize with the pressure of the surrounding environment. The most common barotrauma site for the air traveler is the middle ear. Dawson (2001) reported that an upper

respiratory tract infection could exacerbate the injury because it could cause additional swelling. During descent, cabin air pressure starts to increase and exceeds the pressure within the middle ear. If the middle ear pressure does not equalize, eventually the eardrum will perforate and even a minor perforated eardrum can predispose the middle ear to infection.

Csortan, Jones, Haan, and Brown (1994) suggested that use of an oral decongestant before flying decreases the incidence of middle ear barotrauma associated with ambient pressure changes during air travel. Jones, Sheffield, White and Bloom (1998) refined the study and found that 120 milligrams of pseudoephedrine seemed to reduce the incidence of barotrauma when taken at least 30 minutes before flying.

The situation can be more severe for the airline traveler who scuba dives or deep-sea dives and then flies within 12 to 24 hours. Decompression sickness (generalized barotrauma) can affect the entire body leading to pain and permanent neurological problems. Recognition is critical so treatment in a hyperbaric chamber with 100% oxygen can be initiated immediately. Vann, Denoble, Emmerman, and Corson (1993) studied the relationship between flying after diving and decompression sickness at F.G. Hall Hypo/Hyperbaric Laboratory at Duke University Medical Center. This study reinforced the original recommendation of waiting at least 12 hours after making a single no-decompression dive, before a commercial flight over 8000 feet. To prevent decompression sickness, the *Divers Alert Network* (2003a) Flying after Diving Workshop suggested the single no-decompression diver wait at least 12 hours to

fly. The multiple dives per day diver and the diver who has been diving for multiple days should wait at least 18 hours to fly.

United States Navy divers carry out missions that may require flying almost immediately after diving. To reduce the risk of decompression sickness that resulted from flying-after-diving, the U. S. Navy (1999a; 1999b) Diving Manual published guidelines that specify how long a diver should remain at sea level pressure before further decompression to altitude for a flight. The Divers Alert Network (2003b) is currently conducting a joint operation with the U. S. Navy to study Navy flying after diving procedures on untested air dives, to test a few specific dive/altitude combinations, and to assist in the development of a decompression model calibration set. Freiberger, Denoble, Pieper, Uguccioni, Pollock, and Vann (2002) demonstrated that there is an increase in relative risk from flying after diving following shorter preflight surface intervals (PFSI) and/or greater dive depths on the last day. As part of post-dive guidelines for the commercial diver, OSHA (2003b) mandated that the employer shall alert the diver to the potential hazards of flying after diving.

Relative humidity is the ratio of the water vapor content of the sampled air compared to the maximum vapor content that would saturate it at any specific temperature. The higher the temperature, the more water vapor the air can hold and when saturated, the relative humidity in the air is 100% relative humidity. Higher relative humidity can promote the growth of mold, dust mites, bacteria, fungi, and viruses, which may be difficult to control in the closed aircraft cabin. Shoreland (2003) noted that the in-flight environmental control system keeps the

humidity low, averaging around 17%, but it can fall as low as 5% in business or first class. The result of low humidity is thirst, dry eyes, parched throat, and dry skin. For comparison, the EPA (1995; 2003b) recommended a relative humidity of 30-50% for homes. The NRC (2002) noted that there is a fundamental conflict between humidity control and contaminant control, since increasing the flow of outside air to reduce cabin contaminant levels reduces the humidity level. Decreasing the flow of outside air to raise the humidity increases the amount of contaminants.

Few articles related the potential for adverse effects associated with exposure to low relative humidity. Nagda & Hodgson (2001) found that a cabin environment of low humidity may lead to sick building syndrome symptoms. Increased recirculation of cabin air can increase relative humidity but the benefits and risks associated with increased ventilation need further investigation. It appears that air quality hazards were first identified with buildings and then adapted to aircraft cabins. Therefore, it is more likely that the effect of relative humidity will first be studied in regard to buildings and eventually applied to aircraft cabins. Sato, Fukayo, and Yano (2003) conducted a study to assess the adverse heath effects of low relative humidity in indoor air and found that current safeguards to prevent exposure to very low relative humidity are ineffective and need revision. The study findings indicate that the ultra-dry environment prompted worker complaints that were similar to two previous studies of moderately dry environments. Nordstrom, Norback and Akselesson (1994) found that increasing relative humidity improved dry symptoms and "sick building

syndrome". Reinikainen, Jaakkola, and Seppanen (1992) reported that when relative humidity was elevated from 20% to 40%, there was a decrease in allergy type symptoms.

Temperature control in the aircraft cabin is important for occupant comfort at all altitudes and critical for safety at high altitudes, where the outside temperature can reach -65^0 F at 40,000 feet. Nonetheless, the high passenger density means that cooling of the cabin is required in most circumstances. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) (1992) defined the specific combination of indoor space environmental factors and personal factors that would produce temperature conditions that are acceptable to 80% of the occupants within a space (Standard 55-1992). If this standard were applied to an aircraft cabin to determine a passenger acceptable temperature, some of the environmental factors to evaluate would be temperature, thermal radiation, humidity, and air speed. Personal factors would include activity and clothing.

Cosmic radiation affects the frequent flyer business traveler since the exposure can be cumulative based on hours of travel time. The United States Nuclear Regulatory Commission (NRC) (2003) described cosmic radiation as penetrating ionizing radiation that can displace charged particles from atoms, disrupting living cell processes. It originated in outer space, as opposed to terrestrial radiation that is the naturally occurring background radiation found on earth. Aw (2003) characterized the intensity of cosmic radiation exposure as it relates to altitude, latitude, length of exposure, and the time of the year. The

International Commission on Radiological Protection (ICRP) (2003) recommended that exposure should be limited to one millisievert per year for members of the public. For comparison, one rem equals 10 millisievert (mSv). The intensity of cosmic radiation increases with altitude and a typical long haul route has exposure rates at 5 μSv/hour (WHO, 2002a).

Aw (2003) reviewed the evidence and identified some statistically significant associations between exposure to cosmic radiation during air travel and certain cancers, but acknowledged that these were preliminary because of too many confounding variables. A major finding of this paper was that frequent business travelers who fly more than 200 hours per year could be categorized as radiation workers and that there should be stricter monitoring and awareness education of the risk to the general public.

Zeeb, Blettner, Langner, Hammer, Ballard, and Santaquilani (2003) published the results of a cohort study in which they investigated mortality patterns among more than 44,000 airline cabin crewmembers in Europe. The study is significant because of the size of the population and that no increased mortality due to cosmic radiation exposure was found. NIOSH (1996b) conducted two studies, as a part of the National Occupational Research Agenda (NORA), to evaluate the reproductive health effects on female flight attendants using adverse outcomes caused by ionizing radiation and circadian rhythm changes. A questionnaire study examined past reproductive outcomes of 7,000 women. A feasibility study observed ovulatory function among flight attendants. Teachers served as a comparison population for both studies.

Airline cabin noise varies between 95 and 105 decibels depending on the type of aircraft. Increased noise levels occur during take-off and noise levels are always high in the rear of the plane. OSHA deferred to the FAA to set standards for airline cabin noise; the Deafness Research Foundation (2002) indicated that the FAA does not currently regulate cabin noise levels. Elliott Aviation (2003) identified ways that the aviation industry promotes the use of soundproofing or noise-dampening material in plane design and construction, decreases aircraft engine noise, and identifies problem areas of structural vibration.

The frequent flier business traveler can use hearing protection such as earplugs. Antunano and Spanyers (1999) suggested that headphones using active noise reduction technology provide effective protection against low-frequency noise. The mirror image of a low-frequency noise wave will cancel noise. Traveler awareness is especially pertinent when landing at small airports that exit passengers directly onto the airfield, exposing them to the full extent of aircraft engines.

Psychosocial Hazards

The European Agency for Safety and Health at Work (2000) characterized psychosocial hazards as "those aspects of work design, organization, management, and their social and environmental contexts which have the potential for causing psychological, social, or physical harm" (p. 9).

Rose (2000) divided the causes of global business traveler stress into the common discomforts of international travel and the unique hurdles of long-distance travel. Examples of the peculiar challenges are concerns about self, such

as musculoskeletal problems; family, such as being away from comfortable routines; and workload, such as the additional work volume without office support. Dowdall (2003) examined the stresses of air travel, including traveling to the airport, carrying heavy baggage through check-in, clearing security checkpoints, walking the long distance to the gate, and dealing with flight delays. In addition to these stresses of air travel, the business air traveler has the stress of normal work processes, communication accessibility, and distance from family.

In 1997, Liese, Mundt, Dell, Nagy, and Demure conducted a cross-sectional study, taking all 10,000 World Bank employees, separating out the international business travelers, and assigning each to a trip frequency category. At that point, they reviewed insurance claims data and found that overall rates were 80% higher for men and 18% higher for women travelers compared to their non-traveling counterparts. Striker, Luippold, Nagy, Liese, Bigelow, and Mundt (1999) studied World Bank international business travelers and found that social and emotional concerns, such as impact of travel on family and the sense of isolation contributed the most to traveler stress, followed by health concerns, and post-travel workload. Crossing time zones did not seem to be an additional stressor. Espino, Sundstrom, Frick, Jacobs, and Peters (2002) surveyed spouses and World Bank Group staff with 50% of spouses and 75% of the staff sample reporting high or very high stress related to travel.

Culture shock affects frequent flyer business travelers in the same way that it affects expatriate workers who are residents of the country in which the corporation may have a branch location. Jones (2000) defined an expatriate

assignment as one that is longer than 6 months and involves moving family, pets, and household. Anxiety about cultural differences can occur from the first step of the planning phase. Anderzen (1998) published a comprehensive review of the psychophysiological aspects of foreign assignments. He conducted a longitudinal, prospective study of 131 expatriates and family members before, during, and after assignment and simultaneously followed 81 domestically based workers. He used a schedule of psychosocial and physiological assessments to increase knowledge of individual modifiers of psychophysiological reactions to strains and stressors.

According to the Aviation Health Institute (2003), aerophobia, or the fear of flying, is a complex anxiety disorder comprising six elements: claustrophobia, panic related anxiety, fear of emptiness, fear of airplane disasters, fear of heights, and/or post-traumatic reaction. Richmond (2003) attributed increased airline passenger awareness of air transportation system vulnerability and flight anxiety to the events of September 11, 2001. In line with this, DeHart (2003) observed that the increase of psychosocial stress preceding boarding was partly caused by increased security considerations.

Kraaij, Garnefski, and Van Gerwen (2003) examined the relationship between anxiety symptoms and coping strategies used by airline travelers. The respondents with the lowest anxiety indicated that they used the coping mechanisms of concentrating on planning, meditation, and putting things into perspective. The most anxious respondent worried about potential catastrophies and blamed others for problems. McIntosh, Swanson, Power, Raeside, and Dempster (1998) investigated the occurrence of health problems on short and long

flights, the perception of anxiety during air travel, and individual mechanisms used to reduce such anxiety. Air travelers reported apparent anxiety related to travel and associated this with health problems during flights.

Van Gerwen and Diekstra (2000) reviewed flight anxiety treatment facilities and found a wide diversity among the facilities in treatment methods and protocols. The researchers identified the minimum acceptable standards for fear of flying treatment programs and stressed that standardization is critical to insure that a consistent approach is used in treating anxiety.

Jet lag results from the mismatch between the traveler's internal clock and external environment. The internal clock is controlled by significant zeitgebers that are time-givers such as light, social contacts, and knowledge of clock time. Rapid time zone travel results in the zeitgebers sending conflicting messages to the internal clock and the result is jet lag symptoms (Aerospace Medical Association, 2003). Jet lag symptoms include fatigue, sleep disturbances, and irritability. British Airways (2003) identified lack of sleep and disruption to the circadian clock as factors that may decrease effective decision-making skills by up to 50%. Other decreases were found in communication skills (30%), memory (20%), and attention (75%). As a result, British Airways created a web resource, "Alertness Solutions" (2003), that provides practical strategies and resources to deal with jet lag.

In the work setting, Flower, Irvine, and Folkard (2003) wanted to predict those most at risk for jet lag symptoms as effects vary among individuals and flying across time zones can considerably affect work performance. The study

tool, *The Traveler Profile Questionnaire,* provided insufficient data to identify those travelers who would suffer most from the effects of jet lag.

Since 2001, Herxheimer and Petrie (2003) have been conducting a systematic review and update of randomized trials that compare oral melatonin to a placebo or other medication. The population studied was airline passengers, airline staff, and military personnel. Herxheimer and Waterhouse (2003) stated a significant finding of this study is that melatonin is effective in the prevention or reduction of jet lag symptoms and that occasional short-term use appears to be safe.

Pre-existing Risk Factors

For this paper, a pre-existing risk factor is any characteristic, behavior, or disease that directly influences susceptibility to hazards of air travel. Developing prior to air travel, the risk factor predisposes the person to exacerbation of the characteristic, behavior, or disease. This paper will focus on diabetes, cardiac disease, respiratory disease, pregnancy, and hypersensitivity disease.

Diabetes

According to Shand (2000), Type 2 diabetics and well-controlled Type 1 diabetics do not usually have travel problems, but may suffer dehydration from oral anti-diabetic medication. Uncontrolled, newly diagnosed, and brittle diabetics should postpone travel until stabilized.

The insulin requirements of the diabetic international business traveler are affected by meal content, meal schedules, sleep disturbances, decreased activity, and potential electrolyte imbalance related to the gastrointestinal disturbances

from motion sickness. Crossing time zones shortens or lengthens the normal day for diabetics and in turn may require an adjustment to medication types and timing. These are serious considerations for the Type 1 diabetic traveler who takes insulin. The Aerospace Medical Association (2003) stated that "for the Type 2 diabetic who takes insulin, the endogenous insulin will provide a suitable buffer and compensate to some degree for deficiencies of an insulin regimen" (p. A15). Activity level and climate effects can also affect insulin requirements. Driver (2003) found that regular blood glucose monitoring is crucial and the traveler must understand how to alter insulin intake based on the results. Gill and Redmond (1999) surveyed United Kingdom physicians who ran diabetic clinics and found that advice quality varied greatly and regimens were excessively complicated.

Trip planning and the quality of testing equipment are topics stressed in the literature. Planning is critical to insure that enough food and medication are available in the event of delays. Since the medication schedule can be affected by time zones, food availability, and the absorption rate of the medication, the traveler must be aware of itinerary-specific problems that may occur. The traveler needs to develop a strategy to deal with the effect of altitude on glucose monitoring equipment. Gustaitis (2002) noted that increased airline security from longer airport waiting periods to carry-on restrictions can be problematic for the diabetic traveler. This can have a significant effect on diabetic travelers and requires advance planning for additional glucose monitoring and insulin adjustment. According to new air travel guidelines, the United States Department

of Homeland Security (2003) requires injectable medication to have a professionally printed pharmacy or manufacturer's label and the security screener must be notified in advance if carry-on luggage contains injectable medication, sharps, or a hazardous waste container. Chandran and Edelman (2003) found that the FAA regards physician letters as inadequate to prove insulin necessity because of forgery concerns.

Fink, Christensen, and Ellsworth (2002) assessed the precision and accuracy of seven commonly used blood glucose meters while mountaineering on Mount Rainier. This assessment is applicable to the diabetic airline traveler in that altitude, temperature, and relative humidity affect blood glucose meter performance, and increased glucose levels are more greatly underestimated at higher elevations. They anticipate further study to match glucometer characteristics to specific environments.

Cardiac Disease

The air traveler with cardiac disease may experience hypoxia due to a lowered oxygen pressure at high altitude (Aerospace Medical Association, 2003). The literature attributes diverse cardiovascular contraindications to commercial airline flight. In *Medical Guidelines for Air Travel*, the Aerospace Medical Association (2003) identified some cardiovascular contraindications to commercial airline flight as myocardial infarction within 3-6 weeks of flight, unstable angina, congestive heart failure, uncontrolled hypertension, cardiac bypass within 2 weeks, cardiovascular accident within 2 weeks, and uncontrolled ventricular tachycardia. Bratton (1999) indicated that a passenger with cardiac

problems should be able to walk 100 yards and climb 12 steps before attempting a long flight.

In response to the Aviation Medical Assistance Act of 1998, the FAA (2001c) conducted a yearlong data collection study to determine the adequacy of current training and emergency medical equipment for passenger-carrying aircraft. As a result, the FAA (2003c) issued a final rule that becomes effective in 2004 which requires passenger-carrying aircraft of more than 7,500 lbs. maximum payload capacity with at least one flight attendant to carry at least one automated external defibrillator (AED) and at least one enhanced emergency medical kit.

According to WHO (2002a), flying is generally safe for travelers with pacemakers. Unipolar-lead systems may be susceptible to electronic interference during airport security screening and/or flight, whereas bipolar pacemakers are not affected. The United States Department of Homeland Security (2003) recommended presenting pacemaker identification and asking the screener to conduct a pat-down inspection instead of electronic security screening to prevent potential pacemaker interference.

Roby, Lee, and Hopkins (2002) conducted a randomized, controlled trial to study commercial airline travelers two weeks post-myocardial infarction. They wanted to find out if supplemental oxygen decreased in-flight adverse events and if a medical escort was necessary. The results suggested that these commercial airline travelers do not require supplemental oxygen or a medical escort.

Respiratory Disease

Hypoxia can occur with both cardiac and respiratory disease. Morgan (2002) noted that the normal lung adapts to the sudden pressure decrease associated with ascent, but the air-filled spaces in an abnormal lung may not promptly adjust. Mortazavi, Eisenberg, Langleben, Ernst, and Schiff (2003) described environmental conditions at high altitude with recommendations and methods for patient assessment for both cardiac and respiratory status related to hypoxia. They indicated the need for further study done at higher elevations to validate their findings.

Shand (2000) listed the critical assessment areas for respiratory disease flying fitness as the pressure changes during flight, the cabin air quality, and the reduction in the partial pressure of oxygen. Reduced air pressure may cause gas in the lungs to expand in volume by 25%. According to the NRC (2002), this partial pressure of oxygen reduction in the lungs ultimately leads to a decrease in systemic arterial PO_2. The British Thoracic Society (2002) noted that if a traveler was hypoxic at sea level, air travel would be problematic since the increase in altitude may cause an exacerbation of respiratory disease. To compensate for acute hypoxemia at rest, the traveler must increase his/her breathing rate and heart rate.

Supplemental oxygen may be needed for some passengers to maintain proper oxygenation, but FAA (2003b; 2003h) regulations prohibit passengers from bringing their own oxygen delivery system onto commercial aircraft. United States based airline policies vary regarding supplying medical oxygen and there is

the problem of supplemental medical oxygen in the airport itself. Lyznicki, Williams, Deitchman, Howe, and the American Medical Association (2000) found that in order to provide a consistent, uninterrupted supply of medical oxygen for the entire trip, it was important to standardize procedures regarding the accessibility and availability of oxygen. It was also essential that the oxygen delivery equipment be the same for both commercial aircraft and airports.

Pneumothorax is contraindicated for air travel because of the risk of tension pneumothorax. Shand (2000) explained that gas expansion at altitude and poor ventilation can exacerbate an existing pneumothorax.

The CDC (2003c) identified the viral respiratory illness, Severe Acute Respiratory Syndrome (SARS), in 2003. SARS is a significant issue for the frequent flyer business traveler because of its speed, severity, and rapid spread along international air-travel routes. Stohr and WHO (2003) noted that WHO has successfully identified the causal agent and developed a limited diagnostic test. WHO and the CDC are the most reliable and up-to-date resources for information on SARS.

Pregnancy

The commercial aircraft environment is not generally considered hazardous to the pregnant passenger and most travel alternatives are not as safe or comfortable (Aerospace Medical Association, 2003). The American College of Obstetrics and Gynecology (2001) indicated that pregnant women may fly safely up to 36 weeks of gestation in the absence of obstetric or medical complications. However, pregnant women should not fly with medical complications, such as

pregnancy-induced hypertension or poorly controlled diabetes; or an obstetric complication risk such as premature labor or placental abnormalities. Kingman and Economides (2002) explained the most recent statement of The Royal College of Obstetricians and Gynaecologists which states that although pregnant women should be aware of the potential risks of air travel such as inaccessibility of immediate medical care, commercial air travel is generally safe in pregnancy.

Physiologically, the fetus reacts more consistently than the pregnant woman in the aircraft environment does. "Favorable fetal hemoglobin-oxygen dynamics protect the fetus from the effect of lower cabin pressure" (CDC, 2003a, p. 232). Bettes and McKenas (1999) found that the fetus is able to maintain a greater degree of hemoglobin saturation than the adult is at similar partial pressures of oxygen.

The most recent studies concerning air travel and pregnancy focused on female flight attendants. Their findings are preliminary since they do not prove a clinically significant risk among pregnant flight attendants. Daniell, Vaughan, and Millies (1990) attributed the increased risk of spontaneous abortion in a previous study to methods limitations. Cone, Vaughn, Huete, and Samuels (1998) conducted a study that did not find an overall increased risk for spontaneous abortion among flight attendants compared with other working women. Both groups averaged 10-20% spontaneous abortions. The relatively low overall response rate of 38 out of a population of 418 indicates the need for further study.

Hypersensitivity Disease

The final risk factor is hypersensitivity disease which is an excessive and abnormal susceptibility caused by exposure to specific substances (antigens) such as pollen, bee stings, poison ivy, drugs, or foods (Thomas, 2001). The NRC (2002) found that the scant data limits a reliable conclusion about routine inhalation exposures in aircraft. The few case reports that link hypersensitivity responses with allergen exposure on aircraft focused on peanut allergies. Using telephonic self-reporting to describe the clinical characteristics of allergic reactions to peanuts on airplanes, Sicherer et al. (1999) found that the potential route of accidental exposure are ingestion, inhalation, or skin absorption. Anti-IgE therapy is one strategy that is being used for peanut allergy. Leung, Sampson, Yunginger, Burks, Schneider, and Wortel (2003) concluded that a dose of *TNX-901*, a humanized monoclonal antibody against IgE, significantly and substantially increased the threshold of sensitivity to peanuts on oral food challenge. This is significant to the air traveler in the event of an unintended exposure to peanuts. Using an epidemiological approach, Lack, Fox, Northstone, Golding, and the Avon Study Team (2003) found that sensitization to peanut protein may occur in children via inflamed skin absorption of peanut oil. Future study focus on new prevention strategies to benefit infants.

United Airlines and US Airways are an example of air carriers that have adopted a "peanut policy" in which onboard snacks and meals do not include peanuts. The FAA (2003f) noted that in 1998, the Department of Transportation proposed that United States based airlines make "peanut-free zones" available on

request from passengers with medically documented severe allergies to peanuts, as would be covered in the Air Carrier Access Act of 1986 (¶1). This has not been implemented by any U.S. air carrier.

Summary

The current literature reflects some awareness of the exposure hazards of the frequent flyer business traveler, but the major focus continues to be on pre-existing disease processes such as DVT and diabetes. Research is being conducted on enviromechanical hazards and MSDs. Research on flight crew occupational hazard exposure may be applicable to the business traveler. There still is little relevant data on environmental hazard exposures.

CHAPTER 3

THE ROLE OF THE

OCCUPATIONAL AND ENVIRONMENTAL HEALTH NURSE

Introduction

The American Association of Occupational Health Nurses, Inc. (AAOHN, 2003a) defined *Occupational and Environmental Health Nursing* as:

> The specialty practice that provides for and delivers health and safety programs and services to workers, worker populations and community groups. The practice focuses on promotion and restoration of health, prevention of illness and injury, and protection from work related and environmental hazards (¶ 1).

Gillies (1994) defined a role as a specific framework of anticipated behaviors that characterize a particular position. Randolph (2003) identified "seven major practice roles exist[ing] in occupational and environmental health nursing: clinician/practitioner, case manager, health promotion specialist, manager, consultant, educator, and researcher" (p. 84). This section will address the individual roles of clinician, case manager, and health promotion specialist as they apply to the frequent flyer business traveler.

Clinician

The OEHN primarily functions as a Clinician when assessing and managing care for the frequent flyer business traveler. Whether the OEHN delivers primary care or outsources the travel health services, the nursing process framework is fundamental to this clinical practice role. The OEHN interviews the

potential traveler and gathers data on current traveler status, previous health history, and travel history. The OEHN develops a pre-travel health assessment to establish essential baseline data. Then, the OEHN evaluates the work environment by collecting itinerary-specific information, defining hazardous exposure risks, identifying the mode of transportation, and noting trip duration. For example, a trip to a South American field location may involve diverse methods of transportation that expose the traveler to different hazards. A traveler may be exposed to an infectious disease during a 6-hour commercial flight. The traveler could be exposed to excessive radiation during a 3-hour flight over the Andes in a six-seat plane. A traveler could be subjected to excessive noise and vibration during a 40-minute helicopter ride.

Next, the OEHN analyzes these aggregate data to develop goals and objectives that become the basis for formulating a traveler-specific action plan. For the new traveler, the plan is complex and involves basic travel hazard awareness, immunizations, and country specific issues. The OEHN addresses matters that pertain to this traveler such as a pre-existing risk factor of diabetes and the potential effect of the disease during the trip. In addition to actual exams and immunizations, the new traveler may need counseling sessions as additional concerns surface. For example, once the traveler feels that his/her health questions are answered, questions about security may arise.

While the seasoned traveler may only want immunization updates and country-specific information, it is crucial to reiterate such things as in-flight stretching exercises to prevent DVT and stress reduction techniques for long

flights. A travel plan may involve restrictions that temporarily prohibit air travel for the worker who has uncontrolled hypertension along with the development of a timeline for treatment and education. The treatment timeline involves medication evaluation, blood pressure monitoring, dosage adjustments, and side effects. An education timeline involves nutrition counseling on a low salt diet and increased exercise.

The final phase of the nursing process is evaluation of outcomes and revision. This step is vital to improve quality and discover trends in worker health. For example, the OEHN may notice increased MSD exposures related to lifting luggage and decide to include an awareness component in all air traveler action plans.

Case Manager

The OEHN also operates as a Case Manager by coordinating all travel health services to promote quality and cost effectiveness. Case management has elements that are similar to the nursing process: assessment, planning, implementation, and evaluation. For the business traveler, health maintenance case management may be as vital as illness prevention since many corporate travelers have years of service, are older, and may be more prone to pre-existing risk factors. An integral part of case management is familiarity with pre-travel resources, such as a travel clinic for immunizations, and post-travel resources such as an infectious disease physician to evaluate tropical diseases. An in-flight resource, such as those that provide airport evacuation for life-threatening diseases, is critical. Thompson, Holihan, and MacNeal (1996) noted that many

corporations contract for travel assistance services that consist of in-country medical resources and medical evacuations.

An example of the case management process applies to the frequent flyer business traveler who has pre-existing Type 1 Diabetes. In the assessment phase, the OEHN identifies and communicates with the traveler to collect data via an interview, conducts a health records review, makes itinerary-specific considerations, and has direct contact with the traveler's diabetic educator. The OEHN then develops and implements a plan for an insulin administration schedule and immunization update using a previously established network of services (for example, a travel health clinic that specializes in diabetes). Key competencies of this role are relationship building and advocacy. It is important that the business traveler understands that the OEHN is a knowledgeable travel health professional and an advocate for the traveler. Evaluation is invaluable for future worker-specific issues as the OEHN identifies trends, makes revisions, and may adapt the plan to other diabetic travelers.

Health Promotion Specialist

Another significant OEHN role in relation to the frequent flyer business traveler is that of a Health Promotion Specialist, in developing, implementing, and evaluating health promotion and health protection programs. Rogers (2003) believes that the design of worksite health promotion programs focuses on moving toward optimal health and the reduction of health risk. Health promotion applies to the single traveler during discussion of itinerary-specific risks. It also pertains to first time travelers who need information about risky behaviors and jet

lag issues. The OEHN takes into account the traveler's education level and readiness to learn, and uses a variety of teaching strategies to achieve maximum program effect.

Pender, Murdaugh, and Parsons (2002) defined health promotion as an action behavior that develops health potential into actual behaviors. She characterized health protection primarily as an avoidance behavior, but when ineffective, the focus may become the maintenance of function.

Prevention is the hallmark of both health promotion and health protection. Health promotion is the achievement of health potential with building behaviors, whereas health protection is the avoidance by anticipation and solutions. Campbell (2001) discussed the three levels of prevention: primary, secondary, and tertiary. Primary prevention removes or lessens the risk of disease with definite actions. Secondary prevention identifies the disease as early as possible for the purpose of mitigation. Tertiary prevention focuses on rehabilitation and optimal health outcomes.

Primary Prevention

For the frequent flyer business traveler, primary prevention solutions are the complementary strategies of health promotion, health education, and risk reduction. Health promotion and education are positive strategies aimed at the maintenance or improvement of health and well-being. Awareness is a critical component of program development since recognition of the problem must come before the solution, whether the answer is an active behavior or an avoidance behavior. To identify risks and preventive strategies, the OEHN could develop a

set of learning objectives for a presentation on air travel hazard awareness (See Appendix C). To counsel travelers, the OEHN could develop primary prevention learning objectives for discussions on air travel health (See Appendix D). The OEHN facilitates primary prevention by ensuring that travelers have had all routine childhood immunizations. The CDC Advisory Committee on Immunization Practices (ACIP) (2003e) recommends specific routine childhood immunizations to prevent the following diseases: Polio, Measles, Mumps, Rubella, Diphtheria, Tetanus, Pertussis, Meningitis, Varicella, and Hepatitis B. Burger (2001) identified some vaccine contraindications, such as eggs, thimerosal, and yeast.

Risk identification is the first step to develop risk reduction strategies. The individual pre-travel assessment (See Appendix E) is an effective tool to establish baseline information and foster a nurse-traveler dialogue. To assess risk, Ryan and Kain (2000) indicated that the travel health provider must consider the traveler's health status and itinerary details since each will affect the treatment approach. The OEHN could formulate a country-specific immunization schedule (See Appendix F) to identify what immunizations are required. Immunization tables are helpful to ensure that all information is readily available for the last minute business traveler.

The performance of in-flight stretching exercises can lessen the hazard of DVT (See Appendix G) by promoting circulation. It also helps to reduce MSDs. Utilization of a series of exercises on a regular basis can signify a behavioral change. The air traveler faces risk of infectious diseases and some of these may be

vaccine-preventable. Disease-specific information can assist in improving the air traveler's perception of the disease risk and receiving immunizations (See Appendix H). The psychosocial hazard of stress affects the air traveler. Although the business traveler may acknowledge a stress risk, the OEHN may need to counsel the traveler on ways to initiate behavioral changes through use of stress reduction techniques (See Appendix I).

Secondary Prevention

Secondary prevention focuses on early case identification and intervention. Frequently the business traveler self-identifies the problem for the OEHN, as in the case of traveler's diarrhea. In the event of vague symptoms, the pre-existing risk factor assessment (See Appendix J) can be used for early case finding and diagnosis.

Once the OEHN identifies the specific disease process, an implementation strategy development begins. For example, a first time frequent flyer business traveler informs the OEHN that he/she is a diabetic. In addition to the basic data collection and counseling, the OEHN develops individual teaching guidelines similar to the learning objectives for air travel nutrition counseling for the diabetic business traveler (See Appendix K). In the event an experienced business traveler becomes pregnant, the OEHN formulates one-on-one counseling guidelines for the pregnant business traveler (See Appendix L).

As the main health information source for the frequent flyer business traveler, the OEHN can prepare a list of reliable air travel health websites (See

Appendix M). The Internet is an excellent source of health information, travel injury and illness trends, and pertinent air travel information.

For individual evaluation purposes, the post-travel assessment is a tool for case-finding, early diagnosis, and referral (See Appendix N). Easmon (2000) suggested classifying returning travelers into those who are well, those with pre-existing heath problems, those who are symptomatic, and travelers who become severely ill abroad and require evacuation. Each of these areas has specific measurable outcomes that a purposeful evaluation tool can assess. This classification design is an example of the biopsychosocial model of health described by Rogers and Reilly (2002), in which they note that "individuals differ in vulnerability and susceptibility to disease, because health depends not only on exposure to disease pathogens, but also on psychosocial factors" (p. 450). This data source, if consistently applied, will provide the OEHN with statistics on individuals, populations, programs, or disease/illness trends. Such information is vital to future planning and program revision.

Tertiary Prevention

Tertiary prevention includes disability case management and chronic illness monitoring. In a 2003 *Position Statement,* the AAOHN defined case management as "the process of coordinating an individual's total health care services to achieve optimal, quality care delivered in a cost effective manner. The process integrates the assessment, planning, implementation, and evaluation components" (¶2). Boseman (2001) defined disability management in the context of reducing the effect of health impairment on the worker's established

performance level. Wassel, Randolph, Burgerhuff-Stepler, and Winzeler (2001) noted that disability case management integrates the coordination of benefits and health services into illness and injury management. For the OEHN, an example specific to the frequent flyer business traveler is the traveler who experiences severe ear pain when the aircraft descends upon arrival. Based on the potential physical hazard of barotrauma, the OEHN conducts an assessment, using health records and a traveler interview, then develops a plan for referral and return to work. The plan action items include an ear, nose, and throat (ENT) physician referral, return to work guidelines, and travel health counseling for future trips. The counseling consists of identification of respiratory illness risk factors that could contribute to the development of barotrauma and preventive over the counter (OTC) medications. The implementation phase puts the plan into practice with evaluation and interim modification as needed. The final overall evaluation examines traveler-specific quality and the effect on the entire population. Traveler-specific quality control could determine trends in traveler risk factor identification. The overall evaluation could determine that a concern for the entire frequent flyer business traveler population is the inaccessibility of OTC medications to prevent ear problems.

A chronic illness is a disease with slow onset that lasts for a long period. Chronic illness monitoring is a systematic approach of observation and early treatment. It is a cost effective method of tertiary prevention because it can improve a worker's potential by improving quality of life. There are many business travelers who continue to function well although they may have chronic

diseases such as cardiovascular disease, asthma, cancer, diabetes, depression, and obesity.

In the case of a diabetic traveler, the OEHN begins with a needs assessment related to diabetes and travel. The OEHN implements a plan specific to this worker, centering on the itinerary, duration of the trip, available resources, and any disability requirements. The traveler will need to plan for time zone changes and adapt an insulin schedule. The minimum goal is to maintain the current level of health since an exacerbation of the diabetes will eventually affect the worker's productivity. It is particularly important for the international traveler to have access to current information and the Internet is a valuable tool. However, Internet information needs to be evaluated to make sure it is credible. The American Diabetes Association (2003) and the FAA (2003e) pointed out that the use of Internet resources is particularly effective in remote areas since the traveler has easy access from most international business locations and Internet sites are routinely user friendly.

Interdisciplinary Aspects of the Scope of Practice

The role of the OEHN reflects many disciplines that influence the scope of practice and travel health. The streamlining of global business has promoted a collaborative relationship among the occupational health, safety, and industrial hygiene professionals. This overlap involves frequent communication and the OEHN must have a working knowledge of occupational and environmental health nursing, epidemiology, industrial hygiene, toxicology, safety, and ergonomics.

Rogers (2003) defined epidemiology as "the study of the distribution and determinants of health related states and events in a specified population and the application of this study to the control of health problems" (p. 101). In this case, the specific population consists of frequent flyer business travelers. Health-related states include air travel risks such as exposure to biological hazards of disease transmission. This was very evident in the corporate reaction to the global identification of SARS when restrictions directly affected air travel and international business. Another example of a health-related state is the pre-existing risk factor of pregnancy. DVT research directly influenced the opinion of the American College of Obstetrics and Gynecology Committee on Obstetric Practice (2001) when it found that the pregnant traveler could safely fly up to 36 weeks unless there was a history of DVT.

According to Rogers, MacDonald, and Pompeii (1998), industrial hygiene is an environmental science that utilizes the process of anticipation, recognition, evaluation, and hazard control to promote worker health and safety. In this instance, the worksite is the airplane and the workstation is the passenger seat. The anticipation and recognition steps include a walk-through assessment of the airplane. It is reasonable that an adequate observation necessitates the OEHN to fly periodically on a similar itinerary (plane type and duration) and can include monitoring measures, noise dosimetry, conducting an ergonomic assessment, or communicating with airline staff regarding potential risks. An important component is direct communication with the worker to identify issues and solutions in the form of controls. The evaluation step is critical to improve quality

and discover trends in worker health. As an example, the OEHN can apply this process to the new traveler with the engineering control of a wheeled computer case to increase mobility and decrease the weight to be carried; a work practice control of an awareness program that includes ergonomic solutions to issues previously identified in the walkthrough; and an administrative control utilizing stretch breaks to limits exposure to the passenger seat.

LaDou (1997) termed toxicology as "the study of physical and chemical agents and the injury they cause to living cells" (p.171). To understand the hazard implications that the other disciplines identify, toxicology information resources need to be part of the OEHN knowledge base. For example, not only does the OEHN need to know that ozone, a main contaminant in higher altitudes, has a direct effect on human health but also that it combines with chemicals in the aircraft to produce potentially irritating contaminants.

Rogers (2003) identified the main responsibilities of a safety professional as design implementation and action evaluation that avoids or mitigates hazard exposure, with training and education as the primary focus. The OEHN Health Promotion Specialist role meshes with this prevention characteristic. Examples of prevention strategies are awareness programs and behavioral training. The mitigation aspect is an element of the OEHN Case Manager role when an action plan is developed to minimize illness, such as the itinerary-specific immunization schedule.

Ostendorf (2002) defined ergonomics as "the study of the requirements and limitations of the body in performing physical work" (*ENVR137 Lecture*).

According to Ostendorf, Rogers, and Bertsche (2000), ergonomics involves an interconnection between the worker, health status, and the core competencies required by the job. OSHA (2000) found that the ergonomist designs the job to fit the worker, rather than adjusting the worker's body to the job. A clear example of this is the visualization of the tall or overweight traveler attempting to perform quality work in a safe manner, crammed into an airplane passenger seat.

Summary

When managing the frequent flyer business traveler, the OEHN focuses on health promotion and health protection goals. The three OEHN roles discussed in this paper may use different approaches to achieve these primary goals. The three types of prevention - primary, secondary, and tertiary - follow a timeline beginning with complete prevention, proceeding through, and ending with management of a disease process. The OEHN designs and implements practice strategies practice based on this progression.

CHAPTER 4

SUMMARY AND RECOMMENDATIONS

The EPA (1991b) described the indoor environment of a building as the interaction of many factors such as initial design with modifications, location, internal or external hazard sources, mechanical system management, and the building occupants. This same statement applies to the environment of an airplane except that an airplane must be able to operate in extremes of temperature, ambient air quality, and air pressures. An aircraft is an enclosed space occupied by people and experiences air quality problems similar to those of a building.

Workplace health and safety research projects do not have to study airplanes specifically to apply to the frequent flyer business traveler. This paper has identified other similarities, such as the analogy between passenger seat and office chair, aircraft pressure changes causing concerns that are similar to those of commercial diving operations, and the need for passenger luggage lifting guidelines. Under normal operating conditions, the FAA (2003a) requires the plane to fly at a cabin pressure altitude of not more than 8000 feet. Taken in context, this is higher than the altitude of Santa Fe, NM (6400 feet) or Denver, CO (6200 feet). Air travel issues are not unique and future research can build on previous studies of building air quality, disease transmission, altitude, and ergonomics.

The role of the Occupational and Environmental Health Nurse in the area of frequent flyer business travel health continues to expand with increased business globalization, technological advances, and communication access.

Although specific tasks vary and the process name may be different, the basic framework consists of the same components of assessment, planning, development, implementation, and evaluation. This paper has identified the major hazards faced by the frequent flyer business traveler, the adverse health effects associated with these exposures, the applicability to OEHN practice, and the similarities between the air transportation industry and other types of global businesses.

The World Health Organization (1996) developed a plan, *Global Strategy on Occupational Health for All,* to recognize that work-related injuries and illnesses are a major part of the Global Burden of Disease, and to make contact with the global workers without occupational health access. The United States developed *Healthy People 2010* and *National Occupational Research Agenda (NORA)* to focus health promotion and protection on worksite safety and health. *Healthy People 2010* (2003) is a systematic approach to health improvement for individuals, communities, and the United States using a set of achievable health objectives during 2000-2010. NIOSH (1996a) designed *NORA* as a framework to guide occupational safety and health research. *NORA* is a partnership of more than 500 outside organizations and individuals.

These research initiatives are applicable to the frequent flyer business traveler population since business travel is a major component of increased globalization of business. Specific *NORA* research that is applicable to this population includes low back disorders, upper extremity MSDs, stress, traumatic

injuries, changing economy/workforce, emerging technologies, indoor air, mechanical stressors, noise, and psychosocial factors.

A limitation to the future direction of Occupational and Environmental Health Nursing as it relates to frequent flyer business traveler health are self-imposed constraints. The OEHN must be instrumental in self-expansion of the role. The field is rapidly expanding as the number of travelers, immunizations, and modes of transportation increase. The physician focuses on disease, the industrial hygienist centers on hazard exposure, and the safety professional deals with occupational issues related to illnesses and injuries. The OEHN is the health professional who focuses on all of the previous three areas, in addition to health promotion and health protection. The frequent flyer business traveler has specific and complex needs that the OEHN is in a unique position to address.

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APPENDICES

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APPENDIX A
Comparison of Airline Passenger Seat with Office Chair

TERM	CHARACTERISTICS	ECONOMY CLASS SEAT 7D 7/23/2003 FLIGHT CO158	LEAP CHAIR (STEELCASE)
Seat Pitch	Distance between rows of seats – the measurement from the *same* position on two seats, one behind the other; not the legroom area FAA only has control over exit row pitch http://www.airlinequality.com	31" Fixed Pitch Backrest Tilts	32"+ Variable Pitch Adjustable Chair Distance to Desk Varies
Seat Width	The horizontal measurement taken at right angles to the length; side to side	17.2"	18.5"
Seat Depth	The measurement of the maximum seat depth that permits contact with the back in the lumbar area and avoids pressure on the inside of the lower leg	17"	16"
Seat Height	The measurement from the floor to the bottom of the thighs (popliteal height)	18"	18"
Seat Pan	The horizontal area of the chair upon which the person sits Area: width times depth	Straight Edge Not Adjustable Parallel to the Floor Area: 17.2 x 18	Adjustable Tilt Curved Pan Waterfall Edge Area: 18.5 x 18.5
Back Rest	Shape: lordotic (toward stomach), concave Padded	Lordotic 1.5" Dense Padding	Lordotic 2" Dense Padding
Seat Cushioning	Firm and thick in back section and thin in the front	3" Dense Padding	3" Padding
Arm Rests	Width Should be padded and support forearms 4" gap between armrest and seat back	2" wide Not padded No gap	4.5" wide Padded 4" gap

(Hewitt, 2003)

APPENDIX B

Workstation Evaluation for the Economy Class Airline Passenger utilizing the OSHA eTool: *Computer Workstations*

Direct quotes from OSHA eTool: *Computer Workstations* are indicated by *italicized text*

http://www.osha-slc.gov/SLTC/computerworkstations_ecat/

CHAIR:			
WORKSTATION	**CRITERIA (eTool)**	**HAZARDS (eTool)**	**FINDINGS**
Seat Position	*The seat and backrest of the chair should support a comfortable posture that allows frequent changing of the seating position. The seatpan should accommodate the specific employee, and have adequate padding with rounded edge.*	*Improper size, shape, or choice of materials for the seat pan and backrest may result in uneven weight distribution, contact stress, decreased circulation to the extremities, and awkward posture. This can lead to over exertion and fatigue.*	1. Although the seat back is adjustable, the limited seat pitch (the measurement from the same position on two seats, one behind the other) restricts frequent position changes. 2. The fixed seat size does not adapt easily to body size, type, and weight. 3. The seat pan cushions are 5" dense padding.
Chair Height	*The chair height is correct when the entire sole of the foot can rest on the floor and the back of the knee is slightly higher than the seat of the chair.*	*Improper chair height causes awkward postures and decreased circulation in legs and feet.*	1. Feet are flat on the floor. 2. When knees are much higher than chair seat (in tall people), this compromises circulation. 3. When knees are much lower than chair seat (in short people), this compromises circulation.
Armrest	*Armrests should support both forearms while the employee performs tasks and should not interfere with movement.*	*Armrests that are too high or too low can produce awkward postures, create contact stress to the elbow, and provide inadequate support.*	1. Passengers do not always have access to both armrests. 2. Fixed height/length armrest affects posture and may cause pressure to forearms.

APPENDIX B (continued)
Workstation Evaluation for the Economy Class Airline Passenger utilizing the OSHA eTool: *Computer Workstations*
Direct quotes from OSHA eTool: *Computer Workstations* are indicated by *italicized text*
http://www.osha-slc.gov/SLTC/computerworkstations_ecat/

KEY BOARD & MOUSE:			
WORKSTATION	**CRITERIA (eTool)**	**HAZARDS (eTool)**	**FINDINGS**
Height & Orientation	*Forearms are parallel to the floor. Elbows hang comfortably at the side of the body. Shoulders are relaxed and during keyboard use, the wrist does not assume an awkward posture. Thighs must clear the VDT table.*	*Improper height and angle of the keyboard, mouse, or working surface can cause awkward postures of the wrist and forearm for extended periods. It also prevents the hands from moving easily over the keyboard. Awkward head and neck postures can lead to fatigue and/or headaches and ultimately to musculoskeletal disorders such as carpal tunnel syndrome and tendonitis. Supporting the laptop computer on the thighs is an awkward posture that can lead to stressed muscles of the lower back and upper legs.*	1. A laptop computer, positioned on a meal tray is not adjustable and cannot accommodate a variety of body size, type, and weight. 2. A seat that does not recline or the reclining of the seat in front will decrease the available workspace. 3. Thigh clearance varies based on body size and weight and causes a traveler to support the laptop computer/meal tray with his/her thighs.
Placement	*Keyboard is placed directly in front of user. Mouse is positioned at the operator's side with arm close to the body. A straight line should be maintained between the hand and forearm. The upper arm should not be elevated or extended while using the mouse.*	*A keyboard or mouse that is not directly in front of or close to the body forces the employee to repeatedly reach during use. Reaching causes awkward neck and shoulder postures.*	1. The traveler operates a computer without an auxiliary keyboard or mouse because of space considerations. 2. The keyboard and mouse are directly in front of the user because they are an actual part of the laptop.
Design & Use	*Wrists are straight (neutral position) and not bent up or down. Reduce bending of the wrists by moving the entire arm.*	*Bending wrists in any direction is an awkward posture that can lead to decreased circulation, pain and numbness and ultimately to musculoskeletal disorders e.g. carpal tunnel syndrome and tendonitis.*	1. The fixed armrest and meal tray limit the ability to keep the wrists straight.

APPENDIX B (continued)

Workstation Evaluation for the Economy Class Airline Passenger utilizing the OSHA eTool: *Computer Workstations*

Direct quotes from OSHA eTool: *Computer Workstations* are indicated by *italicized text*

http://www.osha-slc.gov/SLTC/computerworkstations_ecat/

MONITOR & DOCUMENT:			
WORKSTATION	**CRITERIA (eTool)**	**HAZARDS (eTool)**	**FINDINGS**
Display	*The topmost line of the screen should not be higher than the user's eyes. The preferred viewing distance is 18 to 24 inches. If there is not enough table depth to accommodate this distance, it is helpful to install a keyboard extender or tray underneath the desk.*	*A display screen that is too high, too low, or placed to the side of the user may, over time, cause awkward postures and increased stress on the muscles of the neck, shoulders, and upper back.* *Tilting the head to read with the bottom portion of bifocal lenses can stress the neck, back and shoulders.* *Viewing distances that are too long or too short can cause stress and eye strain.* *Viewing the monitor for long periods of time can cause eye fatigue and dryness.*	1. The non-adjustable screen of the laptop computer positioned on a meal tray is not even with the user's eyes and cannot adapt to body size, type, and weight. This causes the awkward posture of hunching over and increases stress on the muscles of the neck, shoulders, and upper back. 2. The angle of the seat in front of the passenger affects the viewing distance, which is frequently less than 18", causing eyestrain. 3. The cabin air is dry and exacerbates eye dryness.
Source Document Position	*The screen and document should be close enough so the operator can look from one to the other without excessive movement of the head, neck or back.* *If writing needs to be performed, a document holder can be positioned directly beneath the monitor.*	*The greater this distance, the more frequent the head and neck movement. Numerous motions looking from the monitor to a document cause awkward postures and increased stress on the muscles of the neck, shoulders, and upper back.*	1. The extremely limited area for document placement requires picking up the document or awkward neck movement. 2. Document use causes increased stress to muscles of the upper body.

APPENDIX B (continued)
Workstation Evaluation for the Economy Class Airline Passenger utilizing the OSHA eTool: *Computer Workstations*
Direct quotes from OSHA eTool: *Computer Workstations* are indicated by *italicized text*
http://www.osha-slc.gov/SLTC/computerworkstations_ecat/

LIGHTING:			
WORKSTATION	**CRITERIA (e-Tool)**	**HAZARDS (eTool)**	**FINDINGS**
Amount of Light	*Lighting should be adequate for the operator to see the text and the screen, but not so bright as to cause glare or discomfort.* *Use light diffusers to perform desk tasks (writing, reading papers) without direct brightness on the computer screen.* *Reorient the workstation so that bright lights from open windows are not in the field of view.* *Use blinds on windows to eliminate bright light.*	*Lighting that is not appropriate for computer work is a major factor in visual discomforts such as eyestrain, burning or itchy eyes, headache, and blurred or double vision.* *Bright light on the display screen "washes out" images making it difficult for operators to see the work clearly.* *Bright light in the operator's field of view affects how and what the operator sees.*	Airplane lighting consists of: 1. Daylight which is adjustable with the use of a pull up shade. Amount of sun and seat location affect window shade use. 2. Indirect cabin lighting which does not provide adequate lighting to read. 3. Overhead spotlight which shines on a fixed place. Eyestrain, headaches, and vision disturbances can be the result of the availability or misuse of these types of lighting.
Contrast of Light with Environment	*For computer work, well-distributed diffuse light is best. The advantages are fewer glare surfaces in the visual field and softer contrasts created by the shape of objects.*	*High contrast between light and dark areas of the computer screen, horizontal work surface, and surrounding areas may cause visual discomforts such as eyestrain, burning or itchy eyes, headaches, and blurred vision.*	Contrast of light with environment varies with the availability and type of lighting. A clear day with brilliant sunshine causes the most severe contrast.

APPENDIX B (continued)

Workstation Evaluation for the Economy Class Airline Passenger utilizing the OSHA eTool: *Computer Workstations*

Direct quotes from OSHA eTool: *Computer Workstations* are indicated by *italicized text*

http://www.osha-slc.gov/SLTC/computerworkstations_ecat/

GLARE:			
WORKSTATION	**CRITERIA (eTool)**	**HAZARDS (eTool)**	**FINDINGS**
Direct Light Sources (e.g., windows, overhead lights) cause a reflected light to appear on the monitor	*Generally, there is reduced glare with a large number of low powered lamps rather than a small number of high-powered lamps.* *Attach screen glare filters directly to the surface of the monitor to reduce glare.* *Orient workstations and position task lighting (e.g. desk lamp) to prevent light sources from screen reflection.* *Position task lighting (e.g. desk lamp).* *Use barriers or light diffusers on fixtures to reduce glare from overhead lighting.*	*Glare on the viewing screen may cause eyestrain, headaches, and/or fatigue. The worker may not be conscious of the irritation; however, over the course of a long day, it can cause problems.*	1. Using screen glare filters on the computer monitor reduces glare. 2. Orienting the laptop computer screen reduces glare. 3. Fixed lighting sources are not adjustable.
Reflected	*To limit reflection from walls and work surfaces around the screen, paint these areas a medium color and have a non-reflective finish.* *Arrange workstations and lighting to avoid reflected glare on the display screen or surrounding surfaces.* *Tilt the monitor down slightly to prevent it from reflecting overhead light.*	*Reflected light from polished surfaces (e.g., keyboards) may cause annoyance, discomfort, or loss in visual performance and visibility.*	1. The colors of an airplane cabin interior are medium, neutral colors with a non-reflective finish. 2. Lighting sources are fixed and not adjustable. 3. Tilting the monitor is difficult because it is attached to the keyboard/mouse.

APPENDIX C
Learner Objectives for Air Travel Hazard Awareness

LEARNER OBJECTIVES	RELATED COURSE CONTENT	TIME	METHODS	EQUIPMENT	EDUCATOR
Identify two biological hazards of air travel	1. Air Quality 2. Disease Transmission		Power Point Program	Slide Handouts Brochures	Olga Tompkins, RN, COHN-S
Identify two chemical hazards of air travel	1. Disinsection 2. Ozone				
Identify two enviromechanical hazards of air travel	1. Lifting Issues 2. Economy Seat Characteristics				
Identify two physical hazards of air travel	1. Barotrauma due to Cabin Pressure 2. Radiation				
Identify three psychosocial hazards of air travel	1. Stress 2. Jet Lag and Decision Making 3. Fear of Terrorism				
Identify five pre-existing risk factors that need special pre-travel counseling	1. Diabetes 2. Cardiac Disease 3. Respiratory Disease 4. Pregnancy 5. Food Allergies/Intolerances				
Identify four ways to prevent food borne illnesses	1. Boil It 2. Cook It 3. Peel It OR 4. Forget It				
Identify four ways to prevent water-borne illnesses	1. Boiling 2. Bottled Water 3. Brushing Teeth with Bottled Water 4. Ice Precautions				
Identify three ways to prevent musculoskeletal injuries during air travel	1. Safe Lifting 2. Avoid Over-packing 3. Avoid Simultaneous Twisting and Bending.				
Identify four travel health risk based behaviors	1. Drug/Alcohol Use 2. Ignoring Personal Safety 3. Unprotected Sex 4. Jet Lag Adjustment				
Identify the two issues that the traveler needs to address upon returning	1. Immunization Update 2. Awareness Itinerary-Specific Illnesses or Injuries				
Identify six web resources for air travel health	1. www.cdc.gov/travel 2. www.who.org 3. www.travel.state.gov 4. http://www.cami.jccbi.gov/ 5. http://www.flightsafety.org/home.html 6. http://www.asma.org/				

APPENDIX D
Learner Objectives for Air Travel Health Awareness

LEARNER OBJECTIVES	RELATED COURSE CONTENT	TIME	METHODS	EQUIPMENT	EDUCATOR
Identify six items that the traveler needs to address before leaving on the trip	1. Itinerary 2. TRAVAX Country Report 3. Confidential Travel Questionnaire 4. Immunization Update 5. Travel Kit 6. Dental Check		Power Point Program	Slide Handouts Brochures	Olga Tompkins, RN, COHN-S
State the difference between itinerary-specific and recommended vaccines	1. Itinerary-Specific - Vaccines Required by Entry Regulations 2. Recommended - Optional for Good Health.				
State three contents of the travel kit	1. OTC Medication 2. First Aid Supplies 3. Mild Sleeping Pill for Jet Lag				
List three services offered by International SOS	1. Medical Clinic Resources 2. Medical Evacuation 3. Country Reports				
Identify five pre-existing risk factors that need special pre-travel counseling	1. Diabetes 2. Cardiac Disease 3. Respiratory Disease 4. Pregnancy 5. Food Allergies/Intolerances				
Identify four ways to prevent food borne illnesses	1. Boil It 2. Cook It 3. Peel It OR 4. Forget It				
Identify four ways to prevent water-borne illnesses	1. Boiling 2. Bottled Water 3. Brushing Teeth with Bottled Water 4. Ice Precautions				
Identify three ways to help prevent serious injury from motor vehicle accidents	1. Wear Seat Belts 2. Drive Defensively 3. Hepatitis B Vaccine				
Identify three ways to prevent musculoskeletal injuries during air travel	1. Safe Lifting 2. Avoid Over-Packing 3. Avoid Simultaneous Twisting and Bending				
Identify four travel health risk based behaviors	1. Drug/Alcohol Use 2. Ignoring Personal Safety 3. Unprotected Sex 4. Jet Lag Adjustment				

APPENDIX D (continued)
Learner Objectives for Air Travel Health Awareness

LEARNER OBJECTIVES (continued)	RELATED COURSE CONTENT	TIME	METHODS	EQUIPMENT	EDUCATOR
Identify two issues that the traveler needs to address upon returning	1. Immunization Update 2. Awareness Itinerary-Specific Illnesses or Injuries				
Identify six ways to prevent vector-borne diseases	1. Peak Biting Time is Dusk to Dawn 2. Long Pants and Long Sleeved Shirts 3. Dark Clothing, Cologne, and Perfume Attract Mosquitoes 4. DEET (Diethyltoluamide) Insect Repellant 5. Permethrin Insecticide 6. Take Prescribed Antimalarial Drug Exactly on Schedule; No Missing Doses				
Identify six web resources for travel health	www.cdc.gov/travel www.travel.state.gov www.who.org www.tripprep.com www.internationalsos.com/ Specific Corporate Web Resources				

APPENDIX E
Pre-Travel Health Assessment

To be completed by employee.

Name (last, first, middle):			Social Security Number:
Date of Birth:	Age	M / F	Job Title
Work Location:	Work Telephone Number:		
Email Address:			Home Telephone Number:
Home Address (street, city, state and ZIP or postal code):			
In case of emergency, notify:	Relationship	Address (if different from above)	Telephone

❖ **ITINERARY:** List in Order the countries you plan to visit.

Country	Urban (City)	Field Site	Departure Date	Length of Stay

❖ **IMMUNIZATION UPDATE:** Please **attach copy:** immunization record or *International Certificate of Vaccination.*

❖ **BLOOD TYPE:** _____ Please **attach copy:** *Documentation* (Example Lab work or Blood Donor Card)

❖ **FAMILY HISTORY:** Has any blood relation (such as parent, grandparent, sister, brother, child) ever had:
Diabetes Heart Disease High Blood Pressure Cancer Tuberculosis Asthma Epilepsy

DISEASE	FAMILY RELATIONSHIP	PRESENT AGE	IF DEAD, AGE AT DEATH / CAUSE

❖ **ALLERGIES:** Are you allergic to any of the following medications or substances? If YES, please explain in comments, below.

Y / N	Y / N	Y / N
☐ ☐ PENICILLIN	☐ ☐ CHEMICALS *NAME:*	☐ ☐ FOOD ALLERGY *NAME:*
☐ ☐ SULFA	☐ ☐ SULFITES	☐ ☐ EGGS
☐ ☐ ASPIRIN	☐ ☐ LATEX	☐ ☐ DUST
☐ ☐ NEOMYCIN ☐ ☐ POLYMYXIN, ☐ ☐ STREPTOMYCIN	☐ ☐ MERCURY ☐ ☐ THIMEROSAL ☐ ☐ LATEX	☐ ☐ POLLEN
☐ ☐ MEDICATION *NAME:*	☐ ☐ INSECT STING *NAME:*	
☐ ☐ OTHER (PLEASE EXPLAIN)		

❖ **MEDICATIONS:** What medications are you currently taking?

NAME	DOSAGE	PURPOSE

APPENDIX E (continued)
Pre-Travel Health Assessment

❖ **PERSONAL HISTORY:** Do you currently have, or do you have a history of having the disease or symptom? If YES, please explain in comments, below.

Y / N / History	Y / N / History	Y / N / History
☐ ☐ ☐ Mumps	☐ ☐ ☐ Lung Disease	☐ ☐ ☐ Sleeping Disturbances, Insomnia
☐ ☐ ☐ Measles (Rubeola)	☐ ☐ ☐ Asthma, Wheezing, Gasping	☐ ☐ ☐ Depression, Excessive Worry
☐ ☐ ☐ German Measles (Rubella)	☐ ☐ ☐ Shortness of Breath	☐ ☐ ☐ Stress Symptoms (comments)
☐ ☐ ☐ Chicken Pox (Varicella)	☐ ☐ ☐ Eye disease; Eyeglasses or Contact Lens	☐ ☐ ☐ Jet Lag Symptoms (comments)
☐ ☐ ☐ Positive TB skin test or Tuberculosis	☐ ☐ ☐ Severe Dental Problems	☐ ☐ ☐ Motion Sickness
☐ ☐ ☐ Fever, Chills, Night Sweats	☐ ☐ ☐ Stomach Condition	
☐ ☐ ☐ Fainting from Drawing Blood or Shots	☐ ☐ ☐ Diarrhea	
☐ ☐ ☐ Reaction to Vaccination	☐ ☐ ☐ Constipation	**WOMEN:**
☐ ☐ ☐ Fever Reaction to Vaccination	☐ ☐ ☐ Diabetes	☐ ☐ Pregnancy (comments)
☐ ☐ ☐ Yellow Fever	☐ ☐ ☐ Immunodeficiency Disease	☐ ☐ High Risk Pregnancy (comments)
☐ ☐ ☐ Malaria	☐ ☐ ☐ HIV or AIDS	☐ ☐ ☐ Vaginitis; Yeast Infections
☐ ☐ ☐ Tropical Disease (comments)	☐ ☐ ☐ Taking Steroids, Prednisone, Cortisone	Date of Last Period (_____)
☐ ☐ ☐ Color Blindness	☐ ☐ ☐ Sexually Transmitted Disease (comments)	Date of Last Pap Smear (_____)
☐ ☐ ☐ Ear Problems related to Air Travel	☐ ☐ ☐ Kidney Disease	
☐ ☐ ☐ Hearing Loss	☐ ☐ ☐ Liver Disease	
☐ ☐ ☐ Epilepsy, Convulsions, Seizures	☐ ☐ ☐ Hepatitis or Jaundice	
☐ ☐ ☐ Heart Disease / Surgery	☐ ☐ ☐ Skin disease or problem (including rash)	
☐ ☐ ☐ High Blood Pressure	☐ ☐ ☐ Musculoskeletal Problems	
☐ ☐ ☐ Blood Disorders	☐ ☐ ☐ Back pain or Injury	
☐ ☐ ☐ Rheumatic Fever	☐ ☐ ☐ Motion Limitation; Physical Disability	
☐ ☐ ☐ Deep Vein Thrombosis	☐ ☐ ☐ Ergonomic Problems	
☐ ☐ ☐ Taking Heart Medication (name _____)	☐ ☐ ☐ Taking Anti Malaria Medicine (name _____)	☐ Right Handed ☐ Left Handed
☐ ☐ ☐ Taking Antidepressants (name_____)	☐ ☐ ☐ Taking Antibiotics (name _____)	☐ ☐ Identifying Scars (comments) ☐ ☐ Identifying Tattoos (comments)
COMMENTS:		

❖ **IF YOU ANSWER YES TO ANY OF THE FOLLOWING, PLEASE EXPLAIN IN COMMENTS SECTION, BELOW:**

1. Have you ever **BEEN HOSPITALIZED OR HAD SURGERY,** including tonsils, appendix or pregnancy?
   If yes, please comment with reason and approximate date in section below. ☐ Yes ☐ No
2. Do you wear any **MEDICAL APPLIANCE** (hearing aid, pacemaker, etc)? ☐ Yes ☐ No
3. Have you any **PHYSICAL COMPLAINTS** or disabilities at present? ☐ Yes ☐ No
4. State the present CONDITION OF YOUR PRESENT HEALTH: ☐ **EXCELLENT** ☐ **GOOD** ☐ **FAIR** ☐ **POOR**

COMMENTS:

Personal **PHYSICIAN** Name Telephone Number:

Personal **PHYSICIAN** Address

Personal **DENTIST** Name Telephone Number:

Personal **DENTIST** Address

REVIEWED BY: HEALTH PROFESSIONAL
Name (print): Signature: Date :

APPENDIX F
Company Asset-Specific Immunization Schedule

Immunizations	Albania	Brazil	Ecuador	Oman	Peru	Qatar	Russia	UAE	Yemen	Frequency
Tetanus/Diphtheria	rec	rec	rec	rec	rec	rec	rec	rec	rec	Every 10 years
Influenza	rec	rec	rec	rec	rec	rec	rec	rec	rec	Every Year
Measles [1]	rec	rec	rec	rec	rec	rec	rec	rec	rec	
Pneumococcal [2]	rec	rec	rec	rec	rec	rec	rec	rec	rec	
Varicella [3]	rec	rec	rec	rec	rec	rec	rec	rec	rec	
Hepatitis A	rec	rec	rec	rec	rec	rec	rec	rec	rec	Month 0; 6
Hepatitis B	rec	rec	rec	rec	rec	rec	rec	rec	rec	Month 0;1; 6
Polio	rec	rec	rec	rec	rec	rec	rec	rec	rec	1 time as an adult
Yellow Fever	*NO*	**REQ**	**REQ**	*NO*	**REQ**	*NO*	*NO*	*NO*	*NO*	Every 10 years
Typhoid [4]	rec	rec	rec	rec	rec	rec	rec	rec	rec	
Rabies [5]	rec	rec	rec	*NO*	rec	*NO*	rec	*NO*	rec	
HIV Test [6]	*NO*	*NO*	*NO*	**REQ**	*NO*	**REQ**	**REQ**	**REQ**	**REQ**	
Atovaquone Proguanil[7]	***NO***	**rec**	**rec**	***NO***	**rec**	***NO***	***NO***	***NO***	**rec**	[6] **Below**
REQ=REQUIRED										
rec=recommended										
NO= NOT NEEDED										

[1] Measles vaccine is indicated for those born in 1957 or later (1970 or later in Canada) without history of disease or of 2 adequate doses of live vaccine at any time during their life. Many countries (including the U.K.) recommend that adults need to have had only 1 countable dose at any time during their life

[2] Pneumococcal vaccine is indicated for all adults over 65 and those with chronic disease or compromising conditions

[3] Varicella vaccine should be considered for long-term travelers with no history of the disease

[4] Injection: every 2 years; Oral every 5 years

[5] Rabies vaccine is recommended: all stays of over 3 months; shorter stays at locations more than 24 hours travel from a reliable source of post-exposure rabies vaccine; potential occupational exposure; all adventure travelers and backpackers

[6] According to the Department of State, testing is required for all foreign visitors. Foreign Test Results may be accepted under certain conditions

[7] Atovaquone Proguanil (Malarone) for malaria: One (1) pill per day: Two (2) days before; Every day during the trip; Seven (7) days after the trip

APPENDIX G
In-Flight Stretching Exercises

IN-FLIGHT STRETCHING EXERCISES

Repeat each step five times. It is prudent to alert your seatmate before you begin your first stretching series
These exercises are meant to be relaxing and should be stopped immediately if there is any pain.

STEP ONE
Sit comfortably and correctly. Place an airplane pillow in the small of your back to keep the natural curves of your spine. Sit tall and with your weight evenly balanced on each buttock. Keep shoulders relaxed. Breathe into your sides, and as you breathe out, hollow your lower abdominals back toward your spine. Breathe normally.

STEP TWO
Sit back in your seat and against the headrest. Gently and slowly allow your head to roll to one side (do not force it) then back through the center and toward the other side. Try to keep the back of your neck long and your shoulders relaxed. Repeat.

STEP THREE
With both feet on the floor, flex both feet with toes pointing upward, then downward. Bend your upper body slightly forward and clasp your hands around one knee. Raise you knee gently towards your chest for a few seconds and then release, placing your feet back on the floor. Continue with the other leg.

STEP FOUR
When possible, get out of your seat at frequent intervals to stretch and walk in the aisle Stand tall, with feet parallel and at hip-width. Come up onto your toes. Think tall as you lower your heels back down. Reach high with one arm and then the other

Resources:

British Airways In-flight Pilates	http://www.britishairways.com
Cathay Pacific Travel Smart	http://www.cathaypacific.com
Continental Airlines In-flight Exercise	http://www.continental.com
United Airlines In-flight Exercise	http://www.ual.com

APPENDIX H
Vaccine Preventable Disease Fact Sheet for the Frequent Flyer Business Traveler

Vaccine Preventable Disease	Method of Transmission	Symptoms
Diphtheria	Airborne Transmission Direct Exposure to Respiratory Droplets (Coughing/Sneezing)	Breathing, Heart Problems *Serious Complications*: Paralysis, Death
Tetanus (Lockjaw)	Cut or Puncture Wound	Muscle Spasms Breathing, Heart Problems *Serious Complications:* Death
Pertussis (Whooping Cough)	Airborne Transmission Direct Exposure to Respiratory Droplets (Coughing/Sneezing)	Extended Coughing Periods Difficulty Breathing *Serious Complications:* Seizures, Brain Damage, Death
Hepatitis A	Stool of Infected Persons Food or Water Containing the Virus Close Personal Contact	Liver Disease Fatigue, Poor Appetite Fever, Vomiting. Jaundice (Yellowing of the Skin and Whites of the Eyes)
Hepatitis B	Blood Body Fluids Intimate Contact	Fatigue, Poor Appetite Fever, Vomiting Joint Pain, Hives, Rash Jaundice (Yellowing of the Skin and Whites of the Eyes) *Serious Complications*: Liver Damage, Liver Cancer, Death
Influenza	Airborne Transmission Direct Exposure to Respiratory Droplets (Coughing/Sneezing) Asthmatics and Diabetics are at Special Risk	Fever, Chills, Muscle Aches, Headache Cough, Sore Throat *Serious Complications:* Pneumonia, Meningitis, Death
Measles (Rubeola)	Airborne Transmission Direct Exposure to Respiratory Droplets (Coughing/Sneezing) *Highly Contagious*	High Fever, Rash *Serious Complications:* Hearing Loss, Pneumonia, Brain Damage, Death
Mumps	Direct Contact with Saliva and Nasal Discharges	Headache, Fever Swollen Glands in Jaw and Neck *Serious Complications:* Hearing Loss, Meningitis, Testicular and Scrotal Pain/Swelling, Rare Sterility

APPENDIX H (continued)
Vaccine Preventable Disease Fact Sheet for the Frequent Flyer Business Traveler

Vaccine Preventable Disease	Method of Transmission	Symptoms
Rubella (German Measles)	Airborne Transmission Direct Exposure to Respiratory Droplets (Coughing/Sneezing)	Slight Fever, Rash *Serious Complications*: Severe Birth Defects, Fetal Death
Pneumococcal Disease	Airborne Transmission Direct Exposure to Respiratory Droplets (Coughing/Sneezing)	Fever, Chills *Serious complications:* Bacterial Meningitis, Pneumonia, Bacteremia
Polio	Stool of Infected Persons	Fever *Serious complications:* Meningitis, Lifelong paralysis, Death
Varicella (Chickenpox)	Airborne Transmission Direct Exposure to Respiratory Droplets (Coughing/Sneezing) Direct Contact with Drainage from the Rash	Fever, Rash Bacterial Infection of Skin Lesions *Serious complications:* Meningitis, Pneumonia, "Flesh-eating" Bacterial Infection, Death Severe Birth Defects, Fetal Death
Typhoid	Stool of Infected Persons Food or Water Containing the Virus Close Personal Contact	Fever, Headache Constipation, Diarrhea Rose-colored Spots on the Trunk Enlarged Spleen and Liver. Fatalities are <1% with Antibiotic Treatment

New York State Department of Health: Communicable Diseases http://www.health.state.ny.us/nysdoh/communicable_diseases/en/index.htm
Immunization Action Coalition http://www.vaccineinformation.org

APPENDIX I
In-Flight Stress Reduction Techniques for the Frequent Flyer Business Traveler

IN-FLIGHT STRESS REDUCTION TECHNIQUES

ALLOW TIME. Get to the airport early. Use wheeled carry-on luggage. Check as much luggage as you can. Walk to the gate in a relaxed, slower gait.

- **DON'T PROCRASTINATE**. It lessens productivity and increases stress.

ADAPT TO YOUR ENVIRONMENT. Color, lighting and noise are all elements that affect our senses. Environmental stress reducers include an eye mask, ear plugs, neck support pillows, or relaxation tape via ear phones.

- **RELAX & BREATHE DEEPLY.** Visualize something pleasant. Meditate. Concentrate on the present.

SLEEP. Lack of adequate sleep can make you moody, angry, and more vulnerable to illness and daily stressors. If jet lag affects you, talk with your doctor about a mild sleeping medicine.

- **EAT RIGHT.** Eat regularly scheduled meals, avoiding sugars and fats. Eating carbohydrates by themselves without added fat produces a relaxing effect. Eating protein rich food boosts alertness and gives an energizing effect. Eat smaller snack-type meals.

ADEQUATE HYDRATION. Drink water instead of coffee, soda, or alcohol.

- **LAUGH.** Laughter increases blood flow to the brain, and endorphins are released and stress hormone levels decrease, which increase our sense of well-being.

GET RID OF ANGER. It is the single most damaging stress-related personality trait that precedes a heart attack.

APPENDIX J
Air Travel Pre-existing Risk Factor Assessment

To be completed by employee.

Name (last, first, middle):			Social Security Number:
Date of Birth:	Age	M / F	Job Title
Work Location:	Work Telephone Number:		
Email Address:			Home Telephone Number:
Home Address (street, city, state and ZIP or postal code):			
In case of emergency, notify:	Relationship	Address (if different from above)	Telephone

❖ Do you currently have, or do you have a history of the disease or symptom?
If YES, please explain in comments section, below.

Y / N / History	Y / N / History	Y / N / History
☐ ☐ ☐ Positive TB skin test or Tuberculosis	☐ ☐ ☐ Lung Disease	
☐ ☐ ☐ Fever, Chills, Night Sweats	☐ ☐ ☐ Asthma, wheezing, gasping	☐ ☐ ☐ Diabetes
☐ ☐ ☐ Taking Antibiotics (name _____)	☐ ☐ ☐ Shortness of Breath	☐ ☐ ☐ Taking Diabetes Medication (name _____)
☐ ☐ ☐ Ear Problems related to air travel	☐ ☐ ☐ Sleeping Disturbances, Insomnia	☐ ☐ ☐ Musculoskeletal Problems
☐ ☐ ☐ Hearing Loss	☐ ☐ ☐ Depression, Excessive Worry	☐ ☐ ☐ Back pain or injury
	☐ ☐ ☐ Stress Symptoms (comments)	☐ ☐ ☐ Motion Limitation; Physical Disability
☐ ☐ ☐ Taking Heart Medication (name _____)	☐ ☐ ☐ Taking Antidepressants (name _____)	☐ ☐ ☐ Ergonomic Problems
☐ ☐ ☐ Heart Disease / Surgery		
☐ ☐ ☐ High Blood Pressure	☐ ☐ ☐ Immunodeficiency Disease	
☐ ☐ ☐ Blood Disorders	☐ ☐ ☐ HIV or AIDS	**WOMEN:**
☐ ☐ ☐ Deep Vein Thrombosis	☐ ☐ ☐ Taking Steroids, Prednisone, Cortisone	☐ ☐ Pregnancy (comments)
		☐ ☐ High Risk Pregnancy (comments)
☐ ☐ ☐ Jet Lag Symptoms (comments)	☐ ☐ ☐ Sexually Transmitted Disease (comments)	Date of Last Period (_____)
☐ ☐ ☐ Motion Sickness		
	☐ ☐ ☐ Cigarette Smoker # Packs per week____	☐ ☐ ☐ Alcohol # Drinks per week____

COMMENTS:

If you answered ***YES*** or have a ***History of These Symptoms***, please contact:
Occupational Health Department to discuss and plan health protection strategies.
Phone Extension XXXXXX

APPENDIX K
Learner Objectives for Air Travel Health Counseling for the Type 1 Diabetic Business Traveler

LEARNER OBJECTIVES	RELATED COURSE CONTENT	METHODS	EQUIPMENT	EDUCATOR
Identify four things the diabetic business traveler must know about airline security checkpoints and insulin syringes	1. Original Container with Original Label 2. Copy of Prescription 3. Call Ahead for Airline-Specific Requirements 4. Notify Security Screener before Screening	One-on-One Counseling; Worker Support Group for Type I Diabetes	Discussion Handouts Brochures	Olga Tompkins, RN, COHN-S
Identify three details about insulin and frequent flyer business travel	1. Insulin Does Not Require Refrigeration 2. Avoid Temperature Extremes. 3. International Insulin Syringe Specific U-40 or U-80			
List three concerns regarding crossing time zones	1. Insulin Schedule 2. Eastward Travel - Shorter Day, Possibly Less Insulin 3. Westward Travel - Longer Day, Possibly More Insulin 4. Wristwatch on Home Time 5. Blood Sugar ASAP After Landing to Avoid Jet Lag Influence			
Identify five essential items that the diabetic air traveler should pack	1. Insulin and Syringes 2. Blood and Urine Testing Supplies 3. Extra Batteries for Glucometer 4. Diabetes Identification 5. Snack to Treat Low Blood Sugar			
Identify three guidelines for effective packing of medication and equipment	1. Bring Twice as much Medication/Equipment as Necessary 2. Carry-On Luggage			
Identify four points of advice regarding eating in the airplane	1. Request Special Needs Meal Two Day in Advance 2. Take Insulin when Food has been Served 3. Carry a Snack to Treat Low Blood Sugar 4. Drink Water instead of Soda, Coffee or Alcohol			
Identify four ways to prevent food borne illnesses	1. Boil It 2. Cook It 3. Peel It OR 4. Forget It			
Identify four ways to prevent water-borne illnesses	1. Boil It 2. Bottled Water 3. Brush Teeth with Bottled Water 4. Ice Precautions			
Identify three actions to prevent foot problems, while flying	1. Wear Comfortable Shoes 2. Perform In-Flight Stretching Exercises to Promote Circulation 3. Examine Feet during Travel for Blisters or Cuts and Treat Promptly			

APPENDIX L
Learner Objectives for Air Travel Health Counseling for the Pregnant Business Traveler

LEARNER OBJECTIVES	RELATED COURSE CONTENT	METHODS	EQUIPMENT	EDUCATOR
Identify four contraindications to air travel for the pregnant business traveler	1. Pregnancy-Induced Hypertension 2. Poorly Controlled Diabetes 3. Sickle Cell Disease 4. Risk Of Premature Labor	On-on-One Counseling; Support Group of Pregnant Workers	Discussion Handouts Brochures	Olga Tompkins, RN, COHN-S
Identify three precautions pregnant business travelers should take to avoid deep vein thrombosis	1. Support Hose 2. Leg Stretches to Promote Proper Blood Circulation 3. Frequent Walks in the Cabin if Seat Belt Sign is Off			
Identify five points of advice regarding eating in the air	1. Request Special Needs Meal Two Day in Advance 2. Avoid Gas Producing Food and Drinks Before and During Flying 3. Eat Frequent, Small Meals 4. Drink Water Instead of Soda, Coffee or Alcohol 5. Carry a Snack to Treat Low Blood Sugar			
Identify four ways to prevent food borne illnesses	1. Boil It 2. Cook It 3. Peel It OR 4. Forget It			
Identify four ways to prevent water-borne illnesses	1. Boil It 2. Bottled Water 3. Brush Teeth with Bottled Water 4. Ice Precautions			
Identify three actions to prevent foot problems	1. Wear Comfortable, Low Heel Shoes 2. In-Flight Stretching Exercises to Promote Circulation 3. Foot Exam for Blisters			
Identify three safety measures to protect mother and baby	1. Seatbelt All Times and Worn Low Around Hips 2. Caution Walking in Cabin 3. Familiarity with Destination Medical Resources			
Identify two guidelines for safe air travel for the pregnant business traveler	1. CDC - Safest Time Second Trimester (18–24 weeks) 2. ACOG - Safe to Fly up to 36 Weeks Gestation			

APPENDIX M
Internet Resources for the Occupational and Environmental Health Nurse

http://www.asma.org/
Aerospace Medical Association

http://www.cami.jccbi.gov/
Office of Aerospace Medicine

www.aaohn.org
American Association of Occupational Health Nurses

http://www.acoem.org/
American College of Occupational & Environmental Medicine

http://www.astmh.org
American Society of Tropical Medicine & Hygiene

http://www.canada.com/travel/activity/business/index.html
Health Canada.com Business Traveler's Health

http://www.epa.gov/air/urbanair/index.html
EPA - Environmental Protection Agency: Air Quality Where You Live

http://www.aee.faa.gov
FAA – Federal Aviation Administration

http://www.flightsafety.org/home.html
Flight Safety Foundation

http://www.vaccineinformation.org
Vaccine Information

http://www.istm.org/
International Society of Travel Medicine

http://www.internationalsos.com/
International SOS Medical Evacuations and Country Information

http://healthlink.mcw.edu/travel-medicine/index.html
Medical College of Wisconsin Health Link: Travel Heath

http://www.cdc.gov/travel/index.htm
National Center for Infectious Diseases: Traveler's Health

http://www.shoreland.com
Travax: Information services for travel health professionals

http://airconsumer.ost.dot.gov/airconsumer/
US Department of Transportation: Aviation Consumer Protection

http://www.who.int/ith/
WHO International Travel and Health

APPENDIX N
Post-Travel Assessment for Case Finding, Early Diagnosis, and Referral

To be completed by employee:

Name (last, first, middle):			Social Security Number:
Date of Birth:	Age	M / F	Job Title
Work Location:	Work Telephone Number:		
Email Address:			Home Telephone Number:
Home Address (street, city, state and ZIP or postal code):			
In case of emergency, notify:	Relationship	Address (if different from above)	Telephone

❖ **ITINERARY:** List in Order the countries you visited. (Include any non-business trips)

Country	Urban (City)	Field Site	Departure Date	Length of Stay

❖ Note any current problems

Y / N	COMMENTS
☐ ☐ Fever, Chills, Night Sweats	
☐ ☐ Leg Pain, ☐ ☐ Deep Vein Thrombosis History	
☐ ☐ Musculoskeletal Problems; ☐ ☐ Low Back Pain	
☐ ☐ Ear Problems related to Air Travel ☐ ☐ Hearing Loss	
☐ ☐ Sexually Transmitted Disease	
☐ ☐ Altitude Sickness	
☐ ☐ Diarrhea ☐ ☐ Ova, Parasite, or Blood in Stool?	
☐ ☐ High Blood Pressure	
☐ ☐ Jet Lag ☐ ☐ Insomnia; Sleeping Disturbances	
☐ ☐ Stress	
☐ ☐ OTHER	
☐ ☐ OTHER	