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Medical claims paid by workers' compensation insurance among US Medicare beneficiaries, 1999–2016

Laura Kurth, PhD[1], **Megan Casey, RN, BSN, MPH**[2], **Brian Chin, MSPH**[3], **Jacek M. Mazurek, MD, MS, PhD**[1], **Patricia Schleiff, MS**[1], **Cara Halldin, PhD, MPH**[1], **David J. Blackley, DrPh**[1]

[1]Respiratory Health Division, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, West Virginia, USA

[2]National Personal Protective Technology Laboratory, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, West Virginia, USA

[3]Division of Field Studies and Engineering (DFSE), National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Cincinnati, Ohio, USA

Abstract

Background: Workers' compensation claims among Medicare beneficiaries have not been described previously. To examine the healthcare burden of work-related injury and illness among Medicare beneficiaries, we assessed the characteristics, healthcare utilization, and financial costs among Medicare beneficiaries with claims for which workers' compensation was the primary payer.

Methods: We extracted final action fee-for-service Medicare claims from 1999 to 2016 where workers' compensation had primary responsibility for claim payment and beneficiary, claim type, diagnoses, and cost information from these claims.

Results: During 1999–2016, workers' compensation was the primary payer for 2,010,200 claims among 330,491 Medicare beneficiaries, and 58.7% of these beneficiaries had more than one claim.

Correspondence: Laura Kurth PhD, Surveillance Branch, Respiratory Health Division, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Mailing address: 1000 Frederick Ln, Mailstop HG900.2 Morgantown, WV 26508, USA. lkurth@cdc.gov.

AUTHOR CONTRIBUTIONS

Laura Kurth and Megan Casey participated in the conception and design of the work. Laura Kurth participated in the analysis of data and drafted the work. All the authors participated in the interpretation of data for the work, revised drafts of the work, and provided the final approval of this article to be published and agreement to be accountable for all aspects of the work.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

John D. Meyer declares that he has no conflict of interest in the review and publication decision regarding this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the Research Data Assistance Centers for Medicare and Medicare data are available at https://www.resdac.org/.

ETHICS APPROVAL AND INFORMED CONSENT

The NIOSH Human Subjects Review Board determined no additional human subjects review was required for this research study.

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Carrier claims submitted by noninstitutional providers constituted the majority (94.5%) of claims. Diagnosis codes indicated 19.4% of claims were related to diseases of the musculoskeletal system and connective tissue and 12.9% were related to disease of the circulatory system. Workers' compensation insurance paid $880.4 million for these claims while Medicare paid $269.7 million and beneficiaries paid $37.4 million.

Conclusions: Workers' compensation paid 74% of the total amount to providers for these work-related medical claims among Medicare beneficiaries. Claim diagnoses were similar to those of all workers' compensation claims in the United States. Describing these work-related claims helps identify the healthcare burden due to occupational injury and illness among Medicare beneficiaries resulting from employment and identifies a need for more comprehensive collection and surveillance of work-related medical claims.

Keywords

medical claims; Medicare; workers' compensation; work-related injuries

1 | INTRODUCTION

In the United States, Medicare is the primary federal health insurance for individuals ≥65 years of age. Individuals <65 years of age receiving Social Security or Railroad Retirement Board benefits due to disability are eligible for Medicare after receiving disability benefits for 24 consecutive months.[1] Individuals of all ages with end-stage renal disease (ESRD) are also eligible for Medicare.[1] Medicare claims data include beneficiary claims for which certain non-Medicare payers, such as workers' compensation insurance (WC), have primary responsibility for claim payment.[2] Most workers in the United States are covered by WC should they become injured or ill as a result of their employment.[3] In 2016, WC covered more than 138 million US jobs and paid $61.9 billion in medical and cash benefits.[4] WC coverage, benefits, and reporting requirements for work-related injury and illness vary by state and a centralized database of national WC claims does not exist.[3] A major challenge of occupational health research and surveillance is determining work-relatedness of injuries and illnesses, information which is included in Medicare claims data. Medicare Coordination of Benefits Rules state that WC pays primary to Medicare when a Medicare beneficiary has a work-related medical claim.[2] Using the primary payer variable found on Medicare claims, we identified claims for which WC had primary payment responsibility and assessed the characteristics, healthcare utilization, and financial costs of a national population of Medicare beneficiaries with work-related claims.

2 | METHODS

We accessed two types of deidentified 1999–2016 Medicare data files through the Centers for Medicare and Medicaid Services (CMS) Virtual Research Data Center: Medicare claim files (institutional and noninstitutional provider claims) and Master Beneficiary Summary File (MBSF) base segment.[5–7] From >10 billion Medicare claims, we extracted final action fee-for-service (Medicare Parts A and B) claims for which WC was listed as the primary payer and excluded denied claims.[2,8] Institutional provider claims included five claim types: inpatient, outpatient, skilled nursing facility, home health agency, and hospice claims.[7,8]

Noninstitutional claims consist of carrier claims, which are submitted by noninstitutional providers (e.g., physicians, physician assistants, nurse practitioners), and durable medical equipment (DME) claims for medical equipment that withstands repeated use, serves a medical purpose, is not useful in absence of illness, and is appropriate for home use.[7,8]

Medicare claims can have more than one diagnosis code; to better understand the diagnosis or reason chiefly responsible for the billed services, we used the "principal diagnosis" for all WC primary payer claims.[7] International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes were used through September 2015, and starting in October 2015, CMS transitioned to the Tenth Revision (ICD-10-CM) system.[9] To have consistent coding under the same ICD-CM revision for all data between 1999 and 2016, all ICD-10-CM codes were converted to ICD-9-CM codes as indicated (https://www.icd10data.com/Convert).[9]

To further characterize the WC primary payer claims, we identified distinct inpatient hospitalizations from inpatient claims based on the admission date and summarized the most frequent "admitting diagnosis" (initial diagnosis at admission, which may differ from the principal diagnosis) for hospitalizations.[10] We also identified emergency room (ER) visits from inpatient and outpatient claims and summarized the leading principal diagnosis codes responsible for ER visits.[11] Due to the large number of detailed ICD-9-CM diagnosis codes, we used the first three integers of the ICD-9-CM diagnosis code to describe hospitalization and ER visit diagnoses. To describe the clinical categories of carrier claims and DME claims, the most frequent Berenson–Eggers Type of Service (BETOS) codes listed on these claim types were summarized (https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareFeeforSvcPartsAB/downloads/betosdesccodes.pdf).

To describe the healthcare utilization of the beneficiaries with these work-related claims, analyses were conducted by claim type. For each claim type, the total paid was calculated as the sum of the amounts paid to providers by WC, Medicare, and the beneficiary using technical guidance published by the Chronic Conditions Data Warehouse.[8] The gross domestic product implicit price deflator was used to adjust annual payment amounts using the Bureau of Economic Analysis National Income and Product Accounts Implicit Price Deflator and all payment amounts are expressed in 2019 US dollars (https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey).

Medicare claims for which WC was the primary payer were linked using the "beneficiary identifier" to beneficiary data in the MBSF base segment to obtain demographic and Medicare entitlement data.[6] Demographic (age, sex, race/ethic origin, and state of residence) and entitlement data were collected from a beneficiary's first WC primary payer claim during 1999–2016. For this analysis, only those aged ≥18 years were included. A beneficiary's original reason for Medicare entitlement (age ≥ 65 years; disability insurance benefits; or ESRD or both disability insurance benefits and ESRD) was identified. The current reason for Medicare entitlement at the time of a beneficiary's first WC primary payer claim was also identified as it may differ from the original entitlement reason. When a Medicare beneficiary <65 years of age turns 65, their entitlement continues due to age ≥65 years.

Data were analyzed using SAS Enterprise Guide 7.1 (SAS Institute). Pearson's χ^2 tests compared frequencies between the 2016 Medicare population and WC primary payer Medicare population and were considered significant at $p < 0.05$.[12] The National Institute for Occupational Safety and Health Institutional Review Board determined that no additional human subjects review was required for this research study.

3 | RESULTS

Among >10 billion fee-for-service institutional and noninstitutional Medicare claims from 1999 to 2016, WC was the primary payer for 2,010,200 claims for 330,491 Medicare beneficiaries. These beneficiaries had a mean age of 63.1 years, 45.2% were <65 years of age, 59.9% were male, 84.7% were white, and the top three reported states of residence were New York (11.3%), California (7.5%), and Texas (6.6%; Table 1). The annual number of WC primary payer claims ranged from a low of 25,387 claims (1999) to a high of 273,131 (2010; Figure 1).

The original reason for Medicare enrollment for 40.4% of beneficiaries was age ≥65 years. There was a higher percent of WC primary payer beneficiaries originally enrolled in Medicare due to disability (58.4%) compared with all Medicare fee-for-service enrollees in 2016 (16.0%; $p < 0.05$).[12] The reason for entitlement at the time of their first WC primary payer claim for 180,950 beneficiaries (54.8%) was age ≥65 years. Approximately 58.7% of beneficiaries ($n = 194,067$) had more than one WC primary payer claim: 16.7% had two claims, 9.2% had three claims, 6.1% had four claims, and 26.7% had five or more claims.

Among the 2,010,200 WC primary payer claims during 1999–2016, the most frequently listed principal diagnosis groups were diseases of the musculoskeletal system and connective tissue (19.4%), diseases of the circulatory system (12.9%), symptoms, signs, and ill-defined conditions (12.7%), injury and poisoning (8.9%), and diseases of the respiratory system (6.8%) (Table 1). Of all WC primary payer claims, 94.5% were carrier claims, 4.0% outpatient claims, 1.1% inpatient claims, 0.2% DME claims, 0.1% skilled nursing facility claims, 0.06% home health agency claims, and 0.01% hospice claims (Table 1).

Summarizing ICD-9-CM principal diagnosis codes for the work-related injury or illness of these Medicare beneficiaries most frequently identified claims for diseases of the musculoskeletal system and connective tissue (including common ICD-9-CM codes 724.2 lumbago [pain in the muscles and joints of the lower back] and 719.46 pain in joint, lower leg) followed by diseases of the circulatory system (including common ICD-9-CM codes 401.1 benign essential hypertension and 401.9 unspecified essential hypertension), symptoms, signs, and ill-defined conditions (including common ICD-9-CM codes 786.50 chest pain, unspecified and 786.50 shortness of breath), and injury and poisoning (including common ICD-9-CM codes 840.4 rotator cuff [capsule] and 847 sprains and strains of other and unspecified parts of back) (data not shown).

Of beneficiaries with a WC primary payer claim, 90.6% ($n = 299,482$) had at least one carrier claim. Among all 1,899,025 carrier claims, the top three BETOS codes were office visits-new (BETOS code M1B; 28.9%), hospital visit-subsequent (M2B; 5.4%), and minor

procedures-other (P6C; 4.6%). For the 4208 DME claims, the top three BETOS codes were other DME (D1E; 33.1%), prosthetic/orthotic devices (D1F; 27.6%); and oxygen and supplies (D1C; 20.9%).

The 22,742 inpatient claims represented 22,709 distinct hospitalizations for 17,437 beneficiaries (5.3%). The top three admitting diagnoses for these hospitalizations were other and unspecified disorders of back (ICD-9-CM 724; 6.8%), osteoarthrosis and allied disorders (ICD-9-CM 715; 5.7%), and intervertebral disc disorders (ICD-9-CM 722; 5.4%). There were 23,407 beneficiaries (7.1%) with at least one ER visit, and 29,835 total ER visits. The top three principal diagnoses for these ER visits were other and unspecified disorders of back (ICD-9-CM 724; 7.7%), sprains and strains of other and unspecified parts of back (ICD-9-CM 847; 3.3%), and fracture of neck of femur (ICD-9-CM 820; 2.9%).

From 1999 to 2016, a total of $1.106 billion was paid to providers for the 2,010,200 claims. By claim type, $315,328,709 (28.5% of total) was paid to providers for carrier claims, $132,057,665 (11.9%) for outpatient claims, $632,419,774 (57.2%) for inpatient claims, $2,783,303 (0.3%) for DME claims, $19,930,632 (1.8%) for skilled nursing facility claims, $3,118,194 for home health agency claims (0.3%), and $581,259 (0.1%) for hospice claims. Institutional claims were 5.3% of all claims analyzed but represented over half of the total paid to providers because they include costly claim types such as inpatient hospitalizations and ER visits. Workers' compensation paid $820.6 million (74.2% of the total paid), Medicare paid $251.1 million (22.7%), and beneficiaries paid $34.5 million (3.1%). The average cost of claims per beneficiary was $3347.

4 | DISCUSSION

In this study, we characterized the Medicare beneficiaries, healthcare utilization, and financial costs associated with more than 2 million Medicare claims where WC had primary responsibility for payment. Without complete information on a beneficiary's employment status at the time of their claim or the event leading to their claim, we cannot discern if the claim is for an employed Medicare beneficiary, is related to ongoing medical services following an earlier work-related injury or illness (possibly occurring before Medicare enrollment), or is related to a pre-existing condition that a job made worse.[13] Among all institutional claims, 12,807 (12%) included an ICD-9-CM E-code which is a non-billable code used to identify the first external cause of injury, position, or other adverse effect (https://www.resdac.org/cms-data/variables/first-claim-diagnosis-e-code-ffs). When examined with the principal diagnosis, available E-codes may help provide a more detailed description of the cause of work-related injuries or illnesses, for example, some of the more costly claims (total charges per claim $500,000–$1 million) were for injuries sustained from motor vehicle traffic accidents, explosive accidents, or fire.

Although details on the event qualifying a beneficiary for Medicare due to disability are not available, a disproportionately higher percent of Medicare beneficiaries with a WC primary payer claim (58.4%) were originally entitled to Medicare due to disability compared with all 2016 Medicare fee-for-service beneficiaries (16.0%).[12] Furthermore, disability was the reason for Medicare entitlement for 44.2% of beneficiaries in this study at the time of their

first WC claim indicating a need for surveillance of and tailored workplace interventions for these workers. While Medicare beneficiaries entitled due to disability represent a small subset of the total Medicare population (approximately 15%), inquiring about work-relatedness of injuries or illnesses upon check-in at care centers helps coordinate insurance benefits and payments for this group and is also beneficial for occupational health surveillance and assisting with recovery/disability management upon return to work.[12]

The most frequently identified ICD-9-CM principal diagnosis codes for the work-related injury or illness of these Medicare beneficiaries with a WC primary payer claim were consistent with findings from other studies of workers.[14,15] For example, a 2015 US Bureau of Labor Statistics nonfatal occupational injury and illness survey estimated musculoskeletal disorders, including sprains and strains, accounted for 31% of the total occupational injury and illness cases requiring days away from work.[14] Among working age, Social Security Disability Insurance applicants, mental disorders, musculoskeletal disorders, and heart disease were common diagnoses.[15] However, Medicare beneficiaries with a WC primary payer claim had a significantly higher percent of carrier and inpatient claims and claims with a principal diagnosis group related to diseases of the musculoskeletal system and connective tissue or injury and poisoning ($p < 0.05$).

This study is limited to Medicare beneficiaries with a WC primary payer claim and does not include all work-related claims (e.g., work-related medical claims where a WC claim was not filed, WC claims for those not enrolled in Medicare, or work-related claims for those not covered by WC). While our analysis combines 17 years of Medicare data including $1.106 billion in paid WC claims, it includes only Medicare beneficiary claims, which represent a small portion of all WC claims. For example, in 2017, $31.2 billion was paid out under WC for medical and hospitalization costs and the average medical cost per claim was $22,219.[16] However, this small portion of all WC claims exemplifies the combined short- and long-term costs of workplace injury, potential chronic health conditions from work-related injuries and illnesses, and various parties responsible for claim payments once a worker enrolls in Medicare. The long-term cost saving benefits to various stakeholders of investing in occupational health prevention and intervention strategies to reduce workplace injuries and illnesses could be further studied among these beneficiaries.[17]

Changes in the economy, workforce, and state WC or Medicare legislation may influence claim payments and study results. For example, the decline in annual claim counts and total costs after 2010 is consistent with a decline in WC-covered workers starting in 2008, declines in reported fatal and nonfatal work-related injuries and illnesses, and an overall decline in WC payment to injured workers and medical care providers reflecting impacts from economic recession.[4] Furthermore, in 2007 attention to Medicare Coordination of Benefits Rules increased with the Medicare and Medicaid SCHIP Extension Act of 2007 requiring enforcement of Medicare Secondary Payer rules within 18 months after the act passed.[18] The Strengthening Medicare and Repaying Taxpayers Act of 2012 provided additional direction and guidance when Medicare seeks secondary payer reimbursements and included a statute of limitations for Medicare as a secondary payer actions.[19] WC paid most (74%) of the total paid to providers for these work-related medical claims, although the

annual percentage of the total paid to providers by WC fluctuated between 54% and 90% reflecting changes in Medicare legislation.

This study has some limitations. Medicare claims do not include consistently report information on the work-related event or employment details of a beneficiary. Furthermore, Medicare beneficiaries are primarily ≥65 years of age and this study may not be representative of all WC claims. We reported how much WC, Medicare, and the beneficiary paid the provider for medical services, but lack payment details on reimbursements made or reasons for payment by a payer. Beneficiary payment amounts were not available for home health agency and hospice claims so the amount paid by the beneficiary may be a conservative estimate of the actual amount paid by the beneficiary. Medicare may have made a payment on the claim if, for example, WC only paid part of the claim because it was related to a pre-existing condition made worse by a beneficiary's job.[12] Furthermore, the beneficiary may have made a payment to cover deductibles or coinsurance or in the expectation of reimbursement. An additional limitation of this analysis is that Medicare claims data are collected for billing purposes rather than for public health surveillance.[20]

Work-related claims among a national population of Medicare beneficiaries have not previously been described in epidemiological studies, and this study demonstrates the need to enhance collection and surveillance of work-related medical claims among Americans to inform occupational health research and workplace interventions. Universal standards for indicating work-relatedness of claims and including the non-billable ICD external cause of injury codes (E-codes) on WC primary payer claims would provide information to inform workplace injury and illness prevention strategies. Specifically, our analysis indicates that WC claims occur in the Medicare population, including in those <65 enrolled in Medicare due to disability and suggests most WC costs and claims occur in those not enrolled in Medicare. Results highlight work-related illness or injury claims from older Americans that may represent claims from long-term employment and provide national estimates of WC payments and claims for beneficiaries enrolled in both Medicare and WC, which are for similar diagnoses as all WC claims in the United States.

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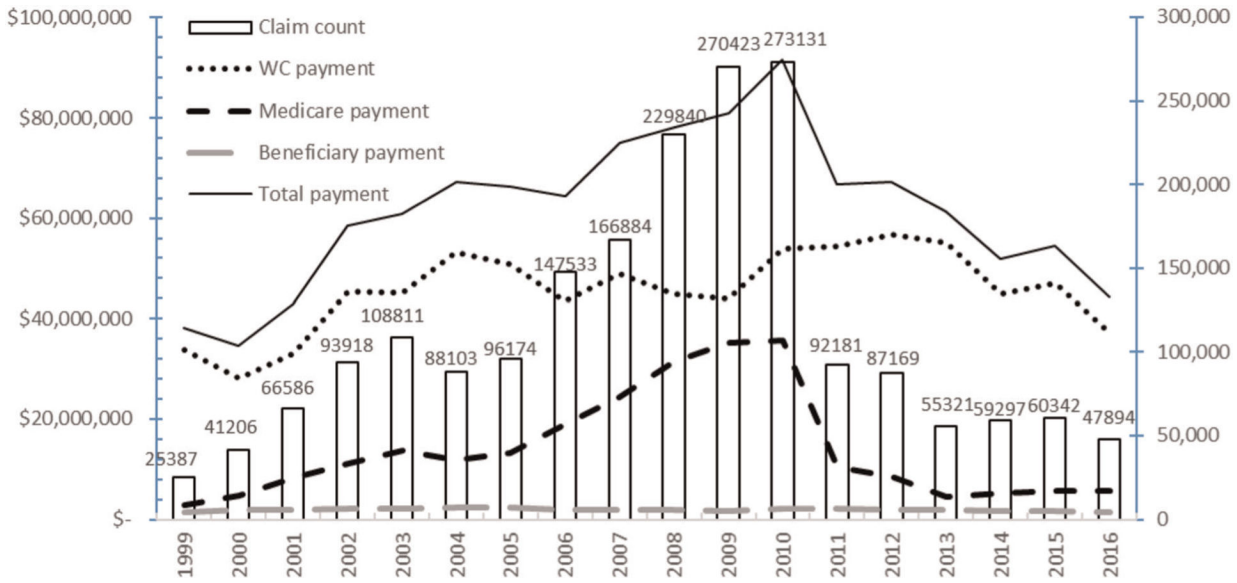

FIGURE 1.

Total annual amount paid to the provider; amount paid annually by WC, Medicare, and the beneficiary; and annual claim count.

Note: Amount paid to the provider by the beneficiary was not available in Medicare claims data for hospice and home health agency claims. There were 21 claims where the first day of the claim billing statement was in 1998 but services rendered on these claims covered multiple days that spanned into 1999. These 21 claims are included in 1999 claim counts

TABLE 1

Demographic factors and Medicare claims of Medicare beneficiaries with a Workers' Compensation insurance (WC) primary payer claim and 2016 Medicare beneficiaries

Demographic factors	**1999–2016 WC primary payer beneficiaries (*N* = 330,387)[a] (%)**	**2016 Medicare original enrollment beneficiaries (*N* = 38,610,384)**
Age group (years)		
18–44	26,027 (7.9)	1,507,958 (3.9)
45–64	123,218 (37.3)	4,896,638 (12.7)
65–74	131,787 (39.9)	18,422,814 (47.7)
75–84	41,926 (12.7)	9,241,719 (23.9)
85+	7429 (2.3)	4,539,670 (11.8)
Sex		
Male	198,049 (59.9)	17,967,676 (46.5)
Female	132,338 (40.1)	20,642,708 (53.5)
Race/ethnic origin		
White	279,925 (84.7)	29,879,444 (77.4)
Black	33,718 (10.2)	3,777,833 (9.8)
Other[b]	15,454 (4.7)	4,372,471 (11.3)
Unknown	1290 (0.4)	580,636 (1.5)
State of residence		
New York	37,223 (11.3)	2,139,045 (5.5)
California	24,889 (7.5)	3,420,954 (8.9)
Texas	21,734 (6.6)	2,512,097 (6.5)
Pennsylvania	21,420 (6.5)	1,548,833 (4.0)
Other states	225,121(68.1)	28,989,455 (75.1)
Original entitlement reason		
Age ≥ 65 years	133,506 (40.4)	32,005,572 (82.9)
Disability	192,907 (58.4)	6,177,008 (16.0)
End-stage renal disease	3974 (1.2)	427,804 (1.1)
Current entitlement reason		
Age ≥ 65 years	180,950 (54.8)	-

Demographic factors	**1999–2016 WC primary payer beneficiaries (*N* = 330,387)[a] (%)**	**2016 Medicare original enrollment beneficiaries (*N* = 38,610,384)**
Disability	146,047 (44.2)	-
End-stage renal disease	3390 (1.0)	-
WC primary payer medicare claims	*N* = 2,010,200 (%)	*N* = 1,178,400,202 (%)
Claim type		
Carrier	1,899,025 (94.5)	914,531,506 (77.6)
Outpatient	80,752 (4.0)	172,696,681 (14.7)
Inpatient	22,742 (1.1)	11,267,140 (1.0)
DME	4208 (0.2)	63,480,528 (5.4)
Skilled nursing facility	2202 (0.1)	5,144,434 (0.4)
Home health agency	1114 (0.06)	6,694,805 (0.6)
Hospice	157 (0.01)	4,585,108 (0.4)
ICD-9-CM principal diagnosis groups		
Diseases of the musculoskeletal system and connective tissue (ICD-9-CM 710–739)	388,806 (19.4)	161,768,640 (13.7)
Diseases of the circulatory system (ICD-9-CM 390–459)	258,064 (12.9)	152,958,597 (13.0)
Symptoms, signs, and ill-defined conditions[c] (ICD-9-CM 780–799)	254,702 (12.7)	152,480,585 (12.9)
Injury and poisoning[d] (ICD-9-CM 800–999)	178,438 (8.9)	42,594,289 (3.6)
Diseases of the respiratory system (ICD-9-CM 460–519)	136,185 (6.8)	73,928,264 (6.3%)
All other principal diagnosis groups	794,005 (39.5)	594,667,736 (50.5)

Abbreviation: DME, durable medical equipment.

[a] Demographic characteristics missing for 104 beneficiaries for the year of their first WC claim.

[b] Other race/ethnic origin included Asian, Hispanic, North American Native, and other.

[c] Corresponding ICD-10-CM category titled “Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified.”

[d] Corresponding ICD-10-CM category titled “Injury, poisoning, and certain other consequence of external causes.”