

Workers' compensation claims for conditions presumed to be occupational diseases among firefighters in Washington State, 2000–2017

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Claire LaSee, MPH MSW

Jennifer Marcum, DrPH MS

David Bonauto, MD MPH

Safety and Health Assessment and Research for Prevention (SHARP) Program

Washington State Department of Labor & Industries

PO Box 44330

Olympia, WA 98504-4330



Executive Summary

Washington State, like many other US states, enacted a legal presumption that certain medical conditions in firefighters are occupational diseases for purposes of workers' compensation. Washington's occupational disease presumption law includes specific cancers, respiratory disease, heart problems following specific exposures or strenuous physical exertion, and specific infectious diseases. The purpose of this study is to describe Washington's firefighter workers' compensation claims for conditions covered by Washington's presumption law. Between 2000 and 2017, 330 claims were filed by firefighters for conditions covered by the presumption law. Of the 330 claims, 43% were for heart problems, 35% for cancer, 15% for respiratory disease, and 8% were for infectious diseases.

Introduction

In Washington State (WA), when a worker becomes injured or ill from work they may be eligible for benefits through workers' compensation (WC). To receive WC benefits, workers are typically required to demonstrate that their injury or illness was caused from workplace exposures. Acute injuries on the job are often straightforward to relate to work as the cause. It can be much more difficult to relate the cause of an illness or disease to work. Occupational diseases may be diagnosed years after the exposure, result from chronic exposures, and often have complex causal pathways. To qualify for WC benefits in WA, a physician must attest that workplace exposures, on a more probable-than-not basis (i.e., greater than 50% chance), are a cause of the disease or have aggravated a preexisting disease[1, 2]. Examples of diseases where workplace exposures are commonly identified as the primary or a contributing cause include asthma, carpal tunnel syndrome, noise-induced hearing loss, and cancer[1].

Many states, including WA, have passed laws in which certain diseases in firefighters and other public safety officers are presumed to be related to work and therefore, eligible for WC benefits. WA's first presumption law was enacted in 1987, granting firefighters who meet the specified eligibility criteria presumptive coverage for respiratory diseases. With legislation in 2002, 2007, 2018, and 2019, additional conditions were added to WA's firefighter presumption law, including for heart problems, certain types of cancers, select infectious diseases, and post-traumatic stress disorder (PTSD) (RCW 51.32.185)[3]. (Table 1). Beginning in 2002, legislation allowed the presumption to be rebuttable by a 'preponderance of the evidence' and was amended to include specific eligibility requirements based on employment duration, ineligibility related to smoking status, and a phasing out of the presumption during retirement.

In this report, we identify and describe WC claims filed between 2000 and 2017 by WA firefighters for conditions presumed to be occupational diseases according to WA's presumption law (RCW 51.32.185)[3]. Conditions added to the presumption law after 2017 are not included (Table 1).

Table 1. Conditions added to the occupational disease presumption law, RCW 51.32.185, by year and disease type.

Year	Occupational Disease Category	Disease-Specific Requirements
1987	Respiratory diseases	
2002	Heart Problems	Experienced within 72 hours of exposure to smoke, fumes, or toxic substances or (starting in 2007) experienced within 24 hours of strenuous physical exertion due to firefighting activity
	Cancer: primary brain cancer, malignant melanoma, leukemia, non-Hodgkin's lymphoma, bladder cancer, ureter cancer, and/or kidney cancer	Only applied to any active or former fire fighters after they have served at least ten years and who was given a qualifying medical examination upon becoming a fire fighter that showed no evidence of cancer
	Infectious Diseases: HIV/AIDS, all strains of hepatitis, meningococcal meningitis, and/or mycobacterium tuberculosis	
2007	Cancer: prostate cancer prior to the age of 50, colorectal cancer, multiple myeloma, or testicular cancer	Only applied to any active or former fire fighters after they have served at least ten years and who was given a qualifying medical examination upon becoming a fire fighter that showed no evidence of cancer
2018	Post-traumatic stress disorder	Only applies to those who have posttraumatic stress disorder that develops or manifests itself after the individual has served at least 10 years.
2019	Cancer: mesothelioma, stomach cancer, non-melanoma skin cancer, breast cancer in women, or cervical cancer.	Only applied to any active or former fire fighters after they have served at least ten years and who was given a qualifying medical examination upon becoming a fire fighter that showed no evidence of cancer

Methods

Description of the Washington workers' compensation system

Workers compensation insurance is required for all non-federal employers in WA unless they are covered by alternative industrial insurance programs, self-insure, or meet certain statutory exclusions under (RCW 51.12.020)[4]. The WA Department of Labor and Industries (L&I) provides workers' compensation (WC) insurance to approximately 182,000 employers and 3 million workers in the WA State Fund[5]. Employers may self-insure in WA for WC by meeting specific financial and safety requirements (WAC 296-15-021)[6]; self-insured employers employ about 25% of all covered workers in WA[5]. The WA L&I administers all State Fund claims, and regulates self-insured employers' management of claims. State Fund and self-insured claims are included in this report, unless otherwise noted due to data limitations.

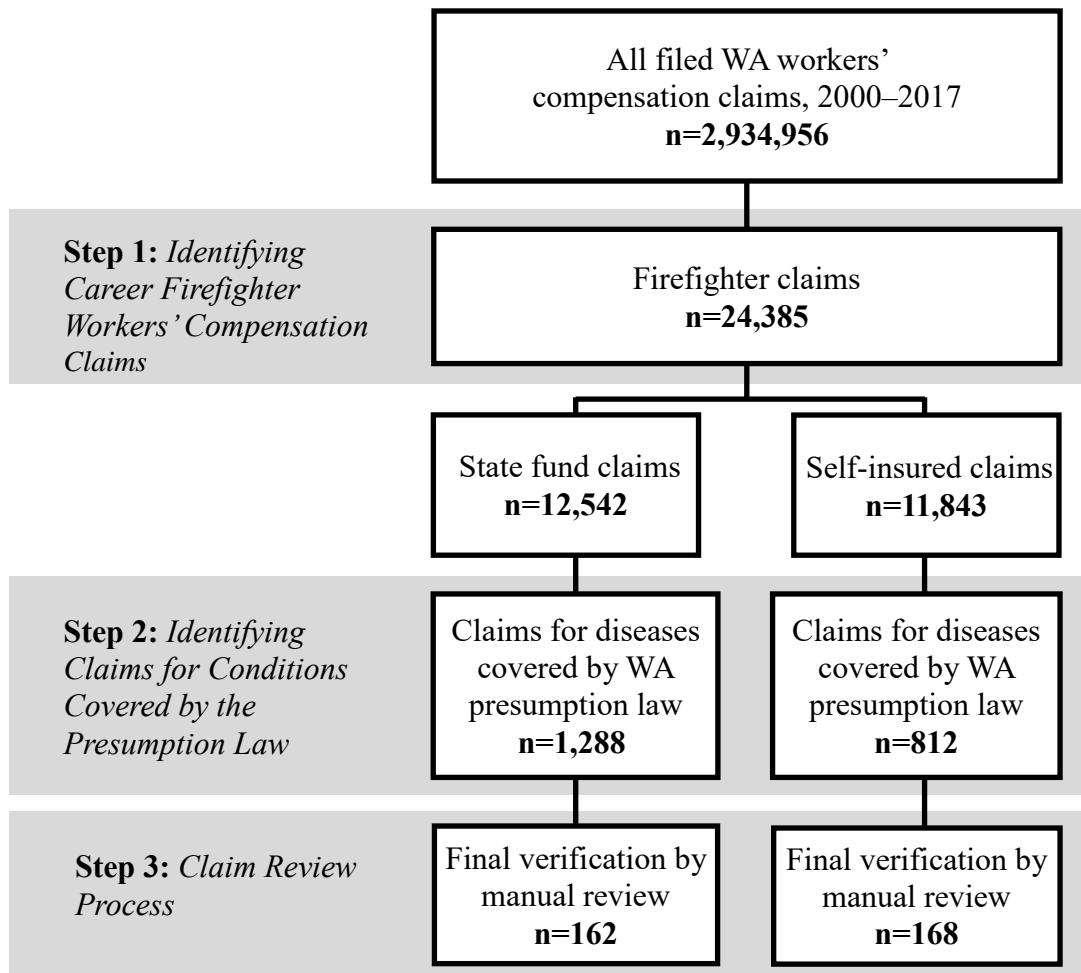
In WA, an injured or ill worker and their medical provider initiate a WC claim when they complete and submit a Report of Industrial Injury or Occupational Disease (RIIOD) form to L&I's State Fund, their self-insured employer, or the self-insured employer's third party administrator. The RIIOD consists of worker demographic information, their employer information, circumstances leading to the injury or illness and details including the initial injury or illness diagnoses. Trained coders at L&I then assign Occupational Injury and Illness Classification System (OIICS) codes based on information on the RIIOD form. OIICS codes characterize the nature, type, and source of the injury, and the body part injured. Claims are assigned a unique claim identification number, and trained claim managers determine if the injury or illness is an occupational injury or illness in accordance with WA law. If so, the claim qualifies for workers compensation benefits, which may include medical and/or indemnity payments. The claim identification number links additional documentation related to each claim, such as medical records, wage replacement benefits, and communication with the worker, which is all stored in L&I databases. Employer information and employee hours worked for all employers insured by the State Fund are also stored in L&I databases and used to assess WC premiums. Similar information is stored in L&I databases for self-insured employers and self-

insured WC claims, but is limited. For example, L&I does not systematically collect detailed medical records for those self-insured claims that involve only medical benefits.

Claim identification

Because claims for conditions filed during the study period and covered by the WA presumption law [3] are not readily identifiable through a single administration code, we developed a three-step process to identify presumption claims (Figure 1). First, all WC claims filed by career firefighters in WA between 2000 and 2017 were identified. Second, claims were evaluated for whether they were filed for a condition listed in the WA presumption law on or after the year in which that specific condition was recognized in the law (Table 1). Claims filed for conditions other than those listed in the presumption law were excluded from analyses. Third, all remaining claims were then manually reviewed to confirm the condition described matched one of those listed in the presumption law. Only claims filed by a firefighter as defined above for one of the four categories of conditions covered by the presumption law were included in the final sample (Figure 1). Details on the three-step process for claim identification follow.

Figure 1. Firefighter claims for diseases covered by the WA presumption law, RCW 51.32.185, 2000–2017



1. *Identifying Firefighter Workers' Compensation Claims*

We identified firefighter WC claims filed between 2000 and 2017 using the employer-assigned WA risk class and North American Industry Classification System (NAICS) codes, and the occupation listed on the RIIOD form. For this report, we use the same definition of “firefighter” as is outlined in the WA presumption law, which includes public firefighters, private firefighters if department includes over 50 firefighters, public employee fire investigators, and emergency medical technicians (RCW 41.26.030 (17) (a), (b), (c), and (h)) [7]. For the remainder of this report, “firefighter” refers to this same group of occupations. Volunteer firefighters and wildland firefighters were excluded from analyses unless they also met the above criteria (i.e., were also

career firefighters). Only claims from firefighters covered in the WA presumption law were included in this analysis. See Appendix A for details on the inclusion criteria, and Appendix B for the exclusion criteria used to identify firefighter claims.

2. Identifying Claims for Conditions Presumed to be Occupational Disease

Claims filed by firefighters were then systematically assessed for whether they were filed for a conditions listed in the WA presumption law[3]. Diagnosis codes (ICD-10-CM) from the RIIOD and medical bills, keywords from the RIIOD, and standardized injury and illness (OIICS) codes assigned by insurance staff were used to identify whether a State Fund firefighter claim was filed for a condition covered by the presumption law (Appendix C). L&I does not systematically collect medical records nor medical bills for self-insured claims. Therefore, inclusion and exclusion criteria used to identify self-insured claim filed for conditions covered by the presumption law were solely from the RIIOD, which included the initial diagnoses from the physician and description of the disease (Appendix D). For accepted self-insured claims, OIICS codes were also used to identify claims that were filed for a conditions covered by the presumption law (Appendix D).

3. Manual Claim Review

At least two of four SHARP researchers involved in this project (two epidemiologists, an occupational medicine physician, and a research assistant) manually reviewed all available records for the remaining claims to determine the following:

- (1) if the claim was filed by a firefighter as stated in RCW 41.26.030[7],
- (2) if the claim was filed for one of the four condition categories in the WA presumption law[3] as of 2017 (i.e., respiratory diseases, heart problems, cancer, and infectious disease), and
- (3) if there was a reference to the presumption law[3] in the claim files.

SHARP researchers were typically able to review the RIIOD, medical records and bills, claim order notices, and notes recorded by the claim manager for State Fund claims. Information on the self-insured claims was limited, and there were typically far fewer self-insured claim records to review as compared to State Fund claims. We also reviewed historical ad hoc queries of the WA

WC data and evaluated those claims against those identified in our extract algorithm. An occupational medicine physician reviewed the remaining claims in order to determine the primary medical condition described in the claim. Claims filed by firefighters for heart palpitations when self-limited and with no identifiable cardiac or pulmonary disease, were excluded from this analysis since the presentation involved only symptoms. Claims filed for smoke inhalation without pulmonary sequelae were also excluded since the presentation involved an exposure without demonstration of subsequent disease or injury. The exclusions for heart palpitations and smoke inhalation reflect the administrative policies within the WA WC system. See Appendix E and F for details on claim counts identified using various aspects of the search algorithms.

Medical and time-loss costs were calculated using case reserve estimates for the total costs the claim over its lifetime. All costs for each claim were adjusted to the 2017 Consumer Price Index for urban wage earners in WA, adjusting for medical costs and wage replacement costs separately. We characterized severity using the WC benefit type: medical aid-only versus wage replacement. Medical aid-only claims typically have less medical severity, are limited to payments for medical treatment, and do not have wage replacement payments and permanent disability awards. Eligibility for wage replacement requires that the injured or ill workers be medically certified unable to perform their normal work duties after a three-calendar-day waiting period from the date of injury. Therefore, the wage replacement claims are typically for more severe injuries or diseases than medical aid-only claims.

Results

Summary of claims

Between 2000 and 2017, WA L&I received nearly three million total workers' compensation (WC) claims. We identified 24,385 total WC claims filed by firefighters as defined above, and flagged less than 10% (n= 2,100) of those as claims potentially for conditions covered by the WA presumption law for manual review. Ultimately, there were 330 claims filed by firefighters between 2000 and 2017 for conditions covered by the WA presumption law. Of these 330

claims, 329 (99.7%) were identified through the extract algorithm described above and one claim was identified from historical ad hoc queries of the WA WC data.

The number of firefighter claims filed for conditions covered by the WA presumption law by year is found in Figure 2. While at least one claim was filed each year during the study period, we observed an upward trend in the number of claims filed for covered conditions each year (Figure 2). This increase in cases likely reflects the 2002 and 2007 expansions of the law as well as increased knowledge about presumptive coverage among WA firefighters.

A similar number of claims were filed for conditions covered by the WA presumption law during 2000–2017 for firefighters working for State Fund employers and self-insured employers (Table 2). However, there are fewer firefighters working for self-insured employers, and the claim rate was 1.4 times higher among firefighters working for self-insured employers compared to the State Fund (Table 2).

Figure 2. Firefighter claims filed for conditions covered by the WA presumption law by claim filing year, 2000–2017, State Fund and self-insured claims combined.

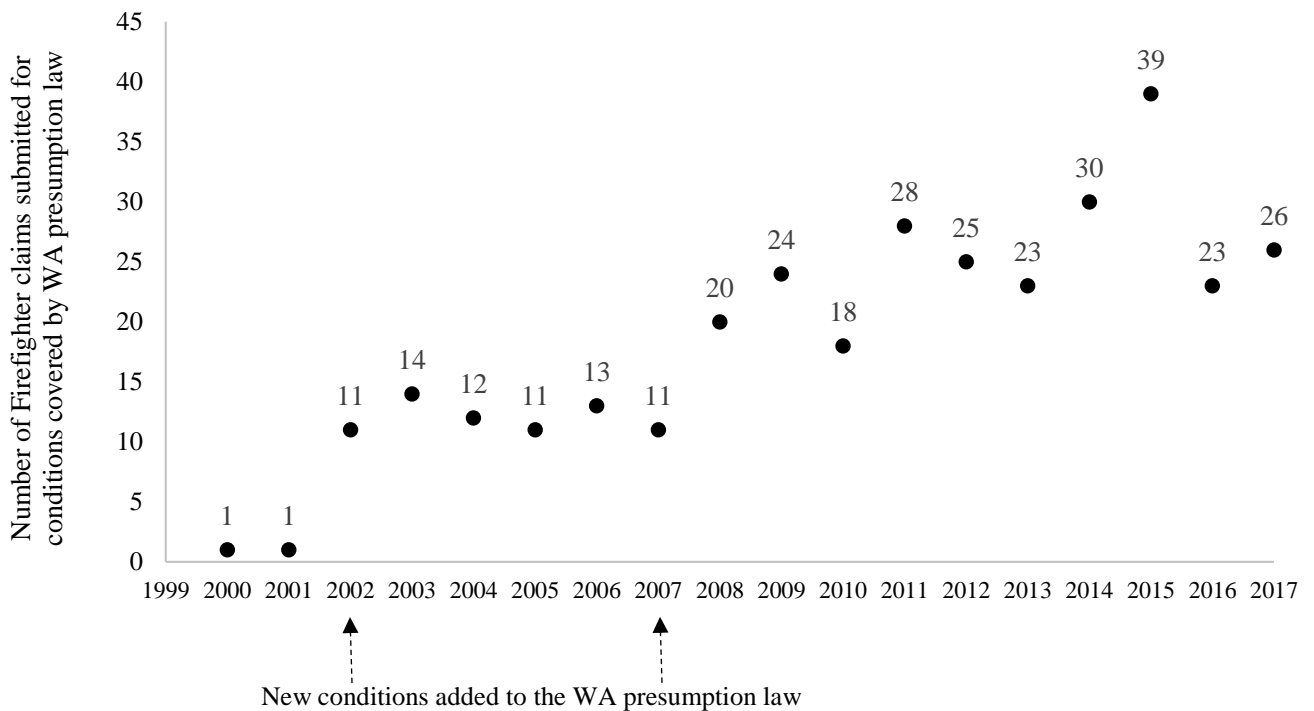


Table 2. Firefighter claims filed for conditions covered by the WA presumption law by insurer type, 2000–2017.

	Number of claims filed	Number of FTE¹ in firefighter risk class	Claim rate per 10,000 FTE
State Fund	154	81,725.8	18.8
Self-insured	156	57,989.3	26.9
Total	310²	139,715.1	22.2

¹FTE= full time equivalent; 1 FTE = 2,000 hours

²n=20 claims excluded because they were not assigned to the 6904 risk class, and denominator was based on number of FTE in 6904 risk class

Claims by medical condition type

Table 3 displays the number of firefighter claims for conditions covered by the WA presumption law by broad categories of conditions—heart diseases, cancers, respiratory diseases, and infectious diseases. The distributions of claims by condition type were similar among the State Fund and self-insured accounts.

Table 3. Firefighter claims filed for conditions covered by the WA presumption law by condition category and insurer type, 2000-2017.

Occupational Condition Category	State fund n (column %)	Self-insured n (column %)	Total n (column %¹)
Heart Problems	66 (41%)	75 (45%)	141 (43%)
Cancer	58 (36%)	57 (34%)	115 (35%)
Respiratory Diseases	25 (15%)	24 (14%)	49 (15%)
Infectious Diseases	13 (8%)	12 (7%)	25 (8%)
Total	162 (100%)	168 (100%)	330 (100%)

¹Totals may not add up to 100% due to rounding.

Nearly half (43%) of the total claims were filed for heart problems, over a third (35%) were filed for various types of cancer, 15% for respiratory diseases, and 8% for infectious diseases. This distribution may reflect actual incidence of these occupational diseases among firefighters, and may be influenced by other factors, such as recognition of the presumption law for the specified condition or claim filing behaviors for specific diseases. Claim filing rates for disease may vary by severity of disease. Firefighters with less severe disease may be less likely to go through the process of filing a WC claim, especially when time loss benefits are not needed. Additionally, it may not be clear to the ill workers exactly what diagnoses or conditions are covered by the WA

presumption law. Specific cancers and infectious diseases are named in the law, whereas ‘heart problems’ and ‘respiratory diseases’ are broad categories of illness.

Table 4. Firefighter claims filed for conditions covered by the WA presumption law by condition category and claim filing year, SF and SI, 2000-2017.

Year	Cancer	Heart Problems	Infectious Diseases	Respiratory Diseases	Total Claims	FTE
2000	Not eligible for study inclusion.			1	1	5,865
2001	Not eligible for study inclusion.			1	1	6,264
2002	3	2	3	3	11	6,536
2003	2	3	8	1	14	6,955
2004	2	7	0	3	12	7,081
2005	2	7	1	1	11	7,179
2006	1	7	0	5	13	7,520
2007	1	8	1	1	11	7,835
2008	5	9	2	4	20	8,127
2009	6	14	2	2	24	8,259
2010	12	3	1	2	18	8,191
2011	11	13	1	3	28	8,319
2012	12	7	1	5	25	8,394
2013	11	9	0	3	23	8,360
2014	14	12	1	3	30	8,516
2015	15	19	2	3	39	8,624
2016	9	8	2	4	23	8,727
2017	9	13	0	4	26	8,964
Total	115	141	25	49	330	139,715 ¹

¹Total may not add up to 100% due to rounding.

The WA presumption law covered respiratory diseases beginning in 1987 (Table 1), and at least one claim was filed for a covered respiratory disease every year during our study period (Table 4). Certain cancers, heart problems and specific infectious diseases were added to the presumption law in 2002 (Table 1), and claims included in our study were filed for these conditions beginning that year (Table 4). Claims may have been filed for those conditions by firefighters before 2002. However, we only included the claims filed after they qualified for coverage by the WA presumption law. Additional cancers were added to the presumption law in 2007, as is apparent with the increase in the number of cancer claims filed after that year (Table 4).

The distribution of claims for specific health conditions covered by the WA presumption law are found in tables 5-8. Over half (63%) of the claims for heart problems filed among both self-insured and State Fund claims were filed for atrial fibrillation or myocardial infarction, Table 5. Among the claims filed for cancers covered by the WA presumption law, the distribution of cancer types was similar between State Fund and self-insured, Table 6. Malignant melanoma was the most common cancer type cited (24% of all cases), followed by renal cancers (16%), and non-Hodgkin’s lymphoma (14%), Table 6.

Eleven specific cancers were eligible for presumption during the study period, and firefighters filed claims for only ten types of cancers covered by the WA presumption law. We did not identify any claims filed for ureter cancer during the study period. Among the respiratory claims, asthma was the most common type filed (41%), Table 7. Finally, hepatitis (all types) was the most frequent infectious disease among claims filed under the presumption law, Table 8. We did not identify any occupational disease claims for meningitis during the study period.

Table 5. Firefighter claims filed for heart problems covered by the WA presumption law by insurer type and specific diagnosis, 2000–2017.

Heart Problem Type	State fund n (column % ¹)	Self-insured n (column % ¹)	Total n (column % ¹)
Cardiac dysrhythmia: Atrial Fibrillation	21 (32%)	28 (37%)	49 (35%)
Ischemic Heart Disease: Myocardial Infarction	25 (38%)	15 (20%)	40 (28%)
Cardiac dysrhythmia: Other	3 (5%)	13 (17%)	16 (11%)
Ischemic Heart Disease: Angina	5 (7%)	7 (9%)	12 (9%)
Cardiac dysrhythmia: PSVT	8 (12%)	3 (4%)	11 (8%)
Cardiac symptoms: chest pain, palpitations	2 (3%)	3 (4%)	5 (4%)
Heart Disease: Other	1 (2%)	3 (4%)	4 (3%)
Cardiac dysrhythmia: Other, unspecified	1 (2%)	2 (3%)	3 (2%)
Cardiomyopathy	0 (0%)	1 (1%)	1 (1%)

¹Totals may not add to 100% due to rounding.

Table 6. Firefighter claims filed for cancers covered by the WA presumption law by insurer type and specific diagnosis, 2000–2017.

Cancer Type	State fund n (column % ¹)	Self-insured n (column % ¹)	Total n (column % ¹)
Malignant Melanoma	12 (21%)	12 (21%)	24 (21%)
Kidney	10 (17%)	8 (14%)	18 (16%)
Non-Hodgkin’s Lymphoma	8 (14%)	8 (14%)	16 (14%)
Bladder	7 (13%)	6 (11%)	13 (11%)
Prostate, diagnosis prior to age 50	5 (9%)	7 (12%)	12 (10%)
Colorectal	4 (7%)	7 (12%)	11 (10%)
Multiple Myeloma	4 (7%)	3 (5%)	7 (6%)
Leukemia	5 (9%)	1 (2%)	6 (5%)
Primary Brain	2 (4%)	4 (7%)	6 (5%)
Testicular	1 (2%)	1 (2%)	2 (2%)
Ureter	0 (0%)	0 (0%)	0 (0%)

¹Totals may not add to 100% due to rounding.

Table 7. Firefighter claims filed for respiratory diseases covered by the WA presumption law by insurer type and specific diagnosis, 2000–2017.

Respiratory Disease Type	State fund n (column % ¹)	Self-insured n (column % ¹)	Total n (column % ¹)
Obstructive lung disease; asthma	11 (44%)	9 (38%)	20 (41%)
Other Respiratory Disease ²	6 (24%)	12 (50%)	18 (37%)
Disease due to chemical fume or vapor ³	6 (24%)	2 (8%)	8 (16%)
Obstructive lung disease: COPD	1 (4%)	1 (4%)	2 (4%)
Upper respiratory illness	1 (4%)	0 (0%)	1 (2%)

¹Totals may not add to 100% due to rounding.

²Examples include lung cancer and other lung masses, granulomas, pulmonary nodules, pneumonia, etc.

³Examples include hemoptysis, acute pneumonitis, acute bronchitis, laryngitis, etc.

Table 8. Firefighter claims filed for infectious diseases covered by the WA presumption law by insurer type and specific diagnosis, 2000–2017.

Infectious Disease Type	State fund n (column % ¹)	Self-insured n (column % ¹)	Total n (column % ¹)
Hepatitis (all types)	5 (38%)	10(83%)	15 (60%)
Tuberculosis	8 (62%)	1 (8%)	9 (36%)
HIV ²	0 (0%)	1 (8%)	1 (4%)
Meningitis	0 (0%)	0 (0%)	0 (0%)

¹Totals may not add to 100% due to rounding.

²Human Immunodeficiency Virus

Claim acceptance rates

Claim acceptance rates varied by occupational disease category and insurer type, Table 9. About half (55%) of the State Fund claims filed for a heart problem covered in the WA presumption law were accepted, and a quarter (25%) of self-insured claims were accepted, Table 9. Most State Fund (90%) and most self-insured (82%) claims for cancers covered in the WA presumption law were accepted. Claim acceptance rates for respiratory diseases varied from 64% for State Fund claims to 58% for self-insured claims, and 92% of State Fund claims for infectious diseases covered in the WA presumption law were accepted, and 67% of self-insured claims for infectious diseases were accepted.

Table 9. Firefighter claims filed for conditions covered by the WA presumption law by insurer type and adjudication status, 2000–2017.

Occupational Disease Category	State Fund number filed (% accepted)	Self-insured number filed (% accepted)	Total number filed (% accepted)
Heart Problems	66 (55%)	75 (25%)	141 (39%)
Cancer	58 (90%)	57 (82%)	115 (86%)
Respiratory Diseases	25 (64%)	24 (58%)	49 (61%)
Infectious Diseases	13 (92%)	12 (67%)	25 (80%)

Claim severity and costs

Information on claim severity and costs are displayed in Table 10 (State Fund) and Table 11 (self-insured). The majority of accepted State Fund claims filed for heart problems and cancers were wage-replacement claims (Table 10). There were a small number of wage-replacement claims for respiratory diseases and infectious disease (n=8 total), and therefore, we cannot make conclusions about typical costs or time loss for these claims. Most self-insured claims for conditions covered by the WA presumption law were wage-replacement claims (87%). More complete information regarding claims costs and time loss are available for the State Fund claims, therefore, self-insured claim costs are not included in Table 11.

Table 10. Claims accepted for conditions covered by the WA presumption law by severity and occupational disease category, State Fund, 2000–2017.

Occupational Disease Category	Number of Accepted Claims	Medical Aid-Only ¹ Claims		Wage-Replacement ² Claims		
		n	Total Cost (median cost per medical aid-only claim)	n	Total Cost (median cost per wage-replacement claim)	Time Loss Days (median) ³
Heart Problems	36	14	\$48,242 (\$2,151)	22	\$2,391,094 (\$31,755)	1169 (31)
Cancer	52	12	\$2,304,275 (\$12,474)	40	\$20,246,770 (\$119,032)	16712 (65)
Respiratory Diseases	16	11	\$159,555 (\$823)	5	\$3,400,285 (\$537,759)	2678 (499)
Infectious Diseases	12	9	\$35,797 (\$476)	3	\$300,204 (\$78,646)	666 (320)

¹Claims qualify for payment of medical expenses only

²Wage replacement requires medical certification that the worker is unable to perform normal work duties after a 3-calendar-day waiting period.

³Median time loss days calculated among compensable claims with time loss > 0 days

Table 11. Claims accepted for conditions covered by the WA presumption law by severity and occupational disease category, self-insured, 2000–2017.

Occupational Disease Category	Number of Accepted Claims	Medical Aid-Only ¹ Claims	Wage-Replacement ² Claims
Heart Problems	19	5	14
Cancer	47	4	43
Respiratory Diseases	14	1	13
Infectious Diseases	7	1	6

¹Claims qualify for reimbursement for medical expenses only

²Wage replacement reimbursement requires medical certification that the worker is unable to perform normal work duties after a 3-calendar-day waiting period.

Documentation of the WA presumption law in claim files

Due to data limitations mentioned earlier, only State Fund claims were evaluated for documentation of the WA presumption law in the claim files. Among the State Fund claims we identified for conditions presumed to be occupational disease in WA, we found that over half of claims filed for the covered heart problems or cancers included documentation of the presumption law (Table 12). Documentation of this type was less common among claims filed for the covered respiratory and infectious diseases (Table 12).

Table 12. State Fund claims for diseases covered by the WA presumption law with documentation of the law in the claim files, 2000-2017.

Occupational Disease Category	Documentation of the law¹
	n (%)
Heart Problems	38 (58%)
Cancer	56 (97%)
Respiratory Diseases	7 (28%)
Infectious Diseases	4 (31%)

Study Limitations

Several limitations affect this analysis. First, before 2017, there was no systematic method to identify claims evaluated under the WA presumption law. Nor does a single administrative code capture firefighters precisely without also including workers in related fields that would not qualify for coverage under the WA presumption law. Similarly, it was difficult to determine which claims filed by firefighter were eligible conditions covered under the law. The case capture algorithms used to identify claims were successful in identifying all but one claim previously known to the agency. However, missing and incomplete data decreased the specificity of our case capture methods, especially in the self-insured medical aid-only claims. Only 16% of the claims identified by the algorithms were determined to be firefighter claims for the specific conditions covered by the WA presumption law by research staff during the manual review. Due to the differences in available data between State Fund and self-insured claims, we developed different algorithms to identify claims. This may have resulted in inconsistencies between the two groups.

Our analyses also does not account for external factors that impact whether a firefighter with condition eligible for presumption proceeds with a WC claim. External factors that may affect whether a firefighter files a claim for a condition covered by the presumption law include knowledge of the law and access to alternative healthcare coverage. Therefore, the results of this study should not be interpreted as a representation of disease burden among firefighters.

Finally, claims that fail to meet the eligibility criteria for inclusion under the presumption may be adjudicated outside of the presumption law. Thus, our descriptive study of presumption claims should be viewed in the context of the Washington workers' compensation system's overall laws and regulations, limiting the generalizability of our observations outside of Washington State.

Conclusions

The primary goal of this analysis was to describe claims filed by firefighters for conditions covered by the WA presumption law[3] between 2000 and 2017. While determining which claims were covered by the WA presumption law remained a major challenge, our analysis highlights that firefighters have sought WC benefits for all four occupational disease categories covered by the law during this time-period.

Improvements to the process of tracking claims adjudicated and accepted under the WA presumption law, which now have been implemented, will ease the challenges we document in identifying these claims and will allow for efficient future reviews. Additionally, claim managers and firefighters alike could benefit from clarity of what types of conditions are covered in the law, especially in the respiratory disease and heart problems categories.

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Appendix A

Step 1: Case inclusion criteria for identifying claims filed by firefighters, as defined in the WA presumption law.

Inclusion Criteria	Must meet at least one of the following:
Employer: Risk class assignment	<ul style="list-style-type: none"> • 6904 (County and City Fire fighters – Salaried)
Employer: Combination of NAICS and SOC codes	<ul style="list-style-type: none"> • NAICS code of 922160 (Fire Protection) and one of the following SOC codes: <ul style="list-style-type: none"> • 29-2041 (Emergency Medical Technicians and Paramedics) • 33-1012 (Police and Detective Supervisors) • 33-2022 (Forest Fire Inspectors and Prevention Specialists) • 33-3051 (Police and Sheriff Patrol Officers) • 35-1012 (Food Preparation and Serving Workers Supervisors) • 45-1011 (First-Line Supervisors of Farming, Fishing, and Forestry Workers) • 99-9999 (unknown) • Or a missing SOC code
Claimant: keyword in occupation description field on ROIID	<ul style="list-style-type: none"> • “FIRE FIGHT” or [variations of spacing and spellings of FIRE FIGHT] or “FIGHT FIRE” or [spacing variations of FIGHT FIRE] or “FIRE DEP” or [spacing variations of FIRE DEP] or “FIRE DISTRICT” or [spacing variations of FIRE DISTRICT] or “FIRE LT” or [spacing variations of FIRE LT] or “FIRE LIUTENANT” or [spacing variations of FIRE LIUTENANT] or “FIRE CHIEF” or [variations of spacing and misspellings of FIRE CHIEF] or FIRE CAPTAIN or [spacing variations of FIRE CAPTAIN] or “FIRE MARSH” or [variations of spacing and misspellings or FIRE MARSH] or “FIRE INVESTIGATOR” or [spacing variations of FIRE INVESTIGATOR]
Claimant: SOC code assigned based on ROIID occupation field	<ul style="list-style-type: none"> • 3310-20, 3310-21 (first line supervisors of firefighters and prevention workers) • 3320-10, 3320-11 (firefighters) • 3320-20, 3320-21 (fire inspectors and investigators)

NAICS= North American Industry Classification System; ROIID= Report of Industrial Injury or Occupational Disease; SOC= Standardized Occupation Code

Appendix B

Step 1, continued: Case exclusion criteria for identifying claims filed by firefighters, as defined in the WA presumption law.

Exclusion Criteria	Must not match any of the following:
Employer: Risk class assignment	<ul style="list-style-type: none"> • 0101-36 (Excavation and grading NOC) • 0505-00 (Building construction, NOC) • 0606-02 (vending machine installation, service, and repair) • 1002-00 (sawmills and automated shake and shingle mills) • 1007-05 (Grading, inspection bureaus/forestry services, NOC) • 1401-01 (taxi cab companies) • 1404-04, 1404-12, 1404-07 (Cabulance and paratransit) • 1802 (aluminum smelting) • 2401-00 (paper, pulp, or wood fiber manufacturing) • 4902, 5300, 5307 (state government employees) • 4907, 4908, 4909 (inmates) • 5004-14, 5004-18 (forestry and timberland services - manual labor) • 5006 (forestry/timberland services -machine operations) • 6901-00 (volunteers) • 6906 (volunteer law enforcement officers) • 7002 (Department of Energy Contractor)
Employer	<ul style="list-style-type: none"> • Department of Natural Resources
Employer: NAICS code assignment	<ul style="list-style-type: none"> • 238210 (electrical contractors and other wiring installation contractors) • 238220 (plumbing, heating, and air-conditioning contracts) • 561651 (security systems services) • 238910 (site preparation contracts)
Claimant: keyword in occupation description field on ROIID	<ul style="list-style-type: none"> • “DISPATCH” or “VOL” or “VOLUN” or [misspellings of VOLUN] or “VALENTEER” • Exclusionary keywords used in the absence of any inclusionary keywords (see above): “POLICE” or “CORRECTION” or “PATROL”
Employer NAICS assignment AND claimant occupation keyword	<ul style="list-style-type: none"> • Cases were also excluded when the employer was assigned the NAICS code = 922160 (Fire protection) AND • the occupation field on the ROIID for the claimant had any of the following keywords: “FORESTRY TECH” or [variations in spacing and misspellings of FORESTRY TECH] or “WILDLAND” or (spacing variations of WILDLAND] or “HOTSHOT” or (spacing variations of HOTSHOT] or “SMOKE JUMP” or [spacing variations of SMOKE JUMP] or “WILD FIRE” or [spacing variations of WILDFIRE] or “FOREST”.

NAICS= North American Industry Classification System; ROIID= Report of Industrial Injury or Occupational Disease; SOC= Standardized Occupation Code

Appendix C

Step 2: Identifying State Fund Claims for Diseases Presumed to be Occupational Disease

1. Does the injury/illness narrative contain words like “presumption” or “cancer”?

Does the combined text of the injury/illness narrative on the ROA contain any of the following words or phrases?

“PRESUM” or “RCW” or “51-32-185” or [spacing and punctuation variations of 51-32-185] or “CANCER” or “TUMOR” or “MYELOMA” or “MELANOMA” or “CHEMOTHERAPY” or “LEUKEMIA” or “LYMPHOMA” or “MALIGNANT” or “SQUAMOUS” or “CARCINO”

2. Do any of the OIICS codes indicate the injury/illness is not covered under the presumption law?

OIICS codes not related to the presumption law include any of the following:

Nature code starting with:

- 01-Traumatic injuries to bones, nerves, or spinal cord
- 02-Traumatic injuries to muscles, tendons, ligaments, joints, etc.
- 06- Intracranial injuries
- 15- Digestive system diseases & disorders
- 16- Genitourinary system diseases & disorders
- 17- Musculoskeletal system & connective tissue diseases & disorders
- 18- Disorders of the skin & subcutaneous tissue

Source code starting with:

- 3- Machinery

3. Does the injury/illness narrative contain words related to cancer, heart or respiratory disease, or certain infectious diseases?

Does the combined text of the injury/illness narrative on the ROA contain any of the following words or phrases (and their common misspellings)?

“HEART PAIN” or [variations of spacing and misspellings of HEART PAIN] or “HEART ATTACK” or [spacing variations of HEART ATTACK] or “HEART RATE” or [spacing variations of HEART RATE] or “CHEST PAIN” or [spacing variations of CHEST PAIN] or “ATRIAL FIB” or [spacing variations of ATRIAL FIB] or “TACHYCARDI” or “CARDIO” or “FLUTTER” or “PERICARDI” or “CARDIA” or “PALPATATIONS” or “INHAL” or “PERICARDI” OR “CARDIOL” OR “HIV” or “HCV” or “HEPATITIS” or “TB” or “TUBERCUL” or “MENINGI” or [variations of MENINGI]

4. Do any of the OIICS codes indicate the injury/illness is not covered under the presumption law?

Other OIICS codes not related to the presumption law include any of the following:

OIICS Nature code starting with:

- 00- Traumatic injuries & disorders, unspecified

Appendix C, continued

- 031- Amputations
- 032- Animal or insect bites
- 033- Avulsions
- 035- Enucleations
- 036- Gunshot wounds
- 04- Surface wounds and bruises
- 05- Burns
- 07- Effects of environmental conditions
- 08- Multiple traumatic injuries & disorders
- 09- Other traumatic injuries & disorders
- 12- Nervous system & sense organs diseases
- 153- Hernia
- 19- Other systemic diseases & disorders
- 20- Infectious & parasitic diseases, unspecified
- 21- Bacterial diseases
- 23- Other arthropod-borne diseases
- 24- Mycoses
- 25- Helminthiases
- 26- Infectious diseases peculiar to the intestines
- 411- General symptoms
- 412- Symptoms involving nervous & musculoskeletal systems
- 51- Damage to prosthetic devices
- 52- Mental disorders or syndromes
- OIICS Source code starting with:**
- 1- Containers
- 2- Furniture & Fixtures
- 4- Parts & Materials
- 6- Structures & Surfaces
- 8- Vehicles
- OIICS Accident code starting with:**
- 0- Contact with Objects & Equipment
- 1- Falls
- 4- Transportation Accidents
- 6- Assaults & Violent Acts

Appendix C, continued

5. Does the injury/illness narrative contain words like “presumption” or “cancer”?

Does the combined text of the injury/illness narrative on the ROA contain any of the following words or phrases?

“PRESUM” or “RCW” or “51-32-185” or [spacing and punctuation variations of 51-32-185] or “CANCER” or “TUMOR” or “MYELOMA” or “MELANOMA” or “CHEMOTHERAPY” or “LEUKEMIA” or “LYMPHOMA” or “MALIGNANT” or “SQUAMOUS” or “CARCINO”

6a. Does the claim include another keyword related to the conditions covered by the presumption law? Does the combined text of the injury/illness narrative on the ROA contain any of the following words or phrases (and their common misspellings)?

“HEART PAIN” or [variations of spacing and misspellings of HEART PAIN] or “HEART ATTACK” or [spacing variations of HEART ATTACK] or “HEART RATE” or [spacing variations of HEART RATE] or “CHEST PAIN” or [spacing variations of CHEST PAIN] or “ATRIAL FIB” or [spacing variations of ATRIAL FIB] or “TACHYCARDI” or “CARDIO” or “FLUTTER” or “PERICARDI” or “CARDIA” or “PALPITATIONS” or “INHAL” or “PERICARDI” OR “CARDIOL” OR “HIV” or “HCV” or “HEPATITIS” or “TB” or “TUBERCUL” or “MENINGI” or [variations of MENINGI]

6b. Is the claim likely to be for the exposure of an infectious disease where the claimant did not manifest the disease?

A claim was considered to be an exposure if it met any of the following criteria:

- a. The combined text of the injury/illness narrative on the ROA contains exposure-related keywords (“EXP” or “NEEDLE” or “LAC”) **AND** does not contain a keyword that would indicate the manifestation of a disease based on the exposure (“SMOKE” or “CHEMICAL” or “CANCER” or “ASBEST” or [misspellings of ASBEST] or “CARBON MON” or [spacing variations of CARBON MON] or “INHAL” or “CO EXP” or [spacing variations of CO EXP] or “PULMONARY” or “BRONCHOSPASM” or “INFX” or “IRR”
- b. An OIICS Nature code of “9999” (nonclassifiable) **AND** an OIICS Accident code starting with 340 (Exposure to caustic, noxious, or allergenic substances, unspecified)
- c. An OIICS Nature code starting with 40 (Symptoms, signs, and ill-defined conditions, unspecified) **AND** a missing OIICS Accident code
- d. An OIICS Nature code starting with 037 (Punctures, except bites) **AND** an OIICS Accident code of 0232 (struck by slipping handheld object)

Appendix C, continued

7. Does the claim have an ICD code for a presumption condition?

Was there an ICD code associated with the claim that indicates an infectious disease diagnosis? Such ICD codes include the following:

Condition	Related ICD codes
HIV	<i>ICD-9-CM:</i> 042 <i>ICD-10-CM:</i> B20
Hepatitis	<i>ICD-9-CM:</i> 070.0, 070.1, 070.20, 070.21, 070.22, 070.23, 070.30, 070.31, 070.32, 070.33, 070.41, 070.42, 070.43, 070.44, 070.49, 070.51, 070.52, 070.53, 070.54, 070.59, 070.6, 070.70, 070.71, 070.9, 571.40, 571.41, 571.42, 571.49, 573.1, 573.2, 573.3, 573.4 <i>ICD-10-CM:</i> B15.0, B15.9, B16.2, B19.11, B16.0, B18.1, B18.0, B16.9, B16.1, B17.11, B17.0, B17.2, B18.2, B17.8, B17.10, B18.8, B18.9, B19.0, B19.20, B19.21, B19.9, K73.9, K73.0, K75.4, K73.2, K73.8, K71.6, B17.9, B19.10
Meningitis	<i>ICD-9-CM:</i> 036.0 <i>ICD-10-CM:</i> A39.0

8. Is the claim predominantly for an MSD, back injury, rash, or eye problem?

Does the combined text of the injury/illness narrative on the ROA contain any of the following words or phrases (and their common misspellings)?

“EYE” or “CORNEA” or “RASH” or “SCABIES” or “SPRAIN” or “LIFT” or “LOW BACK” or [variations of LOW BACK] or “LUMBAR” or “BACK STR” or [misspellings and variations of BACK STR] or “BACK PAIN” or [misspellings and variations of BACK PAIN]

Appendix D

Step 2: Identifying Self-Insured Claims for Diseases Presumed to be Occupational Disease

1. Does the injury/illness narrative contain any keywords or OIICS codes that would indicate the claim may be eligible for presumptive coverage?

- a. Does the combined text of the injury/illness narrative on the ROIID contain any of the following words or phrases?

“PRESUM” or “RCW” or “51-32-185” or [spacing and punctuation variations of 51-32-185] or “CANCER” or “TUMOR” or “MYELOMA” or “MELANOMA” or “CHEMOTHERAPY” or “LEUKEMIA” or “LYMPHOMA” or “MALIGNANT” or “SQUAMOUS” or “CARCINO” or “CA” or “BLADDER” or “ASBESTOS” or “EXHAUST” or “DEISEL” or “TESTICULAR” or “ASTHMA” or [misspellings of ASTHMA] or “PURSUANT” or “BIOPSY” or “PROSTATE” or “PALPITATIONS” or “PALPS” or “CHEST” or “MI” or “SYNCOPE” or “EKG” or “TACHY” or “DYSPPN” or “SOB” or “BLOOD PRESSURE” or [spacing variations of BLOOD PRESSURE] or “BP” or “PULSE” or “CARCINO” or “HEART” or “HYPERTEN” or [misspellings of HYPERTEN] or “ARRH” or “ARTERY” or “CX PAIN” or [variations in spacing and misspellings of CX PAIN] or “SHORTNESS OF” or [variations of SHORTNESS OF] or “BREATH”

- b. Does the combined text of the injury/illness narrative on the ROIID contain the following keywords “YEAR” or “YR” or “MONTHS” or “ACCUM” **BUT NOT** keywords “HEARING” or [misspellings of HEARING] or “NOISE” or “LOUD” or “EAR”

Does the combined text of the injury/illness narrative on the ROIID contain the following keywords “ATRIAL FIB” or [spacing variations of ATRIAL FIB] or “CARDIO” or “FLUTTER” or “PERICARDI” or “CARDIA” or “INHAL” or “HIV” or “HCV” or “HEPATITIS” or “TB” or “TUBERCUL” or “MENINGI” or [variations of MENINGI] **BUT NOT** keywords “EXP” or “NEEDLE” or “LAC”

Appendix D, continued

Step 2: Identifying Self-Insured Claims for Diseases Presumed to be Occupational Disease

- c. Do any of the OIICS codes indicate the injury/illness may be eligible for presumptive coverage?

OIICS codes including any of the following:

Body Code starting with:

5- Body Systems
223- Heart
225- Lung(s), pleura
2441- Bladder
2442- Kidney(s)
2461- Liver
2563- Pancreas

Source code starting with:

00- Chemical and chemical products, unspecified
082- Natural gas
099- Chemicals and chemical products, not elsewhere classified
533- Viruses
561- Bodily diseases of injured, ill workers

Nature code starting with:

1331-Myocardial infarction (heart attack)
1361- Stroke
1389- Diseases of the veins, lymphatics, not elsewhere classified
14- Respiratory system diseases
221- Human immunodeficiency virus (HIV) infection
225- Viral Hepatitis
310- Malignant neoplasms and tumors (cancer, carcinomas, and sarcomas), unspecified
319- Malignant neoplasms and tumors of other sites
49- Symptoms, signs, and ill-defined diseases, not elsewhere classified
59- Other diseases, diseases, and disorders, not elsewhere classified
3112- Malignant neoplasms and tumors of bone or connective tissue: Connective and other soft tissue
3121- Malignant neoplasms and tumors of the skin: Melanoma of the skin (melanocarcinoma)
3139- Malignant neoplasms and tumors of lymphatic and hematopoietic tissue, not elsewhere classified
4164- Chest pain

Appendix E

Distributions of all firefighter claims, manually reviewed claims, and final cases by firefighter inclusion criteria¹ and insurer type

Firefighter inclusion criteria*	Step 1: all firefighter claims			Step 2: all claims manually reviewed			Step 3: final cases after review		
	State Fund (n=12,542)	Self-insured (n=11,843)	Total (n= 24,385)	State Fund (n=1,288)	Self-insured (n=812)	Total (n=2,100)	State Fund (n=162)	Self-insured (n=168) ³	Total (n=330)
Keyword	8,688 (69%)	8,516 (72%)	17,204 (71%)	878 (68%)	625 (77%)	1,503 (72%)	119 (73%)	136 (81%)	255 (77%)
Risk Class	11,664 (93%)	10,973 (93%)	22,637 (93%)	1,197 (93%)	765 (94%)	1,962 (93%)	156 (96%)	154(92%)	310 (94%)
SOC Code	10,733 (86%)	5,271 (45%)	16,004 (66%)	1,099 (85%)	297 (37%)	1,396 (66%)	154 (95%)	78 (46%)	232 (70%)
NAICS Code ²	1,172 (9%)	2,432 (21%)	3,604 (15%)	133 (10%)	182 (22%)	315 (15%)	6 (4%)	0 (0%)	6 (2%)

¹Specific Firefighter inclusion criteria outlined in Appendix A.

²Claims having a NAICS code of 922160 (Fire Protection) and one of several SOC codes not included in the SOC Code category. See Appendix A for specific codes included in each criterion.

³Includes one claim identified through ad hoc methods

Appendix F

Distributions of firefighter claims selected for manual review and final cases by disease inclusion criteria¹ and insurer type

Disease inclusion criteria¹	Step 2: all claims manually reviewed			Step 3: final cases after review		
	State Fund (n=1,288)	Self-insured (n=812)	Total (n=2,11)	State Fund (n=162)	Self-insured (n=168)	Total (n=330)
Keyword: Presumption	35 (3%)	37 (5%)	72 (3%)	23 (14%)	25 (15%)	48 (15%)
Keyword: Disease-specific	899 (70%)	424 (52%)	1,323 (63%)	136 (84%)	104 (62%)	240 (73%)
ICD ² diagnosis code	420 (33%)	85 (10%)	505 (24%)	137 (85%)	58 (35%)	195 (59%)

¹Presumption Claim inclusion criteria outlined in Appendix D

²International Classification of Diseases (ICD) version 9 with Clinical Modification