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Health Conditions in Wyoming Miners as Reflected in Wyoming Miner's Hospital Insurance Claims, 2014–2023

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Clinical Significance

Most occupational research has focused on diseases associated with known occupational hazards, but there is an ongoing shift toward the role of work in overall health status and well-being. Claims data can be used to identify health conditions that impact worker health status and well-being to guide occupational health programming.

Abstract

Objectives

This study examines the prevalence of health conditions for which miners enrolled in a state-funded insurance program sought care.

Methods

We conducted a retrospective analysis of claims data submitted to the Wyoming Miner's Hospital during 2014–2023. Using International Classification of Diseases codes and identifiers unique to each miner, we calculated the number of unique miners with claims submitted for major disease categories and common diagnoses within each category.

Results

Musculoskeletal disorders (MSDs) and diseases of the endocrine and cardiovascular systems were the most prevalent conditions, affecting 72.7%, 34.2%, and 31.1% of enrolled miners, respectively.

Conclusions

This population of miners has a substantial burden of health conditions that can adversely impact health and well-being. Mine safety and health professionals can use analyses of claims data to identify priorities for improving miner health and well-being.

Keywords

Miners; health conditions; musculoskeletal disorders; well-being

JOEM Learning Outcomes

- Understand the prevalence of common health conditions among a population of miners.
- Understand the association between common health conditions and worker well-being.

Introduction

Understanding the burden of chronic health conditions among miners is an important step in implementing programs to improve their health and safety. Increasingly, work is understood as a social determinant of health.[1-3] Evidence is growing that risk factors in the workplace, such as shift work, excessive work hours, and negative interactions with colleagues and managers, contribute to various adverse health conditions, including those that were previously thought to be unrelated to work.[3] Collins et al. demonstrated that chronic health conditions cost an estimated 11% of total labor costs and were associated with both absenteeism and presenteeism.[4] Worker health status also impacts job performance and safety. Workers with chronic health conditions have a higher risk of work-related injuries.[5,6]

Understanding the prevalence of chronic health conditions among miners is important to: 1) support the needs of the mining workforce, and 2) implement and evaluate interventions that decrease the impact of work-related risk factors on health and safety. Programs to improve miner health and well-being can focus on both work and non-work factors. A better understanding of miner health status may facilitate mining community partners to prioritize research and health programs on occupational and non-occupational risk factors for conditions that have the greatest impact on miner health and well-being.

Information on non-injurious health conditions among miners is less readily available than that of work-related injuries. National health surveys do not always include information on industry and occupation to specifically identify miners. In surveys that do include industry and occupation, miners are a small proportion of the survey population, and the low sample size makes it difficult

to obtain precise estimates of the prevalence of health conditions. Studies that are available have generally demonstrated that miners experience some health conditions to a greater extent than other workers. For example, studies have demonstrated a higher prevalence of hearing loss,[7,8] hypertension,[9] and musculoskeletal pain[9] among miners compared with workers in other industries. Additionally, miners have the highest rates of suicide among all workers,[10] indicating that efforts to focus on miner well-being can be improved in the mining community.

Because no existing single data source provides a comprehensive view of miner health conditions, researchers must use a variety of data sources to assemble a picture of miner health. Claims data is one data source that can be used to identify health conditions for which workers receive care, and researchers have used claims data to study occupational diseases. Bushnell et al. used claims data from a health care insurer to compare rates of occupational diseases between industries.[11] Claims data have also been included in occupational health surveillance systems or other analyses to evaluate occupational diseases such as musculoskeletal disorders and occupational lung disease.[12-16] To our knowledge, claims data have not been used to evaluate general health conditions that are not solely related to occupation among miners. The goal of this study was to examine the prevalence of health conditions for which miners enrolled in the Wyoming Miners Hospital sought care during 2014–2023.

Methods

A retrospective analysis of claims data submitted to the Wyoming Miner's Hospital (WMH) during 2014–2023 was conducted. WMH is a state-funded program providing enrolled Wyoming miners with financial assistance for pre-specified health conditions.[17] Rather than providing direct medical

care, WMH is a payer of last resort, paying up to $5,000 annually per miner for specified mining-related cardiovascular, pulmonary, musculoskeletal, and hearing conditions eligible for reimbursement. Many mine workers are covered by other systems (e.g., primary health insurance, Medicare). Medical providers can submit claims to the WMH for enrolled miners regardless of whether health conditions are eligible for reimbursement. As a result, both paid and unpaid claims are included in the dataset. Claims include demographic information; International Classification of Diseases, Ninth or Tenth Revision, Clinical Modification diagnosis codes (ICD-10-CM, ICD-9-CM); and total medical expenditures.

All claims data were de-identified prior to transmission to researchers at the National Institute for Occupational Health and Safety (NIOSH). A written data use agreement between NIOSH and the WMH Board explicitly stated how data were to be protected and reported. Each miner was assigned a code by a third-party administrator that was used as a unique identification number for longitudinal analysis. NIOSH had no access to names or other personally identifiable information. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[1]

Study Population

Miners aged ≥18 years who were enrolled in WMH during 2014–2023 were included. Eligibility requirements for enrollment were determined by the WMH Board. Prior to July 2018, eligibility requirements were as follows: 1) Mine work within Wyoming for one year, or 2) Mine work in a contiguous state for one year while residing in Wyoming. After June 2018, eligibility requirements

[1] See e.g., 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq.

changed to the following: 1) At least 10 cumulative years of mine work while living in Wyoming, or 2) Inability to continue working as a miner because of a work-related injury at a mine in Wyoming or contiguous state, and 3) Current Wyoming resident.

Health conditions

Health conditions were identified by ICD-CM diagnosis codes. Claims occurring during 2014–2016 used ICD-9-CM, whereas claims occurring during 2016–2023 used ICD-10-CM. The 2016 claims contained ICD-9-CM or ICD-10-CM codes. We used the CDC general equivalence mapping (GEM) tool[18] to match diagnoses codes between ICD-9 and ICD-10 coding schemes.

Diagnosis codes were first grouped into major health categories that were based on ICD-CM chapters (e.g., cardiovascular, pulmonary).[19,20] Some ICD-9-CM diagnosis codes moved into different major categories with the conversion to ICD-10-CM. However, for our analysis, we maintained individual ICD-9-CM codes in whichever major category that they were assigned to within ICD-9-CM, and we maintained individual ICD-10-CM codes in whichever major category to which they were assigned within ICD-10-CM. The only exception was the ICD-9-CM major category of diseases of the nervous system and sense organs. Because ICD-10-CM separated diseases of the eyes and ears into a different major category from diseases of the nervous system, we included the ICD-9-CM codes for diseases of the eyes and ears separately as well (see Appendix A, http://links.lww.com/JOM/B918). Appendix B (http://links.lww.com/JOM/B919) lists the ICD-9-CM codes that would be classified in a different ICD-10-CM category from the ICD-9-CM category to which they were originally classified.

Within each major category, we identified the diagnosis code or codes for common health conditions as well as diagnosis codes of particular occupational health conditions of interest. To limit misclassification, we completed one-to-one conversions between ICD-9-CM and ICD-10-CM for each of these more specific health conditions. Appendix A (http://links.lww.com/JOM/B918) lists the ICD-9-CM and ICD-10-CM diagnosis codes within each major category and the common health and occupational health conditions.

Denominator data

We obtained the total number of enrolled miners in the WMH per quarter during 2014–2023. Because the total number of enrolled miners fluctuated each quarter (N=6,771–8,191), the highest sample population within the 10-year period (N=8,191) was used as the denominator to calculate period prevalence. For analyses of data by year, we used the number of enrolled miners for the final quarter of each year.

Data analysis

We conducted a descriptive analysis of WMH data, calculating total number of miners and prevalence rates for the period 2014–2023. Miners were designated as having been seen for a selected health condition or major health category if the corresponding ICD diagnosis code was listed among any one of up to six diagnoses codes provided on each claim. To be considered prevalent for a selected health condition or major health category, the diagnosis codes were required to be present on two outpatient claims or one inpatient claim during the 10-year period. Total frequency within a major health category was calculated by summing the total number of miners with at least two identical outpatient or one inpatient ICD diagnosis code within that major

category. The corresponding prevalence rate for a major category was calculated by dividing the total number of miners in that category by the highest number of enrolled miners during the study period (N=8,191). For the more specific health conditions, we summed the total number of miners with at least two outpatient or one inpatient codes for the corresponding diagnosis and calculated prevalence using a denominator of N=8,191. We conducted similar analyses for major categories and health conditions by year, using the final quarterly enrollment each year as denominator. The median number of claims per miner per year was calculated for major health categories, accounting for the total number of years each miner was actively using WMH services from year of first claim, but these results showed little variation and were not reported (i.e., 1–2 claims per miner per year for most categories).

Results

Of 8,191 enrolled miners during the study period, 8,083 miners had at least one submitted claim in any of the years during 2014–2023. Not all claims were paid by WMH. The number of enrolled miners with paid claims ranged from 2,444 (29.8%) to 3,373 (41.2%) annually. Demographic information was available for all but 108 of miners with claims (98.7%, Table 1). Of those, 87.0% (6,678) were male. The most common age group was 50–65 years (43.5%).

Table 2 presents the number of miners within each major health category. Musculoskeletal disorders (MSDs) were the most common category, affecting 5,954 (72.7%) of enrolled miners, with a total of 112,304 claims. Back and chronic soft tissue disorders, selected health conditions within the MSD major health category, were diagnosed in 4,679 (57.1%) and 4,098 (50%) of all enrolled miners, respectively. Following MSDs, diseases of the endocrine and cardiovascular

systems were the second and third most common major health categories, experienced by 34.2% and 31.1% of miners, respectively. Within the cardiovascular category, hypertension was most common, diagnosed in 1,981 (24.2%) of enrolled miners. Other notable health categories and health conditions with prevalence >10% of enrolled miners include hearing loss (28.4%), arthritis (21.7%), acute musculoskeletal injuries MSDs (21.7%), high cholesterol (19.6%), obstructive sleep apnea (13.8%), gastroesophageal reflux disease (12.9%), and allergic rhinitis (10.2%).

The percentage of miners diagnosed with most major health categories and health conditions did not substantially change by year. However, hearing loss increased slightly over time, with 8.7% of miners having a diagnosis in 2014 and 10.5% of miners having a diagnosis in 2023. Musculoskeletal disorders appeared to decrease slightly over time, with 33.8% of miners having a diagnosis in 2014 and 27.7% of miners having a diagnosis in 2023.

Discussion

Because WMH receives claims for enrolled miners regardless of whether conditions are eligible for reimbursement, these data provide valuable insight on the general health conditions for which this population of miners receives care. This analysis enables us to evaluate the prevalence of health conditions that affect well-being and quality of life in this population.

Health is an important component of worker well-being and quality of life. Work is a contributing factor to health status, but many health conditions in workers are not caused solely by work hazards. Rather, health status of workers reflects a combination of factors including but not limited to work, genetics, demographics, socioeconomic status, and lived environments. Occupational

health has typically focused on conditions associated with known occupational hazards, but there is an increasing focus toward the role of workplaces in well-being and quality of life.

The definition of worker well-being is "an integrative concept that characterizes quality of life with respect to an individual's health and work-related environmental, organizational, and psychosocial factors. Well-being is the experience of positive perceptions and the presence of constructive conditions at work and beyond that enables workers to thrive and achieve their full potential."[21] Worker well-being includes factors such as job satisfaction, engagement at work, positive emotions, satisfying physical and mental health, and good social relationships.[21] Studies have demonstrated an association between well-being, health, and job performance. Well-being is associated with improved worker health and productivity.[22,23] Improving workplace conditions can improve worker well-being.[24,25] Conversely, studies have demonstrated higher health care costs with lower well-being.[26,27]

Health and safety initiatives within the mining industry may be bolstered by including well-being and quality of life. To do so, occupational health and safety specialists could consider expanding the definition of health and safety to include factors related to well-being. Work-related determinants of well-being include workplace management and organization, the extent to which employees have job control, demands (i.e., psychological) placed on workers, effort versus reward, prevention and management of health problems, ergonomics, work-life balance, and occupational safety and health.[28] As employers begin to adapt workplace conditions and organizational structure and management to respond to worker needs and improve well-being, worker health status is an important factor to include. Analyses of health claims can provide employers with information to

increase awareness of emerging or high priority health conditions, monitor health conditions over time, and inform workplace interventions to improve health and well-being. Our analysis demonstrates that this sample of Wyoming miners has a high prevalence of several diseases that can affect well-being and health-related quality of life.

Musculoskeletal disorders (MSDs) are the most common major health category in our population, with 72.7% of enrolled miners having at least one MSD diagnosis. Other studies have also shown a high prevalence of MSDs among miners and other workers. A study using National Health Interview Survey (NHIS) data found that approximately 26% of all U.S. workers reported low back pain.[29] Using the same survey data, researchers found that approximately 33%, 15%, 16%, and 38% of miners reported low back pain, leg pain related to low back pain, neck pain, and joint pain, respectively.[30] In our study, which used health provider diagnoses rather than self-report, 57% of the miners enrolled in WMH had a back disorder. Although a larger proportion of enrolled WMH miners had back disorders, our study population comprises miners who chose to enroll in WMH, whereas NHIS comprises a random sample of the general population and is therefore more representative of miners in general. The high prevalence of MSDs in multiple studies, including ours, is an important finding, because workers with MSDs have decreased quality of life.[31,32] Indeed, two common MSDs in our analysis are the most common causes of disability in the U.S. Arthritis is the most common disability nationwide, followed by back and spine disorders.[33]

Similar to MSDs, hearing loss is another common diagnosis in this population. In our analysis, 28.4% of enrolled miners have a diagnosis of hearing loss. Other studies have also demonstrated a high prevalence of hearing loss among current and retired miners. An analysis of the NIOSH

Occupational Hearing Loss Surveillance Project demonstrated that miners had the highest prevalence of hearing loss among workers exposed to noise in all industries, with 17% of miners having hearing loss.[34] Approximately 18% of retired miners self-reported substantial hearing loss in a study using national survey data.[35] Differences in population and methods between studies likely contribute to differences in prevalence of hearing loss in our study compared with other studies. The NIOSH Occupational Hearing Loss Surveillance Project uses audiograms to diagnose hearing loss, some studies use self-reported hearing loss, and our study uses medical diagnosis codes. Occupational hearing loss is predominantly caused by noise exposure,[36] and the mining industry has the highest self-reported prevalence of occupational noise exposure, with a prevalence of approximately 61%.[37] Hearing loss is associated with a lower quality of life,[38] and a study of noise-exposed workers using disability-adjusted life years to estimate impact on quality of life found that approximately 2.5 healthy years were lost annually per 1,000 noise-exposed workers.[34]

Not only does noise exposure cause hearing loss, it is also associated with an elevated prevalence of health conditions such as hypertension and cardiovascular disease (CVD).[37] CVD, including heart attacks and heart failure, not only impacts mortality but is also associated with decreased quality of life.[39] Persons with CVD are more likely to have depression, which can contribute to decreased quality of life.[40] Persons with both CVD and depression have higher mortality rates,[40] and quality of life has been shown to predict mortality after cardiac events.[41]

Although our population does not have a high prevalence of CVD, it does have a high prevalence of risk factors for CVD. The most common of these risk factors is hypertension, which is present in about 24% of enrolled miners. Studies using national survey data have demonstrated that miners

have a higher prevalence of hypertension than workers in other occupations, with 27.9% of active miners and 67% of retired miners reporting hypertension.[30,35] The high prevalence of hypertension among miners is an important finding because hypertension is one of the leading risk factors for multiple diseases, including CVD. Work-related conditions such as long working hours, night shifts, and high job stress are associated with increased risk of hypertension.[42] Efforts to mitigate these factors such as raising miners' awareness of blood pressure and helping them manage their hypertension could improve their health. These improvements may also reduce the risk of conditions like CVD, enhancing their overall quality of life.

Similar to hypertension, diabetes is a health condition that is a risk factor for other conditions such as CVD, and approximately 9% of enrolled miners have a diagnosis of diabetes. Similarly, 9.3% of Wyoming adults were estimated to have diabetes according to the 2022 Wyoming Behavioral Risk Factor Surveillance System (BRFSS).[43] Diabetes impacts quality of life directly as well as indirectly through its impact on other diseases. Diabetes complications with the greatest impact on quality of life are amputation, stroke, blindness, kidney failure, heart failure, and heart attack.[44] Even in the absence of complications, diabetes negatively impacts quality of life in multiple domains, including enjoyment of food, work and family life, physical and social limitations, and limitations in traveling and leisure activities.[45] Because diabetes affects various organ systems, appropriate care includes control of multiple factors such as blood sugar, cholesterol, and blood pressure. Patients with diabetes report decreased quality of life due to the combination of treatments and lifestyle changes required to control these factors, and the effect of comprehensive diabetes treatment on quality of life is similar to that of certain diabetes complications like angina, diabetic neuropathy, and diabetic kidney disease.[46] Not only does diabetes impact quality of life,

but it also impacts work productivity. In one study of adult employees aged ≤64 years, employees with type II diabetes had over four excess days of work absences and double the medical costs compared with employees without diabetes.[47] Efforts to prevent or better manage diabetes among miners would likely benefit both miners and mining companies.

Our analysis found additional diagnoses that affect quality of life. Approximately 7% of enrolled miners have a diagnosis of depression or anxiety, and almost 14% have any mental health diagnosis. According to the Wyoming BRFSS, in 2022 an estimated 22.1% of Wyoming adults reported that they had ever been told by a healthcare professional that they had a depressive disorder. Although our results demonstrate a lower prevalence of depression or anxiety, it is important to remember that BRFSS asks if someone has ever had a diagnosis, not just currently, and thus it is not possible to directly compare results. Nevertheless, these results demonstrate that mental health is a challenge for miners.[43] Mental health problems cause substantial impact on workers' lives both at home and at work. At work, depression is associated with both absenteeism and presenteeism.[48] Quality of life is substantially impacted among persons with mental health disorders. For example, one study demonstrated that persons with mental health disorders experienced greater impairment than persons with pain, diabetes, and hypertension.[49] In fact, persons with mental health disorders reported 17.6 unhealthy days per month compared with 12.2 unhealthy days for back or neck problems and 12.3 unhealthy days for diabetes.[49]

Additionally, some of the most common diagnoses among our population within the neurologic, pulmonary, genitourinary, and gastrointestinal disease categories are sleep apnea, allergic rhinitis, benign prostatic hyperplasia (BPH), and gastroesophageal reflux disease (GERD). Studies have

demonstrated that each of these diseases impacts quality of life.[50–58] For instance, sleep apnea negatively impacts neurocognitive performance,[50] mood,[51] and job performance,[52] and quality of life improved after sleep apnea treatment.[53]

Although this analysis provides useful information on the general health status of enrolled miners, several limitations restrict the ability to generalize findings to a larger population of miners. The proportion of total miners in Wyoming who are eligible or enrolled in the program is unclear, and differences in health status may exist between miners who decide to enroll and those who do not enroll. Additionally, eligibility requirements for the program changed in 2018, and the number of current or former miners in Wyoming who do not meet eligibility criteria is unknown. Another limitation is the lack of a comparison group. The dataset only includes enrolled miners, and we do not have a comparison group of similar workers to analyze whether certain health conditions are diagnosed more often in miners. Furthermore, we are unable to ascertain how often enrolled miners submit claims to WMH; for instance, if their primary insurance covers all costs, they may not submit claims to WMH, and thus we cannot know the true prevalence of these conditions within the enrolled miner population. Unlike workers' compensation data, these claims cannot be assumed to be work related, because detailed information on events surrounding diagnoses as well as current or past work history is not available. Furthermore, the data do not include mine commodity, so differences in health status between miners of different commodities cannot be analyzed. Predominant commodities mined in Wyoming include coal, trona, bentonite, and uranium, as well as sand and stone products that are used for building projects.[59] Various health effects can arise from exposure to each of these commodities, but these differences cannot be assessed using our dataset. An additional limitation is the change from ICD-9-CM to ICD-10-CM during the study

period. While there could be some misclassification bias based on ICD-9-CM codes that would have been classified in a different ICD-10-CM major category (Appendix B, http://links.lww.com/JOM/B919), only 0.45% of individual claims would be misclassified and would therefore be unlikely to affect our results.

Additionally, no information is available on risk factors or other clinical data related to diagnoses. Age at initial diagnosis is unavailable, and we thus cannot ascertain early onset health conditions. Inaccuracies or inconsistencies in coding (i.e., different diagnosis codes for the same clinical diagnosis) may affect the prevalence of health conditions. Furthermore, age- and sex-related denominator data are not available, and thus we cannot compare distributions by age and sex. Fewer claims were submitted for miners aged ≥65 years for unclear reasons, when we would expect greater numbers of claims in this population, although Medicare eligibility may play a part. The transition from ICD-9-CM to ICD-10-CM could have introduced some inaccuracies within categories of health conditions. And finally, the number of enrolled miners changed throughout the study period. We chose to use the highest quarterly enrollment as our denominator. If we had chosen the lowest quarterly enrollment (i.e., 6,771), our estimates of proportion of miners with each health conditions would increase. For instance, the proportion of enrolled miners with back disorders (69.1%), chronic soft tissue disorders (60.5%), arthritis (26.2%), high cholesterol (23.7%), diabetes (11.0%), hypertension (29.3%), chronic obstructive pulmonary disease (7.3%), and obstructive sleep apnea (16.7%) would all increase.

Conclusion

Our findings demonstrate that this population of miners has health conditions that can adversely impact quality of life and well-being. These findings provide useful information on the burden of disease among this sample of Wyoming miners and can be used in conjunction with other data sources to provide a more comprehensive view of miner health status. Analyses such as these allow occupational and public health practitioners, researchers, and industry partners to identify priorities for prevention and interventions and research to improve miner health and well-being. As occupational safety and health expands its scope from traditional hazards and occupational diseases to a broader range of conditions, we have a greater chance to positively impact miner health and well-being.

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Table 1. Total number of miners by age and sex

Demographic variables	Number of miners N=8,083* (%)
Sex	
Male	6,678 (87.0)
Female	999 (13.0)
Age** (years)	
18–29	284 (3.7)
30–49	2,333 (30.4)
50–64	3,343 (43.5)
≥65	1,725 (22.5)

*Demographic information not available on all miners with claims
**Age category based on age when first claim in dataset was submitted

Table 2. Number of miners with at least one claim within major health categories and selected health conditions

Major Health Category and Selected Health Condition*	Number of miners N=8,191 (%)
Musculoskeletal disorders	**5,954 (72.7)**
Back	4,679 (57.1)
Chronic soft tissue	4,098 (50.0)
Arthritis	1,776 (21.7)
Acute injuries	1,779 (21.7)
Endocrine, nutritional, and metabolic	**2,799 (34.2)**
High cholesterol	1,608 (19.6)
Diabetes	744 (9.1)
Cardiovascular system	**2,549 (31.1)**
Hypertension	1,981 (24.2)
Ischemic heart disease	759 (9.3)
Atrial fibrillation/flutter	295 (3.6)
Cardiomyopathy and heart failure	288 (3.5)
Cerebrovascular disease	235 (2.9)
Pulmonary system	**2,507 (30.6)**
Rhinitis (allergic, vasomotor)	838 (10.2)
Chronic obstructive pulmonary disease	496 (6.1)
Asthma	384 (4.7)
Pneumonia and influenza	384 (4.7)
Pneumoconiosis	54 (0.7)
Nervous system	**2,374 (28.9)**
Obstructive sleep apnea	1,132 (13.8)
Carpal tunnel syndrome	511 (6.2)
Cervical and lumbosacral root disorders	224 (2.7)
Hearing loss	**2,324 (28.4)**
Digestive system	**2,192 (26.8)**
Gastroesophageal reflux disease	1,055 (12.9)
Genitourinary system	**1,577 (19.3)**
Benign prostatic hyperplasia (BPH)	507 (6.2)
Urinary tract infections (UTI)	245 (3.0)
Kidney stones	200 (2.4)
Skin	**1,310 (16.0)**
Contact dermatitis	69 (0.8)
Mental, behavioral and neurodevelopmental	**1,131 (13.8)**
Depression or anxiety	591 (7.2)
Neoplasms	**1,119 (13.7)**
Infectious diseases	**1,000 (12.2)**
Ear (except hearing loss)	**739 (9.0)**
Blood and blood-forming organs	**672 (8.2)**
Eye and adnexa	**438 (5.3)**

***See Appendix A for conditions included in each category; major health categories in bold.**

APPENDIX A

International Classification of Diseases, Ninth and Tenth Revisions, Clinical Modification (ICD-9-CM and ICD-10-CM) diagnosis codes for major health categories and selected health conditions

Major health category	Health condition	ICD-9-CM Code	ICD-10-CM-Code
Musculoskeletal disorders		710-739, 800-848	M00-M99, R25-R26, R29, S02, S06, S12, S14, S22, S24, S32, S34, S42, S52, S62, S72, S82, S92 D481, T07, T14, S01, S03, S11, S13, S21, S23, S29, S31, S33, S41, S43, S46, S51, S53, S56, S61, S63, S66, S71, S73, S76, S81, S83, S86, S91, S93, S96, T03
	Back disorders (spondylosis, non-inflammatory spondylopathies, disc disorders, dorsopathies, and back pain)	721-724	M47-M49, M50-M54
	Chronic soft tissue disorders (disorders or patella and derangements of knee; synovitis and disorders of synovia and tendons; soft tissue disorders from overuse; bursopathies; shoulder lesions; enthesopathies)	717-719, 726-727, 729	M22-M25, M65.2-M65.9, M67, M70, M71.2-M71.9, M75-M79
	Arthritis	715	M15-M19
	Acute muscle/joint/ligament/tendon soft tissue injuries (i.e., dislocations, sprains, acute muscle and tendon injuries; not	830-848	S03, S13, S16, S23, S33, S43, S46, S53, S56, S63, S66, S73, S76, S83, S86, S93, S96, T03

	including acute nerve or blood vessel injuries)		
Endocrine, nutritional, and metabolic diseases		240.0-279.9	E00-E89
	High cholesterol	272	E78.00
	Diabetes (all types)	250	E08-E13
Cardiovascular conditions		390-459	I00-I87, G45
	Hypertension	401-405	I10-I15
	Ischemic heart disease	410-414	I20-I25
	Atrial fibrillation/flutter	427.3	I48
	Cardiomyopathy and heart failure	425, 428	I42-I43, I50
	Cerebrovascular disease	430-438	I60-I69, G45
Pulmonary conditions		460-519	J00-J99
	Allergic and vasomotor rhinitis, chronic rhinitis, nasopharyngitis/pharyngitis, chronic sinusitis	472-473, 477	J30-J32
	Chronic obstructive pulmonary disorder (COPD)	491-492, 496	J41-J44
	Asthma	493	J45
	Pneumonia and influenza	480-488	J09-J18
	Pneumoconiosis and respiratory conditions from external agents	495, 500-508	J60-J70
Diseases of nervous system		320-389	G00-G99
	Obstructive sleep apnea	327.23	G47.33
	Carpal tunnel syndrome	354.0	G56
	Cervical and lumbosacral root disorders	724.4	G54.2
Hearing loss		388.1, 389	H83.3, H91

Diseases of the digestive system		520-579	K00-K95
	Gastroesophageal reflux disease	530.81	K21-K21.9
Diseases of genitourinary system		580-629	N00-N99
	Benign prostatic hyperplasia (BPH)	600.00, 600.01, 600.10, 600.11, 600.20, 600.21, 600.3, 600.9	N40
	Urinary tract infections (UTI)	599.0	N39
	Kidney stones	592.0, 592.1, 592.9	N20
Diseases of skin		680-709	L00-L99
	Contact dermatitis	692.9	L23.9
Mental, behavioral, and neurodevelopmental disorders		290-319	F00-F99
	Anxiety or depression	300.00-300.10, 311, 296.20-296.36	F32-34, F41
Neoplasms		140-239	C00-D49
Infectious diseases		001-139	A00-B99
Diseases of ear other than hearing loss		380-389 except 388.10-388.12, 389	H60-H95 except H83.3, H91
Diseases of blood and blood-forming organs		280-289	D50-D89
Diseases of eye and adnexa		360-379	H00-H59

APPENDIX B

International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes that would be categorized differently in ICD-9-CM and International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)

ICD-9-CM Code	Diagnosis Corresponding to ICD-9-CM Code	ICD-9-CM Category	ICD-10-CM Code(s) Corresponding to Original ICD-9-CM Code	ICD-10-CM Category
135	Sarcoidosis	Infectious and parasitic diseases	D86.9	Blood and blood forming organs, and certain disorders involving immune mechanism
136.1	Behcet's syndrome	Infectious and parasitic diseases	M35.2	Musculoskeletal system and connective tissue
237.71	Neurofibromatosis Type I	Neoplasms	Q85.01	Congenital malformations
273.1	Monoclonal gammopathy	Endocrine, nutritional and metabolic diseases, and immunity disorders	D47.2	Blood and blood forming organs, and certain disorders involving immune mechanism
274	Gout	Endocrine, nutritional and metabolic diseases, and immunity disorders		Musculoskeletal system and connective tissue
274.01	Idiopathic gout	Endocrine, nutritional and metabolic diseases, and immunity disorders	M10.00	Musculoskeletal system and connective tissue
274.02	Chronic gout, unspecified	Endocrine, nutritional and metabolic diseases, and immunity disorders	M1A.9XX0	Musculoskeletal system and connective tissue
274.03	Chronic gout	Endocrine, nutritional and metabolic diseases, and immunity disorders	M1A.00X1 or M1A.20X1 or M1A.30X1 or M1A.40X1 or M1A.9XX1	Musculoskeletal system and connective tissue

274.11	Uric acid nephrolithiasis	Endocrine, nutritional and metabolic diseases, and immunity disorders	N20.0	Genitourinary system
274.89	Other secondary gout	Endocrine, nutritional and metabolic diseases, and immunity disorders	M10.40	Musculoskeletal system and connective tissue
274.9	Gout, unspecified	Endocrine, nutritional and metabolic diseases, and immunity disorders	M10.9	Musculoskeletal system and connective tissue
279	Diseases of immune mechanisms	Endocrine, nutritional and metabolic diseases, and immunity disorders		Blood and blood forming organs, and certain disorders involving immune mechanism
279.06	Common variable immunodeficiency	Endocrine, nutritional and metabolic diseases, and immunity disorders	D83.1	Blood and blood forming organs, and certain disorders involving immune mechanism
279.3	Immunodeficiency, unspecified	Endocrine, nutritional and metabolic diseases, and immunity disorders	D84.9	Blood and blood forming organs, and certain disorders involving immune mechanism
279.49	Other disorders involving immune mechanism	Endocrine, nutritional and metabolic diseases, and immunity disorders	D89.89	Blood and blood forming organs, and certain disorders involving immune mechanism
279.8	Immune mechanism disease, not elsewhere classified	Endocrine, nutritional and metabolic diseases, and immunity disorders	D84.1, D89.4, D89.89	Blood and blood forming organs, and certain disorders involving immune mechanism
289.2	Nonspecific mesenteric lymphadenitis	Blood and blood forming organs	I88.0	Circulatory system
289.3	Nonspecific lymphadenitis, unspecified	Blood and blood forming organs	I88.9	Circulatory system
307.81	Tension headache	Mental disorders	G44.209	Nervous system

357.2	Neuropathy in diabetes	Nervous system and sense organs	E08.42, E09.42, E10.42, E11.42, E13.42	Endocrine, nutritional and metabolic diseases
435.9	Transient ischemic attack	Circulatory system	G45.9, I67.848	Nervous system
446.2	Hypersensitivity angiitis	Circulatory system		Musculoskeletal system and connective tissue
446.29	Hypersensitivity angiitis, not elsewhere classified	Circulatory system	M31.0	Musculoskeletal system and connective tissue
455	Hemorrhoids	Circulatory system		Digestive system
455.1	Other hemorrhoids	Circulatory system	K64.8	Digestive system
455.2	Internal hemorrhoids	Circulatory system	K64.8	Digestive system
455.3	External hemorrhoids without complications	Circulatory system	K64.4	Digestive system
455.4	External thrombosed hemorrhoids	Circulatory system	K64.5	Digestive system
455.5	External hemorrhoids with complications	Circulatory system	K64.4	Digestive system
455.6	Hemorrhoids not otherwise specified	Circulatory system	K64.9	Digestive system
455.7	Thrombosed hemorrhoids	Circulatory system	K64.5	Digestive system
455.8	Other hemorrhoids	Circulatory system	K64.8	Digestive system
455.9	Hemorrhoidal skin tags	Circulatory system	K64.4	Digestive system
526.8	Other jaw diseases	Digestive system		Musculoskeletal system and connective tissue

526.9	Jaw disease, unspecified	Digestive system	M27.9	Musculoskeletal system and connective tissue
536.2	Vomiting	Digestive system	R11.10	Symptoms, signs and abnormal clinical and laboratory findings
599.7	Hematuria	Genitourinary system	R31	Symptoms, signs and abnormal clinical and laboratory findings
599.71	Gross hematuria	Genitourinary system	R31.0	Symptoms, signs and abnormal clinical and laboratory findings
599.72	Microscopic hematuria	Genitourinary system	R31.1, R31.21, R31.29	Symptoms, signs and abnormal clinical and laboratory findings
608.82	Hematospermia	Genitourinary system	R36.1	Symptoms, signs and abnormal clinical and laboratory findings
719.7	Difficulty walking	Musculoskeletal system and connective tissue	R26.2	Symptoms, signs and abnormal clinical and laboratory findings
729.8	Other musculoskeletal symptom, limb	Musculoskeletal system and connective tissue		Symptoms, signs and abnormal clinical and laboratory findings
729.82	Cramp in limb	Musculoskeletal system and connective tissue	R25.2	Symptoms, signs and abnormal clinical and laboratory findings
729.89	Other musculoskeletal symptoms not elsewhere classified	Musculoskeletal system and connective tissue	R29.898	Symptoms, signs and abnormal clinical and laboratory findings