



Presumptive Duty-Related Illness for Law Enforcement

Preliminary Report Follow-up

LEOFF Plan 2 Retirement Board

November 28, 2007

Follow-Up Issues

- Published Research
 - WA Presumptive Coverage Study
 - Recent Published Research

WA Presumptive Coverage Study

- Senate Resolution 1991-8674
 - Report published December 1, 1992
- Study incidence of cancer and circulatory disease
 - Labor and Industries
 - Dept of Health
 - University of Washington
 - DRS
 - Senate Staff
 - Advisory Committee of Stakeholders

WA Presumptive Coverage Study

Cancer

- Law Enforcement cancer risk similar to general population
- Very few studies specifically designed to examine law enforcement cancer risk

WA Presumptive Coverage Study

Circulatory Disease

- Law Enforcement risk similar to or slightly above general population
- Some evidence found excess risk of ischemic heart disease, but not enough to draw conclusions
- Limitations of epidemiologic studies

Recent Published Research

Infectious Disease

- Recent Research
- Findings suggest that police officers have significantly elevated statistical rates for a number of diseases
- Findings statistical, but not necessarily causal association

Recent Published Research

Heart Disease

- Few specific studies
- Stresses and demand for extreme exertion thought to increase risk
- Law enforcement risk of death similar to, or slightly above, that of general population

Recent Published Research

Cancer

- Few specific studies
- Concerns of exposure, little epidemiologic evidence
- Overall risk of cancer among law enforcement similar to general population

Presumptive Duty-Related Illness for Law Enforcement

Questions?

LAW ENFORCEMENT OFFICERS' AND FIRE FIGHTERS' PLAN 2 RETIREMENT BOARD

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Presumptive Duty-Related Illnesses for Law Enforcement Officers

Preliminary Report

November 28, 2007

1. Issue

Certain illnesses and medical conditions are presumed to be duty-related for fire fighters in the State of Washington. Although a similar presumption exists in other states for law enforcement officers, there is currently no presumption in Washington for law enforcement officers.

2. Staff

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3. Members Impacted

This issue impacts all of the active Law Enforcement Officers in LEOFF Plan 2. As of the September 30, 2005 Actuarial Valuation, there were 15,168 active members in LEOFF Plan 2, including 8,797 Law Enforcement Officers.

4. Current Situation

There is no occupational disease presumption for law enforcement officers in Washington State. Although the occupational disease provisions in the Workers' Compensation statutes apply to law enforcement officers, the burden of proof to qualify for benefits shifts to the member. An occupational disease presumption exists for fire fighters in Washington State.

5. Background Information and Policy Issues

A presumptive occupational disease law is a law that links a particular occupation with a disease or condition that has been shown to be a hazard associated with that occupation. As a result of this linkage, if an individual employed in the occupation covered by the presumption contracts a disease or condition that is specified in the presumptive law, then that disease or condition is presumed to have come from that occupation. In this case, the burden of proof shifts from the employee to the employer to demonstrate that the condition was not in fact associated with the occupation but with another cause.

In the case of public safety officers, particularly for fire fighters, scientific evidence has demonstrated an increased risk for heart disease, lung disease, cancer, and infectious diseases. Many states have an occupational disease presumption law that applies to at least one category of emergency response personnel. However, these presumption laws vary between states in terms of medical conditions/illnesses covered and emergency response personnel covered.

Presumptive Coverage Provisions in Washington

In 1987, the Legislature passed Engrossed Substitute Senate Bill 5801, which created a presumption that certain diseases were occupationally related for industrial insurance purposes for only fire fighters. As originally passed, this bill only included respiratory disease as an occupational disease.

The 2002 Legislature amended the definition of occupational disease to include heart problems that are experienced within seventy-two hours of exposure to smoke, fumes, or toxic substances; certain cancers; and infectious diseases.

The presumption of *cancer* as an occupational disease only applies to a fire fighter, where the cancer develops or manifests itself after the fire fighter has served at least 10 years, and was given a qualifying medical examination upon becoming a fire fighter that showed no evidence of cancer. Time served as a volunteer fire fighter does not count towards the 10 years of service required for presumptive cancer coverage. Under the 2002 legislation, the presumption of cancer only applied to the following specific types of cancer¹:

¹ The 2002 bill originally listed a broader set of cancers within the presumption than was passed in the final version of the bill. The original bill included the following types of cancer: Breast Cancer, Reproductive System Cancer, Central Nervous System Cancer, Skin Cancer, Lymphatic System Cancer, Digestive System Cancer, Hematological System Cancer, Urinary System Cancer, Skeletal System Cancer, Oral System Cancer.

- Primary Brain Cancer
- Malignant Melanoma
- Leukemia
- Non-Hodgkin's Lymphoma
- Bladder Cancer
- Ureter Cancer
- Kidney Cancer

The presumption of *infectious disease* as an occupational disease only applies to fire fighters who contracted the following:

- Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
- All Strains of Hepatitis
- Meningococcal Meningitis
- Mycobacterium Tuberculosis

The 2007 Legislature further expanded the occupational disease presumption for fire fighters. A presumption of occupational disease was added for heart problems that are experienced within 24 hours of strenuous physical exertion due to firefighting activities. "Firefighting activities" means fire suppression, fire prevention, emergency medical services, rescue operations, hazardous materials response, aircraft rescue, and training and other assigned duties related to emergency response.

Certain cancers were also added to the list of cancers presumed to be occupational diseases. The cancers added included:

- Prostate Cancer, diagnosed prior to the age of 50
- Colorectal cancer
- Multiple Myeloma
- Testicular cancer

The presumption of occupational disease may be rebutted by a preponderance of evidence, including, but not limited to use of tobacco products, physical fitness and weight, lifestyle, hereditary factors, and exposure from other employment or non-employment activities. Since July 1, 2003, the presumption of occupational disease has not applied to a fire fighter who develops a heart or lung condition and who is a regular user of tobacco products or who has a history of tobacco use.

After terminating from service the presumptions are extended such that a member can qualify for benefits for a period of three calendar months for each year of service, out to a maximum of sixty months following the last date of employment. For example, a member who separates from service after a 10-year career will be covered under the presumption for 2 ½ years (30 months) after the date of separation from employment.

The 2007 Legislation also included provisions for the recovery of litigation costs and fees. When a determination involving the presumption of occupational disease for fire fighters is appealed to the Board of Industrial Insurance Appeals or to any court and the final decision allows the claim for benefits, the Board of Industrial Insurance Appeals or the court must order that all reasonable costs of the appeal be paid to the fire fighter or his or her beneficiary.

Presumptive Coverage Provisions in Other Jurisdictions

The presumptions vary from state to state in terms of what occupational diseases are covered for each profession. An initial review of the workers' compensation, pension, and employment statutes of all 50 states shows that most of the states have an explicit occupational disease presumption in statute. At least 38 states (76%) have an explicit occupational disease presumption for fire fighters and 28 states (56%) have an explicit occupational disease presumption for law enforcement. Several states also have included groups such as corrections officers, state police, and volunteer fire fighters.

In the 28 states with a law enforcement presumption, the most commonly occurring presumptions are for heart attack or cardiovascular disease which is covered by 20 states and respiratory or lung disease which is covered by 11 states. A handful of states also have a presumption for hypertension (6), cancer (5), and stroke (3).

Sixteen of the states with a law enforcement presumption include one or more occupational illness caused by infectious disease. In most cases, occupational disease is specifically defined by illness type; however some states use a general definition of occupational disease which broadly includes the specific diseases covered in other states. The most common occupational diseases covered by a presumption for law enforcement include: hepatitis (9), tuberculosis (7), HIV/AIDS (6), meningococcal meningitis (3), and other or generally defined (6).

Table 1: Presumption Coverage for Law Enforcement Officers details the occupation disease coverage by type of occupational disease for each of the 28 states that have an explicit law enforcement presumption in statute.

Table 1: Presumption Coverage for Law Enforcement Officers

State	Heart	Respiratory/Lung	Hypertension	Cancer	Stroke	Hepatitis	Tuberculosis	Other or Generally Defined	HIV/AIDS	Meningococcal Meningitis
Arizona		✓		✓						
California	✓			✓		✓	✓	✓		
Colorado						✓				
Florida	✓		✓				✓			
Hawaii	✓	✓								
Illinois	✓	✓		✓	✓		✓			
Indiana	✓	✓		✓			✓	✓	✓	✓
Iowa	✓	✓								
Kansas	✓	✓		✓						
Louisiana						✓				
Maine						✓	✓			✓
Maryland	✓		✓							
Massachusetts	✓		✓							
Michigan	✓	✓						✓		
Minnesota	✓							✓		
Nevada	✓	✓								
New Jersey	✓				✓					
New York						✓	✓		✓	
North Dakota	✓	✓	✓			✓			✓	
Ohio	✓	✓								
Oklahoma								✓		
Pennsylvania	✓				✓	✓				
Rhode Island						✓			✓	
South Carolina	✓									
Tennessee	✓		✓							
Utah						✓		✓	✓	
Vermont	✓									
Virginia	✓	✓	✓			✓	✓		✓	✓
Total by Type	20	11	6	5	3	10	7	6	5	3

Presumptive Coverage Provisions at Federal Level – PSOB

The Public Safety Officers' Benefits (PSOB) Act was enacted in 1976 to assist in the recruitment and retention of law enforcement officers and fire fighters. State and local law enforcement officers and fire fighters are covered for line-of-duty deaths occurring on or

after September 29, 1976.² As defined by Congress in Public Law 90-351 (Sec. 1217), a public safety officer includes individuals serving a public agency in an official capacity, with or without compensation, as a law enforcement officer or fire fighter.

The PSOB Program provides death benefits in the form of a one-time financial payment to the eligible survivors of public safety officers whose deaths are the direct and proximate result of a traumatic injury sustained in the line of duty. Beneficiaries of the PSOB Death Benefits Program must comply with the PSOB Office's administrative review process by producing sufficient evidence to show that the public safety officer died as the direct and proximate result of a personal injury sustained in the line of duty. The PSOB Act only covers deaths resulting from traumatic injuries sustained in the line of duty. The PSOB Act does not have extensive coverage for occupational diseases, however, heart attack deaths are covered in some instances.

On December 15th, 2003, President Bush signed into law the Hometown Heroes Survivor Benefits Act (S. 459 / H.R. 919), which expanded the PSOB program to cover public safety officers who die of heart attacks or strokes in the line of duty. The death benefit is payable to the survivors of a public safety officer who "has died as the direct and proximate result of a personal injury sustained in the line of duty." See Appendix A: PSOB Statute – Presumption for Heart Attack and Stroke.

Prior to the Hometown Heroes Survivor Benefits Act, in almost every incidence of death by heart attack or stroke it had been ruled that the heart attack or stroke was not a direct result of an injury sustained in the line of duty and the families received no benefits even though the deaths were clearly triggered by the rigors of the job. The Hometown Heroes Survivor Benefit Act was intended to correct that deficiency in the law, by ensuring that a public safety officer who suffers a fatal heart attack or stroke while on duty or not later than 24 hours after participating in a physical training exercise or responding to an emergency situation, is presumed to have died in the line of duty for purposes of public safety officer survivor benefits.

Law Enforcement Presumption Research

Senate Resolution and Report. During the 1991 legislative session, Senate Floor Resolution 8674 requested the Department of Labor and Industries to conduct a study of the unique occupational disease hazards encountered by law enforcement officers and fire fighters. The Department of Labor and Industries was specifically asked to address the incidence of cancer and heart disease and the problems of proof associated with occupation disease. The study was completed December 1, 1992. The study was conducted with the assistance of the Department of Health and the University of Washington. An advisory committee was also established with representatives from stakeholder organizations.

² Federal, state, and local public rescue squads and ambulance crews are covered for line-of-duty deaths occurring on or after October 15, 1986.

With respect to law enforcement and cancer, the study reported that based on the available epidemiologic evidence that the overall risk of cancer among law enforcement personnel was similar to that of the general population. The study also reported that there had been very few studies specifically designed to examine the risk of cancer among law enforcement officers.

The study reported with respect to law enforcement and circulatory disease that while the stresses associated with law enforcement are thought to increase the risk of ischemic heart disease, most epidemiologic studies found law enforcement to have a risk of death due to circulatory disease similar to , or only slightly above, that of the general population. Despite the available evidence suggesting increased risk of heart disease, there was not enough evidence from which to draw firm conclusions. The study reported that very few studies of this specific nature about law enforcement had been performed and current studies were limited to available death records which lack many specific details.

Recent Research. An initial review of medical literature databases resulted in finding limited literature about the risk of cancer and heart disease for law enforcement. The more recent research on cancer and heart disease in law enforcement that has been published contain findings and conclusions similar to those presented in the 1992 Washington presumption report.

Infectious diseases and law enforcement, which were not included in the 1992 study, have been more readily covered in recent research. Findings suggest that law enforcement officers have significantly elevated statistical rates for a number of diseases. However, despite these statistical findings, they do not necessarily prove causal association.

Appendix B contains citations and abstracts from recent literature about law enforcement occupational illness.

6. Policy Options

Option 1: Include Law Enforcement Officers in the presumption for infectious diseases.

This option would include Law Enforcement Officers in LEOFF Plan 2 under the same presumption for infectious disease that currently covers Fire Fighters including Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome, all Strains of Hepatitis, Meningococcal Meningitis, and Mycobacterium Tuberculosis. This option would provide coverage for the exposure of law enforcement officers, because of their employment, to uncontrolled environments containing various hazardous such as infectious diseases. This option would put Washington on level with a number of states that have presumptions to establish that various infectious diseases are work-related for law enforcement officers under disability or workers' compensation laws. This option is not mutually exclusive from the other options; rather it could be selected in addition to Option 2 and/or Option 3

Option 2: Create a presumption for heart problems for law enforcement officers.

This option would create a presumption for heart problems similar to the presumption established for Fire Fighters during the 2007 Legislative Session. A presumption would exist

if a law enforcement officer covered by LEOFF Plan 2 experienced heart problems within 24 hours of strenuous physical exertion due to law enforcement activities. This option would require “law enforcement activities” to be specifically defined. This could include criteria such as participating in a physical training exercise, responding to an emergency situation, or other assigned duties related to or requiring a law enforcement response. This option would put Washington on level with the Federal Government and 20 other states that have presumptions to establish that heart problems are work-related for law enforcement officers under disability or workers' compensation laws. This option is not mutually exclusive from the other options; rather it could be selected in addition to Option 1 and/or Option 3

Option 3: Create a presumption for cancer.

This option would create a presumption for cancer. This option would require the identification of the specific types of cancers to be covered. This option would put Washington on level with five other states that have a cancer presumption for law enforcement officers. This option is not mutually exclusive from the other options; rather it could be selected in addition to Option 1 and/or Option 2.

7. Supporting Information

- **Appendix A: PSOB Statute – Presumption for Heart Attack and Stroke**
- **Appendix B: Recent Literature Regarding Law Enforcement Occupational Illness**

Appendix A: PSOB Statute – Presumption for Heart Attack and Stroke

42 U.S.C. § 3796, Sec. 1201(k) Payment of death benefits

(k) For purposes of this section, if a public safety officer dies as the direct and proximate result of a heart attack or stroke, that officer shall be presumed to have died as the direct and proximate result of a personal injury sustained in the line of duty, if—

- (1) that officer, while on duty—
 - (A) engaged in a situation, and such engagement involved nonroutine stressful or strenuous physical law enforcement, fire suppression, rescue, hazardous material response, emergency medical services, prison security, disaster relief, or other emergency response activity; or
 - (B) participated in a training exercise, and such participation involved nonroutine stressful or strenuous physical activity;
- (2) that officer died as a result of a heart attack or stroke suffered—
 - (A) while engaging or participating as described under paragraph (1);
 - (B) while still on that duty after so engaging or participating; or
 - (C) not later than 24 hours after so engaging or participating; and
- (3) such presumption is not overcome by competent medical evidence to the contrary.

Direct and proximate result of a heart attack or stroke –

A death results directly and proximately from a heart attack or stroke if the heart attack or stroke is a substantial factor in bringing it about.

Nonroutine stressful physical activity –

Except as excluded by the Act, at 42 U.S.C. 3796(l), nonroutine stressful physical activity means line of duty activity that—

- (1) Is not performed as a matter of routine;
- (2) Entails non-negligible physical exertion; and
- (3) Occurs—
 - (i) With respect to a situation in which a public safety officer is engaged, under circumstances that objectively and reasonably—
 - (A) Pose (or appear to pose) significant dangers, threats, or hazards (or reasonably-foreseeable risks thereof), not faced by similarly-situated members of the public in the ordinary course; and
 - (B) Provoke, cause, or occasion an unusually-high level of alarm, fear, or anxiety; or
 - (ii) With respect to a training exercise in which a public safety officer participates, under circumstances that objectively and reasonably—
 - (A) Simulate in realistic fashion situations that pose significant dangers, threats, or hazards; and
 - (B) Provoke, cause, or occasion an unusually-high level of alarm, fear, or anxiety.

Competent medical evidence to the contrary –

The presumption raised by the Act, at 42 U.S.C. 3796(k), is overcome by competent medical evidence to the contrary, when evidence indicates to a degree of medical probability that circumstances other than any engagement or participation described in the Act, at 42 U.S.C. 3796(k)(1), considered in combination (as one circumstance) or alone, were a substantial factor in bringing the heart attack or stroke about.

Appendix B: Recent Literature Regarding Law Enforcement Occupational Illness

1. Potential work-related exposures to blood borne pathogens by industry and occupation in the United States Part II: A telephone interview study.

Chen GX, Jenkins EL. American Journal of Industrial Medicine. 50(4):285-92. April 2007

BACKGROUND: The companion surveillance portion of this study [Chen and Jenkins, 2007] reported the frequency and rate of potential work-related exposures to bloodborne pathogens (BBP) treated in emergency departments (EDs) by industry and occupation, but it lacks details on the circumstances of the exposure and other relevant issues such as BBP safety training, use of personal protective equipment (PPE) or safety needles, or reasons for seeking treatment in a hospital ED.

METHODS: Telephone interviews were conducted with workers who had been treated in EDs for potential work-related exposures to BBP in 2000-2002. Respondents were drawn from the National Electronic Injury Surveillance System.

RESULTS: Of the 593 interviews, 382 were from hospitals, 51 were from emergency medical service/firefighting (EMS/FF), 86 were from non-hospital healthcare settings (e.g., nursing homes, doctors' offices, home healthcare providers, etc.), 22 were from law enforcement (including police and correctional facilities), and 52 were from other non-healthcare settings (i.e., schools, hotels, and restaurants). Needlestick/sharps injuries were the primary source of exposure in hospitals and non-hospital healthcare settings. Skin and mucous membrane was the primary route of exposure in EMS/FF. Human bites accounted for a significant portion of the exposures in law enforcement and other non-healthcare settings. In general, workers from non-hospital settings were less likely to use PPE, to have BBP safety training, to be aware of the BBP standards and exposure treatment procedures, and to report or seek treatment for a work-related exposure compared to hospital workers.

CONCLUSIONS: This study suggests that each industry group has unique needs that should be addressed.

2. Cardiovascular disease risk factors and the perception of general health among male law enforcement officers: encouraging behavioral change.

Ramey SL. American Association of Occupational Health Nurses Journal. 51(5):219-26. May 2003.

The relationship among cardiovascular disease (CVD) morbidity, risk factors (including stress), and the perception of health among male law enforcement officers (LEOs) compared to men in the general population were examined in this study. Self reported prevalence of CVD and CVD risk factors among currently employed male LEOs from nine states (n = 2,818) were compared to those of other men in the same states (n = 9,650 for CVD risk factors, n = 3,147 for CVD prevalence). Perceived stress in LEOs was assessed to determine if it affected the relationship between CVD prevalence and CVD risk factors. Cross tabulated simple percentages showed CVD was less prevalent in the LEO group than among the

general population. The best predictor variables for CVD were perceived stress, time in the profession, and hypertension. The LEO group had greater prevalence of hypercholesterolemia, overweight, and tobacco use than the general population. However, a greater percentage of LEOs perceived their health as "good to excellent" compared to men in the general population. Using multivariate analysis of variance (MANOVA) it was determined that perceived stress was associated with CVD in the LEO group and three CVD risk factors (i.e., cholesterol, hypertension, physical activity) were significantly affected by perceived stress. Among susceptible officers, stress may contribute to CVD development as well as potentiate several CVD risk factors. However, an apparent lack of association exists between perception of general health and CVD risk in LEOs.

3. The risk of acquiring hepatitis B or C among public safety workers: a systematic review.

Rischitelli G, Harris J, McCauley L, Gershon R, Guidotti T. American Journal of Preventative Medicine. 20(4):299-306; May 2001.

CONTEXT: Determination of the occupational risk of hepatitis B and C to public safety workers is important in identifying prevention opportunities and has significant legal and policy implications.

OBJECTIVES: Characterize the risk of occupationally acquired infection: (1) risk of exposure to blood and body fluids, (2) seroprevalence of hepatitis B and C in the source population, and (3) risk of infection after exposure.

DATA SOURCES: Electronic search of MEDLINE (1991-1999), HealthStar (1982-1999), and CINAHL (1975-1999) supplemented by selected reference citations and correspondence with authors of relevant articles.

STUDY SELECTION: Peer-reviewed journal articles (N=702) that addressed the transmission of hepatitis B and C in law enforcement, correctional, fire, emergency medical services, and healthcare personnel were identified. One hundred five (15.0%) articles were selected for full-text retrieval; 72 (68.6%) were selected for inclusion.

DATA ABSTRACTION: Articles selected for inclusion were abstracted by two reviewers and checked by a third reviewer, using a standard reporting form. Evidence tables were constructed, using the standardized abstracts. The tables were designed to summarize data for the key elements of the risk analysis.

CONCLUSIONS: Data suggest that emergency medical service (EMS) providers are at increased risk of contracting hepatitis B, but data have failed to show an increased prevalence of hepatitis C. EMS providers have exposure risks similar to those of hospital-based healthcare workers. Other public safety workers appear to have lower rates of exposure. Urban areas have much higher prevalence of disease, and public safety workers in those areas are likely to experience a higher incidence of exposure events.

4. Occupational needlestick injuries in a metropolitan police force.

Lorentz J, Hill L, Samimi B. American Journal of Preventative Medicine. 18(2):146-50; February 2000.

OBJECTIVES: Police officers are at risk of bloodborne diseases through needlestick injuries but few studies have addressed this problem. The purpose of this study was to assess the risk of needlestick injuries in law enforcement officers and to determine predictors of injuries and reporting rates.

DESIGN: An anonymous, voluntary questionnaire was distributed to 1738 active-duty, metropolitan police officers. The survey included the number of needlestick injuries ever experienced, how often these were reported, activities at the time of injury and attitudes toward injuries.

RESULTS: Of the 803 respondents (46.2% of survey population), 29.7% had at least one needlestick injury, and 27.7% of this group had two or more. Risk factors included evening shifts, pat-down searches, patrol duties, male gender and less experience. Only 39.2% sought medical attention for these injuries.

CONCLUSIONS: Needlestick injuries occur with considerable frequency in this group of law enforcement personnel, suggesting an increased risk of becoming infected with bloodborne pathogens, including hepatitis B, hepatitis C and HIV.

5. Coronary heart disease risk factors in employees of Iowa's Department of Public Safety compared to a cohort of the general population.

Franke WD, Cox DF, Schultz DP, Anderson DF. American Journal of Industrial Medicine. 31(6):733-7; June 1997.

The prevalence of coronary heart disease (CHD) risk factors in law enforcement personnel compared to that in the general population was studied by determining the predicted 10-year risk for developing CHD (CHD10, expressed as %) in subjects from the Iowa Department of Public Safety and comparing it to the average CHD10 for similarly aged subjects in the Framingham Heart Study cohort. The Iowa data included measures on 388 men from 30 to 64 years old, 246 of whom were measured in 1980-1981 and again in 1992-1993. The CHD10 came from an algorithm developed using the Framingham data; it included measures of age, gender, cholesterol, HDL-C, systolic blood pressure, smoking habit, glucose level, and left ventricular hypertrophy (ECG criteria). For this group, average CHD10 was reported by age in five-year increments [Circulation 83:356, 1991]. The Iowa subjects (n = 388) did not show a statistically significant difference in CHD10 from the reference population (8.9% versus 7.9%). The change with age was very similar in the two groups: for Iowa (n = 388) the estimate was $CHD10 = -16.5 + .59(\text{age})$; for Framingham it was $CHD10 = -17.5 + .60(\text{age})$. The change in individual risk factors with time was also similar in both groups; the per year change in CHD10 in the Iowa subjects, which was measured twice (n = 246, 0.63%), did not differ statistically from the 0.60% change predicted by the Framingham model. These results suggest that, for the risk factors considered here, the 10-year probability of developing CHD

among Iowa law enforcement personnel is similar to that found in the Framingham population.

6. Epidemiological studies of work-related injuries among law enforcement personnel.

Sullivan CS, Shimizu KT. J Soc Occup Med. 1988 Spring-Summer;38(1-2):33-40.

7. Career risk of hepatitis C virus infection among U.S. emergency medical and public safety workers.

Rischitelli G, Lasarev M, McCauley L. Journal of Occupational & Environmental Medicine. 2005 47(11):1174-1181. Erratum in: J Occup Environ Med. 2006 Mar;48(3):234-5.

OBJECTIVE: A probabilistic model was used to analyze the cumulative risk of occupational hepatitis C virus (HCV) infection among U.S. public safety workers.

METHODS: A model for the career risk of HCV was developed using the frequency of parenteral exposures to blood, the population seroprevalence of HCV, and the risk of seroconversion after exposure. Estimates of key input variables were obtained from published studies.

RESULTS: Calculated estimates of the 30-year risk of infection ranged from <0.1% for police, firefighters, and corrections officers to 1.9% among paramedics and emergency department personnel in high-risk communities. Infrequent exposure to high-risk blood seems to present a greater risk of infection than more frequent contact to low-risk populations.

CONCLUSIONS: Use of a probabilistic risk assessment model using published data can assist in policy decisions designed to protect the health and safety of workers. Further efforts to document the frequency of occupationally acquired HCV are needed.

8. Cost-effectiveness of hepatitis A-B vaccine versus hepatitis B vaccine for healthcare and public safety workers in the western United States.

Jacobs RJ, Gibson GA, Meyerhoff AS. Infection Control and Hospital Epidemiology. 2004 Jul;25(7):563-9.

OBJECTIVE: To determine the cost-effectiveness of substituting hepatitis A-B vaccine for hepatitis B vaccine when healthcare and public safety workers in the western United States are immunized to protect against occupational exposures to hepatitis B.

PARTICIPANTS: A cohort of 100,000 hypothetical healthcare and public safety workers from 11 western states with hepatitis A rates twice the national average.

DESIGN: A Markov model of hepatitis A was developed using estimates from U.S. government databases, published literature, and an expert panel. Added costs of hepatitis A-B vaccine were compared with savings from reduced hepatitis A treatment and work loss. Cost-effectiveness was expressed as the ratio of net costs to quality-adjusted life-years (QALYs) gained.

RESULTS: Substituting hepatitis A-B vaccine would prevent 29,796 work-loss-days, 222 hospitalizations, 6 premature deaths, and the loss of 214 QALYs. Added vaccination costs of \$5.4 million would be more than offset by \$1.9 million and \$6.1 million reductions in hepatitis A treatment and work loss costs, respectively. Cost-effectiveness improves as the time horizon is extended, from \$232,600 per QALY after 1 year to less than \$0 per QALY within 11 years. Estimates are most sensitive to community-wide hepatitis A rates and the degree to which childhood vaccination may reduce future rates.

CONCLUSION: For healthcare and public safety workers in western states, substituting hepatitis A-B vaccine for hepatitis B vaccine would reduce morbidity, mortality, and costs.

9. Occupational exposures and risk of hepatitis B virus infection among public safety workers.

Averhoff FM, Moyer LA, Woodruff BA, Deladisma AM, Nunnery J, Alter MJ, Margolis HS. Journal of Occupational & Environmental Medicine. June 2002; 44(6):591-6.

We conducted a questionnaire and seroprevalence survey to determine the frequency and type of occupational exposures (OEs) and the risk of hepatitis B virus (HBV) infection experienced by public safety workers (PSWs). Of the 2910 PSWs who completed the survey, 6.8% reported at least one OE in the previous 6 months, including needlestick (1.0%), being cut with a contaminated object (2.8%), mucous membrane exposure to blood (0.9%), and being bitten by a human (3.5%). The rate of OE varied by occupation with 2.7% of firefighters, 3.2% of sheriff officers, 6.6% of corrections officers, and 7.4% of police officers reporting ≥ 1 OE ($P < 0.001$). The HBV infection prevalence was 8.6%, and after adjustment for age and race, it was comparable to the overall US prevalence and did not vary by occupation. By multivariate analysis, HBV infection was not associated with any OEs, but it was associated with older age, being nonwhite, and a previous history of a sexually transmitted disease. This study demonstrated that although OEs are not uncommon among PSWs, HBV infection was more likely to be associated with nonoccupational risk factors. Administration of hepatitis B vaccine to PSWs early in their careers will prevent HBV infection associated with occupational and non-OEs.

10. Hepatitis C in urban and rural public safety workers.

Rischitelli G, McCauley L, Lambert WE, Lasarev M, Mahoney E. Journal of Occupational & Environmental Medicine. 2002 Jun;44(6):568-73.

A sample of 719 Oregon public safety personnel (police officers, firefighters, and corrections officers) was tested for hepatitis C virus (HCV) antibody after completing a risk questionnaire. Seven of nine positive enzyme immunoassay tests (78%) were confirmed with recombinant immunoblot assay, yielding confirmed prevalence estimates of 1.2% (95% confidence interval, 0.4 to 2.8%) among the 406 firefighters and emergency medical technicians, and 0.7% (95% confidence interval, 0.1 to 2.6%) in 274 corrections personnel. No cases were observed in the 29 participating police officers. Self-reports of the number of workplace exposures to blood were not associated with HCV positivity, and the number of years of public safety employment seemed to be slightly less for HCV-positive subjects. Two

of the seven (28.6%) HCV-positive individuals reported having at least one nonoccupational risk factor (odds ratio, 4.3; 95% confidence interval, 0.4 to 27.1), suggesting the greater relative importance of nonoccupational exposures.

11. Hepatitis C screening and prevalence among urban public safety workers.

Upfal MJ, Naylor P, Mutchnick MM. Journal of Occupational & Environmental Medicine. 2001 Apr;43(4):402-11.

This study examines the prevalence of anti-hepatitis C virus by using an enzyme-linked immunoassay test (EIA-2) in 2447 volunteers (including 1560 police, 678 fire, and 209 emergency medical service personnel) and a self-reported questionnaire on potential occupational and non-occupational risk factors. Subjects consisted of 76% men, 54.8% blacks, and 40.3% whites. Twenty-eight individuals (1.1%) tested positive, with prevalence rates of 1.1% and 1.3%, respectively, among blacks and whites. Although firefighters and emergency medical service workers had a higher prevalence (2.3% and 2.8%) than police (0.6%), the overall prevalence was lower than that typical of urban populations. In a multivariate analysis, the most important risk factors were behavioral, with no significant occupational exposure risk observed. Previously reported racial differences were not detected in this study, most likely because the subjects were of similar socioeconomic status.

12. Potential work-related exposures to bloodborne pathogens by industry and occupation in the United States Part II: A telephone interview study.

Chen GX, Jenkins EL. American Journal of Industrial Medicine. 2007 Apr;50(4):285-92.

BACKGROUND: The companion surveillance portion of this study [Chen and Jenkins, 2007] reported the frequency and rate of potential work-related exposures to bloodborne pathogens (BBP) treated in emergency departments (EDs) by industry and occupation, but it lacks details on the circumstances of the exposure and other relevant issues such as BBP safety training, use of personal protective equipment (PPE) or safety needles, or reasons for seeking treatment in a hospital ED.

METHODS: Telephone interviews were conducted with workers who had been treated in EDs for potential work-related exposures to BBP in 2000-2002. Respondents were drawn from the National Electronic Injury Surveillance System.

RESULTS: Of the 593 interviews, 382 were from hospitals, 51 were from emergency medical service/firefighting (EMS/FF), 86 were from non-hospital healthcare settings (e.g., nursing homes, doctors' offices, home healthcare providers, etc.), 22 were from law enforcement (including police and correctional facilities), and 52 were from other non-healthcare settings (i.e., schools, hotels, and restaurants). Needlestick/sharps injuries were the primary source of exposure in hospitals and non-hospital healthcare settings. Skin and mucous membrane was the primary route of exposure in EMS/FF. Human bites accounted for a significant portion of the exposures in law enforcement and other non-healthcare settings. In general, workers from non-hospital settings were less likely to use PPE, to have

BBP safety training, to be aware of the BBP standards and exposure treatment procedures, and to report or seek treatment for a work-related exposure compared to hospital workers.

CONCLUSIONS: This study suggests that each industry group has unique needs that should be addressed.

13. Relationship Between Cardiovascular Disease Morbidity, Risk Factors, and Stress in a Law Enforcement Cohort.

Franke, Warren D. PhD; Ramey, Sandra L. PHD; Shelley, MackC. II, PhD. Journal of Occupational & Environmental Medicine. 44(12); 1182-1189, December 2002.

It is unclear to what extent law enforcement officers (LEOs) experience increased prevalence of cardiovascular disease (CVD; defined as coronary heart disease, myocardial infarction, angina, or stroke) and, if so, whether perceived stress affects this relationship. First, self-reported CVD risk factors among currently employed male LEOs from 9 states (n = 2818) were compared to CVD risk factors among similarly-aged males with similar incomes in the same states (n = 8046). Second, CVD prevalence was compared among LEOs (n = 1791) and similarly-aged males with similar incomes (n = 2575) from four of these states. Finally, among the LEOs only, the possible effect of perceived stress on the relationship between CVD prevalence and CVD risk factors was assessed. LEOs reported higher prevalence of hypertension, hypercholesterolemia, tobacco use, and elevated body mass index. CVD prevalence did not differ significantly between the LEO group and the general population (2.3% +/- 15% versus 3.1% +/- 17%; P = 0.095). In the LEO-only group, the best predictors of CVD were: time in the profession (OR = 1.07; 95% CI = 1.03-1.11), perceived stress (OR = 1.05; 95% CI = 1.00-1.10), and hypertension (OR = 0.33; 95% CI = 0.18-0.62). In the LEO-only group, perceived stress was associated with CVD (P = 0.008), and three CVD risk factors were significantly affected by perceived stress: cholesterol, hypertension, and physical activity. Perceived stress was affected by duration of time in the profession (P = 0.004), independent of an age effect (P = 0.353). Among susceptible officers, perceived stress may contribute to CVD directly and through potentiating several CVD risk factors.

14. Cardiovascular Disease Morbidity in an Iowa Law Enforcement Cohort, Compared with the General Iowa Population.

Franke, Warren D. PhD; Collins, Shannon A. MS; Hinz, Paul N. PhD. Journal of Occupational & Environmental Medicine. 40(5); 441-444, May 1998.

It remains uncertain if law enforcement officers experience an elevated cardiovascular disease morbidity and, if so, whether their profession contributes to this incidence. Consequently, the self-reported incidence of cardiovascular disease (CVD) (coronary heart disease, myocardial infarction, stroke, coronary artery bypass graft surgery, angioplasty) and CVD risk factors (age, diabetes, elevated body mass index (≥ 27.8 kg [middle dot] m²), hypercholesterolemia, hypertension, tobacco use) in 232 male retirees, ≥ 55 years of age, from the Iowa Department of Public Safety were compared with 817 male Iowans of similar age. CVD incidence was higher in the law enforcement officers than the general population (31.5% vs 18.4%, P < 0.001). Using multiple logistic regression, factors found to be

associated with CVD included the law enforcement profession (odds ratio [OR]= 2.34; 95% confidence interval [95% CI] = 1.5-3.6), hypercholesterolemia (OR= 2.37; 95% CI = 1.7-3.3); diabetes (OR = 2.22; 95% CI = 1.4-3.6), hypertension (OR = 1.79; 95% CI = 1.3-2.5), tobacco use (OR = 1.67; 95% CI = 1.07-2.6), and age (OR = 1.06; 95% CI = 1.03-1.08). These results suggest that employment as a law enforcement officer is associated with an increased cardiovascular disease morbidity and this relationship persists after considering several conventional risk factors.

15. Ischemic Heart Disease Mortality and Occupation Among 16- to 60-Year-Old Males.

Calvert, Geoffrey M. MD, MPH; Merling, Jeffrey W. MD; Burnett, Carol A. MS. Journal of Occupational & Environmental Medicine. 41(11):960-966, November 1999.

Cardiovascular disease is the leading cause of death, and the role of occupation continues to generate interest. Using the National Occupational Mortality Surveillance system, proportionate mortality ratio (PMR) analyses were used to examine the association between occupation and ischemic heart disease among 16- to 60-year-old males. We used data from 1982-1992 from 27 states. Separate analyses were conducted for blue-collar and white-collar occupations. Among the blue-collar occupations with the highest PMRs for ischemic heart disease mortality were sheriffs, correctional institution officers, policemen, firefighters, and machine operators. Physicians (blacks only) and clergy (both races) were among the white-collar occupations with the highest PMRs for ischemic heart disease. Although more study is needed, consideration should be made for targeting high-PMR occupations, with improvement in work organization to reduce occupational stress and promotion of healthy lifestyles through cardiovascular disease prevention programs.

16. Occupational Exposures and Risk of Hepatitis B Virus Infection Among Public Safety Workers.

Averhoff, Francisco M. MD, MPH; Moyer, Linda A. RN; Woodruff, Bradley A. MD, MPH; Deladisma, Adeline M. MPH; Nunnery, Joni MPH; Alter, Miriam J. PhD; Margolis, Harold S. MD. Journal of Occupational & Environmental Medicine. 44(6):591-596, June 2002.

We conducted a questionnaire and seroprevalence survey to determine the frequency and type of occupational exposures (OEs) and the risk of hepatitis B virus (HBV) infection experienced by public safety workers (PSWs). Of the 2910 PSWs who completed the survey, 6.8% reported at least one OE in the previous 6 months, including needlestick (1.0%), being cut with a contaminated object (2.8%), mucous membrane exposure to blood (0.9%), and being bitten by a human (3.5%). The rate of OE varied by occupation with 2.7% of firefighters, 3.2% of sheriff officers, 6.6% of corrections officers, and 7.4% of police officers reporting ≥ 1 OE ($P < 0.001$). The HBV infection prevalence was 8.6%, and after adjustment for age and race, it was comparable to the overall US prevalence and did not vary by occupation. This study demonstrated that although OEs are not uncommon among PSWs, HBV infection was more likely to be associated with nonoccupational risk factors. Administration of hepatitis B vaccine to PSWs early in their careers will prevent HBV infection associated with occupational and non-OEs.