Employer Guide to Pain Management

Developed in collaboration with Pfizer Inc.

MBGH is one of the nation's leading non-profit business groups of over 130 large self-insured public and private employers. Comprised primarily of human resources and health benefits professionals, member organizations provide health benefits to over 4 million lives and annually spend more than $4.5 billion on health care benefits. This Guide was prepared by MBGH staff and employer members, Pfizer Medical Affairs and industry peers.

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The Business Case: *Why employers should focus on pain management*

Employees and their family members who suffer from pain are less productive and costlier for employers. [1] According to the 2015 Institute of Medicine (IOM) Report, pain related conditions affect 116 million adults in the U.S., resulting in $560 to $635 billion in medical costs and lost productivity.

Data indicate that more than half of Americans live with chronic or recurrent pain – this is greater than those with cancer and stroke combined. The IOM report also stated that about four in 10 Americans say pain interferes with their mood, sleep and the ability to do work or have enjoyment in their lives.

A 2016 report revealed that opioid abusers cost employers nearly twice as much ($19,450) in medical expenses on average annually as non-abusers ($10,853). The study also showed that nearly one out of three opioid prescriptions subsidized by U.S. employers is being abused. [2]

The National Safety Council states that opioids are not any more effective than non-opioid alternatives such as acetaminophen or ibuprofen to treat the most common workplace-related injuries, including soft tissue and musculoskeletal issues. [3]

Despite these statistics, many employers have struggled to see the business case for addressing the management of pain. This is because the costs associated with pain are distributed among multiple clinical conditions, and measuring the total impact of pain on an organization requires reviewing data from both internal and external sources.

How To Use This Guide

This guide was developed to help employers create the business case to improve the treatment of pain within their population. The guide includes recommendations on how to engage in discussions with health care vendors to create a strategy that will ultimately improve care and reduce overall costs through a multi-pronged approach. Employers should begin by gathering data from all available sources to identify trends and potential problems and learn which data elements will provide the most insight to a population health approach to pain management.

Within this Guide is a list of action items an employer can use to evaluate existing programs and benefits as well as develop interventions with vendor partners that will have the largest impact on painful conditions in the workplace. Recommendations are stratified into three categories based on ease of implementation and include:

- **Essential** – have a high value and are considered relatively easy to implement
- **Strongly Recommended –** are able to enhance the value of health benefits
- **Optional –** should be considered after Essential and Strongly Recommended interventions have been implemented

Employers are encouraged to work with their vendors and take a proactive approach to make evidenced-based, innovative decisions about supporting employees in effective pain management. Through the use of this Guide, employers can better understand the implications of various treatment options for pain and implement safeguards to prevent inappropriate use of medication, e.g. opioid misuse.

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Health Plan/Medical Benefits

It is recommended that employer's focus on the appropriateness of treatment, based on a patient's conditions and quality metrics for the top priority conditions, and review their current benefit design approach for any necessary changes to better support employee health and safety.

Essential Recommendations

- ☐ Request data and analysis from your health plan and pharmacy benefits manager (PBM) in order to evaluate inpatient, outpatient, drug and emergency room (ER) claims for:
  1. Multiple admissions for a pain diagnosis [4]
  2. Opioid abuse, dependence or poisoning [4,5]
     (Appendix C lists ICD-9-CM codes used to identify non-medical use of opioids)
  3. Dependence on central nervous system depressants (e.g., benzodiazepines) [10]
- ☐ Ask health plans and PBMs if they are conducting outreach to all targeted providers, including dentists, to encourage appropriate treatment of pain. [4]
- ☐ Consult your health plan and legal counsel for coverage options and requirements for addiction treatment and support. [3,6,11] (Refer to the Addiction and Recovery section for a list of treatment options.)

Strongly Recommended

- ☐ Review all health plan data collected in context with PBM data to begin developing an overall picture of the impact of pain on your population. [11]
  (See Aggregation of Pharmacy and Health Plan Data (page 7) in the PBM/Pharmacy Benefit section for more details.)
- ☐ Work with your health plan to monitor health care utilization patterns for patients diagnosed with a painful condition. This may include identifying: [11]
  1. The utilization of sites of care for treatment of pain (e.g. inpatient, outpatient, emergency room, urgent care)
  2. The percent of the population that has a diagnosis for a pain condition
- ☐ Identify the most common and costly conditions impacting your population by categories that highlight the prevalence of pain. [11]
  1. Appendix A lists standard ICD-9-CM codes identified in the literature for painful conditions by category. [7,8]
  2. Appendix B lists other conditions that are often common or costly to serve as a comparison. [9]

Coding Considerations

The International Classification of Diseases Clinical Modification (ICD-CM) is the standard system used to classify diseases in health records. The system was updated and expanded from 6,969 ICD- 9-CM codes to 12,420 ICD-10-CM codes on October 1, 2015. The Center for Disease Control has published General Equivalence Mappings (GEMS) or crosswalks to support the conversion of ICD-9- CM to ICD-10-CM codes. [10] Chronic pain conditions have been categorized in the published literature based on ICD-9-CM codes. [7,8] A conversion to ICD-10-CM is required to utilize the same categories as in the published literature.

Benefit Design Considerations for Health Plans

Essential Recommendations

- ☐ Evaluate coverage options to ensure treatment approaches are affordable, convenient and easily accessible. [11]
- ☐ Allow for referral to comprehensive pain centers when appropriate. [1]
- ☐ Design a pathway for employees with chronic pain to achieve appropriate care. [1]
- ☐ Recommend a patient urge collaboration between the primary care physician and any pain specialists the patient is referred to see. [11]

Strongly Recommended

- ☐ Provide coverage for non-medication therapy options for conditions supported by clinical evidence and by state mandated coverage requirements. [1,4,6] The value of the interventions should be assessed based on outcome measures that demonstrate improvements in pain and pain-related disability functional status. [1]

  - Physical therapy [1]
  - Behavioral health treatment [1,4]
  - Acupuncture [1,4] – ancillary to conventional therapy in treatment of nonspecific, non-inflammatory low back pain [12]
  - Chiropractic care [1]
  - Medical massage therapy [1,4,6]
    - Rendered by a licensed medical massage therapist
    - Prescription required from health care provider every 12 months
  - Yoga therapy [1]

Optional Recommendations

- ☐ Align provider payment incentives with evidence-based assessment and treatment of pain. [1]
- ☐ Review coverage for imaging based on evidence. [1,13]

Value of Comprehensive Treatment

Pain results from a combination of biological, psychological and social factors and often requires comprehensive approaches to prevention and management. [1] *(Institute of Medicine)*

Multimodal and multidisciplinary therapies help reduce pain and improve function more effectively than single modalities. [14] *(CDC Guidelines)*

Benefit Design Considerations for Addiction Recovery through Health Plans, PBMs and Employee Assistance Programs (EAPs)

Opioid abuse alters the brain's structure and function resulting in changes that persist long after the use of the medication has stopped. These changes help explain why the risk of relapse is high and treatment needs to be customized and of adequate length to achieve the best outcomes.

The first step in the addiction recovery process is medically assisted detoxification in conjunction with individualized counseling and treatment of other co-morbid physical or mental conditions.[15] You may need to work with multiple vendors to ensure comprehensive support is provided at different stages of the recovery process.

Essential Recommendations

- ☐ Evaluate benefit offerings from your health plan and EAP to ensure you provide comprehensive counseling.
- ☐ Coverage for counseling should be for a minimum of 90 days in duration.[16]
- ☐ Allow for EAP encounter data to be shared with vendors such as PBMs and health plans.[6]
- ☐ Ensure medication coverage for opioid abuse treatment, including methadone, buprenorphine or naltrexone, is available through the health plan or PBM.[14,31]
- ☐ Evaluate the counseling options provided by your health plan and EAP to ensure adequate options are readily available to accommodate multiple needs and situations. These may include:
  - Screenings for depression and anxiety (at no cost for the employee)[11]
  - Confidential substance abuse screening[4,6]
  - Brief intervention for substance abuse[6]
  - Access and referrals to case/care management services during treatment and recovery[6]
  - Residential Treatment - short term (3-6 weeks)
  - Residential Treatment - long term (6-12 months)
  - Outpatient programs - low intensity (provides education)
  - Outpatient programs - high intensity (intensive day treatment similar to residential)
  - Sober House following intensive treatment
  - Individual counseling (includes social support in addition to drug counseling)
  - Group Counseling
  - Family Counseling[6]

Pharmacy Benefits/PBM

Gathering PBM data on pain management prescriptions (on an aggregate basis only) will help determine if you have a business case for opioid abuse. Note that some PBMs may have in-house programs that include such monitoring. Check to see if there is an additional cost to provide this analysis. [11]

Essential Recommendations

☐ Review patient profiles for multiple similar opioid medications: [4]

1. Review the number of prescribers writing more than one type of pain medication for the same patient. [4]
2. Additional data that may be available from your PBM or health plan: [17]
    a. Drug Therapy Class (Generic Product Index (GPI) codes)
    b. National Drug Code (NDC) to determine exact strength/dose
    c. Days' Supply and Quantity Dispensed
    d. Prescriber and Pharmacy NABP information
    e. Diagnosis Codes (if available)

☐ Identify processes to intervene when abuse is suspected by patients or prescribers: [17]

1. At the point of sale (POS):
    a. Concurrent drug utilization review
    b. Acetaminophen daily dose greater than 4 grams/day
    c. Short Acting Opioids – set a days' supply limit of only 30 days per fill or 45 days' supply within 90 days with a hard reject that requires PBM prior authorization
    d. Set a threshold morphine equivalent dose/day (MED) and apply a hard reject at POS requiring guideline based PBM prior authorization
2. Retrospective Drug Utilization Review:
    a. Target multiple prescribers/pharmacies for therapeutic duplication and/or overutilization based on Days' Supply, Refill Thresholds, MED, etc.
    b. Identify members exceeding the daily average MED and thresholds for various prescribers and pharmacies. If identified, coordinate pharmacist outreach to prescriber to determine appropriateness of patient's medication utilization.
    c. Review medications containing acetaminophen and potentially restrict how often patients refill these.
    d. Summarize pain-related medication utilization at the drug class level.

Strongly Recommended

☐ Identify patients with poor adherence to medication therapy. Include under and over utilization of opioids and non-opioid therapy. Be sure to include specialty pharmacy data as well as data from traditional PBM vendors. [11]

Aggregation of Pharmacy and Health Plan Data

When both the diagnosis and treatment information are available, consider the following steps to make more informed decisions on how to support your covered population. [11]

- ☐ Identify conditions or situations where opioids may be used for inappropriate conditions such as fibromyalgia, migraines, abdominal pain or back pain. [18,19]
- ☐ Work with PBM or other vendors to assess quality metrics and potential interventions for quality improvement and enhanced care coordination. [17]
- ☐ Identify patient populations and conditions that may be undertreated. [1]
- ☐ Consider adding interventions or reviews when prescriptions for naloxone are adjudicated with a chronic opioid, for example: [17]
    - Care coordination for substance abuse treatment; ensure member is receiving care by a prescriber certified through the Substance Abuse and Mental Health Services Administration (SAMHSA)
- ☐ Work with PBM to incorporate appropriate contract language that addresses the above clinical interventions and outcomes. [11]

Data Limitations

An analysis of claims data has limitations. Not all diagnoses are correctly coded and some may not be captured. Self-care with over-the-counter (OTC) medications such as acetaminophen (Tylenol®), non-steroidal anti-inflammatory agents (NSAIDS) or topical patches will not be included in a claims analysis. Patients may choose to pay cash for their prescriptions (including opioids) and these claims will also not be available through the PBM. Data from state monitoring programs are not available to employers. [11]

Appropriate Treatment of Pain [20]

There are three different causes of pain:

- Damage to the tissues (nociceptive) due to trauma or inflammation
- Damage to the nerve (neuropathic)
- Hypersensitivity to pain

Treatments should be targeted to the source of pain. However, patients often have more than one type of pain and with some conditions there may be multiple causes. For example, low back pain can be a result of both neuropathic and nociceptive causes. The following table reflects the appropriate treatment by medication class for specific the types of pain.

Type of Pain		
Nociceptive	Neuropathic (Nerve) Pain	Hypersensitive
Examples		
Arthritis	Shingles	Fibromyalgia
Treatment		
NSAIDS / APAP	AED / SNRIs / TCAs	AED / SNRIs / TCAs
Role of Opioids		
Last Line	Last Line	Should be avoided

NSAIDS = non-steroidal anti-inflammatory medications
APAP = Acetaminophen; AED = anti-epileptics
SNRIs = serotonin norepinephrine receptor inhibitors
TCAs = Tri-cyclic antidepressants

IMPORTANT OPIOID FACTS

Chronic use of opioids is associated with the development of tolerance and the need for increased doses to achieve the same effect. The risk of opioid overdose approximately doubles at daily doses between 20 – 49 MED and increases nine times at doses greater than 100 MED/day. [14] The risk of developing an opioid use disorder ranges from a three-fold increase for acute low dose opioids to 122 times for patients on > 120 MED/day. There is no completely safe dose of an opioid. [21]

Benefit Design Considerations for a PBM

Essential Recommendations

- ☐ Review when opioids can be prescribed for chronic pain. Consider a prescription only after failure of, or in conjunction with, first line non-opioid and non-pharmacologic therapies for painful conditions. [14]
- ☐ Consider quantity limits per opioid fill for acute pain of 3-7 days only. [11,14]
- ☐ Require immediate release formulations be prescribed before long acting opioids. [14]

Strongly Recommended

- ☐ Require high utilizers of opioids to "lock-in" (only receive prescriptions from one prescriber and one pharmacy). [4]
- ☐ Evaluate co-pays for non-opioid therapy relative to opioids to support published guidelines. [4, 11]
- ☐ Consider coverage for concurrent opioid reversal agent (naloxone) prescriptions for patients with a history of overdose, substance use disorder, higher opioid doses or concurrent benzodiazepine utilization. [14]

Optional Recommendations

- ☐ Require assessment/documentation for patients with an opioid prescription: [14]
    - One week after initiation of an opioid
    - Every three months for patients on chronic opioids
    - If patient has a prescription for a high dose of an opioid
- ☐ Assess patients on chronic opioids for potential of tapering to lower doses
- ☐ Offer coverage for abuse deterrent opioid formulations for patients for whom chronic opioid therapy is appropriate. [6]
- ☐ Ensure pharmacist cannot override rejected claim for an opioid without an exemption (i.e. prior authorization) from a physician. [4]

Short-Term Disability (STD)

To see where you compare to your industry peers on STD, compare data to national benchmarks (publicly available or through your vendor) [22] by industry type and clinical condition. [23] For some industries, the benchmarks may vary by quarter based on the sample size of the benchmark. In these cases, it may be beneficial to review benchmarks for "all industries" rather than by a specific industry. [22]

1. Track over time the number of employees on leave with a pain medication. [11]
2. Compare your company STD data to benchmarking data. [23]

Table 1. STD Benchmarks from the Integrated Benefits Institute for All Industry Types*

Condition	% Closed Claims	% of payments for Closed Claims	Lost calendar days per closed claim Mean	Lost calendar days per closed claim Median
Neoplasms	6.1	8.5	77.55	53
Endocrine, nutritional and metabolic diseases and immunity disorders	1.9	1.3	45.95	31
Mental disorders	6.9	9.2	72.31	55
Diseases of the nervous system and sense organs	4.3	4.6	66.03	44
Diseases of the musculoskeletal system and connective tissue	20.0	24.8	76.54	62
Injury and poisoning	12.3	12.2	67.54	54

*2015

Long-Term Disability (LTD)

Compare data to national benchmarks (publicly available or through your vendor) [22] by industry type and clinical condition. [23] For some industries, the benchmarks may vary by quarter based on the sample size of the benchmark. In these cases, it may be beneficial to review benchmarks for "all industries" rather than by a specific industry. [22]

1. Track over time the number of employees on leave with a pain medication. [11]
2. Compare your company LTD data to benchmarking data. [23]

Table 2. LTD Benchmarks from the Integrated Benefits Institute for All Industry Types*

Condition	% of Closed	% of Payments for Closed
Neoplasms	14.1	10.6
Endocrine, nutritional and metabolic diseases and immunity disorders	1.5	2.1
Mental disorders	9	10.9
Diseases of the nervous system and sense organs	8.1	15.5
Diseases of the musculoskeletal system and connective tissue	29.2	28.6
Injury and poisoning	10.2	6.2

*2015

Workers' Compensation

Many claims for workers' compensation include employees being treated for pain as a result of an acute injury. These data are segmented from health and pharmacy claims. [22]

Strongly Recommended

- ☐ Conduct routine assessments focused on high cost claims. [22]
- ☐ Compare data to national benchmarks and track over time:
    1. Compare the number of employees on leave with a prescription for a pain medication.
    2. Compare the number of employees on leave with an opioid prescription.
    3. Compare formulary from workers' compensation to formulary from standard PBM for discrepancies. [22]
    4. Compare data to benchmarks: Percent of injured workers utilizing opioid analgesics (2015) = 60.2%. [24]

Internal Policies

The following sections highlight suggested resources and things to consider when reviewing your organization's overall strategy for pain management.

General

- ☐ Consult your firm's legal counsel to ensure compliance with regulations from the state and the U.S. Department of Health and Human Services and other applicable regulations pertaining to the employer's specific industry. [3]
- ☐ Ensure appropriate and up-to-date policy details are incorporated in all appropriate documents throughout the organization. [22]
- ☐ Require employees to sign policies to acknowledge that they have read them. [3]

Prescription Drug Workplace

- ☐ Prohibit use of unauthorized prescription drugs on company property. [3]
- ☐ Recommend employees notify managers if they are taking a prescription or over-the-counter (OTC) medication that could impair their work performance or use appropriate procedures (request sick times, request change of duty etc.). [3]

Drug Testing

Essential Recommendations

- ☐ Policies should include actions for both the manager and the employee. [3]
- ☐ Ensure there is a policy for prescribers staffing on-site clinics to conduct baseline testing for illicit drug use, use of non-prescribed opioids, benzodiazepines and stimulants before considering patients for chronic opioid therapy. [1,25]
- ☐ Require drug testing (urine, blood, saliva or hair) in a standard consistent process for the following situations: [26]
    1. The organization has a reasonable suspicion that an employee is impaired or is taking a controlled substance [26]
    2. An employee has been involved in an accident on the job [26]
    3. An employee has a prescription for a schedule II or III narcotic (to ensure the employee tests positive for opioids and is not diverting the medication) [14]
    4. An employee returns to work without an opioid prescription (to ensure the employee tests negative for opioids) [3]
    5. Randomly for employees reporting to work [26]
- ☐ Emphasize privacy protection and confidentiality for employee information about opioid use and testing. [3,26]
- ☐ Identify a process to intervene when abuse is detected to ensure all employees who test positive are handled in a consistent manner. [26]
- ☐ Discipline employees for a positive drug test if they do not have a prescription from their health care professional (include potential termination). [16,26]
- ☐ Ensure testing includes all prescription opioids (including synthetic oxycodone and methadone that do not show up on standard panels) in addition to illicit opioids. [3]

Strongly Recommended

- ☐ Allow employees to enter a mandatory treatment program and maintain negative drug tests as a stipulation for continued employment. [26]

Optional Recommendation

- ☐ Permit employees to request a sealed portion of the sample for employee-initiated testing at their own expense. Custody of the sample should not be given to the employee. [26]

Return to Work

- ☐ Require employees to provide a letter to their supervisor from the prescribing health care professional stating the ability to work while taking a schedule II or III narcotic opioid. [3]
- ☐ Based on the nature of the work environment and safety considerations, determine if an employee using an opioid can function in the workplace with minimal risk. If risk is not considered minimal, continue disability status to eliminate any safety concerns. [11]

Education and Outreach

Essential Recommendation

- ☐ Educate managers on detecting impaired employees and what appropriate interventions to utilize. [3,16]

Strongly Recommended

- ☐ Promote programs and resources that enable employees to self-manage their pain. [1]
- ☐ Promote coverage of alternative non-medication pain therapies. [14]
- ☐ Provide education on appropriate pain management to employees and dependents. [4]
    1. Evaluate educational resources from health plan, PBM, EAP and other vendors. [11]
    2. Identify and offer publicly available educational resources such as: [11]
        a. CDC
            1. http://www.cdc.gov/drugoverdose/prescribing/patients.html
            2. http://www.cdc.gov/drugoverdose/prescribing/resources.html
        b. American Board of Internal Medicine and Consumer Reports
            1. www.choosingwisely.org
            2. http://www.choosingwisely.org/patient-resources/medicines-to- relieve-chronic-pain/
            3. http://www.choosingwisely.org/american-society-of-anesthesiologists-asa-releases-choosing-wisely-list-for-pain-medicine/
        c. Patient assessment tools
            1. http://www.rethinkopioids.com/patient- assessment-tools
- ☐ Educate employees on safe storage of prescription medications. [27]
    1. Store away from visitors and children.
    2. Lock in a container or cabinet.
- ☐ Educate employees and dependents on appropriate methods of disposing unused prescription medication. [4,28]
    1. Medicine take-back programs
    2. U.S. Drug Enforcement Agency (DEA)
    3. Public Disposal Locations: https://apps.deadiversion.usdoj.gov/pubdispsearch/spring/main?execution=e1s3
    4. Disposal – Trash
        a. Dispose of medication and container separately
        b. Mix medication with unpalatable substance (coffee grounds, kitty litter)
        c. Place in sealed bag
        d. Remove/scratch out all personal information on empty bottle
        e. Flush select medications (including some opioids)
- ☐ Educate employees on EAP services provided.
- ☐ Coordinate EAP outreach with patients who may be at high risk. [3]

Glossary of Terms

A consensus for terminology related to nontherapeutic use of opioids is lacking, making it difficult to determine the true prevalence of opioid misuse/abuse. The definitions below are similar to those commonly used in clinical trials. [29]

Abuse: Use for nontherapeutic, recreational purposes to obtain psychotropic or euphoric effects; contradicts medical advice or is not as prescribed.

Addiction: Compulsive use despite harm or negative consequences; chronic disease, impaired control, craving, neurobiological dysfunction.

Diversion: Removal of a medication from legal distribution.

Misuse: Use of a prescription or over-the-counter medication for a medical purpose that contradicts medical advice or that is not prescribed.

Morphine Equivalent Dose (MED) or Morphine Milligram Equivalents (MME) [21]: The total amount of daily oral morphine that is prescribed. For non-morphine opioids, a conversion factor is used to estimate the total daily oral equivalent dose of morphine.

Non-medical (therapeutic) Use: Use of a prescription drug without a prescription; use of a prescription drug to obtain psychotropic or euphoric effects.

Opioid Use Disorder: A problematic pattern of opioid use that results in clinically significant impairment or distress manifested by two of eleven diagnostic criteria. [30]

Physical Dependence: Associated with withdrawal symptoms when a drug is rapidly withdrawn; adaptive physiologic process; tolerance to substance effects.

Psychological Dependence: Compulsive or impaired control, craving characterized by drug use to obtain

Psychotropic or euphoric effects; avoidance of negative effect and symptoms associated with drug absence.

Tolerance: Diminished response to a drug with repeated use.

Appendix A. Painful Conditions [8]

Pain Cohort	ICD-9 Codes* (prior to Q42015)	Key Words
Acute Pain	840-847,805.xx, 808.xx, 820.xx, 835.xx, 800.xx-804.xx, 807.xx, 809.xx, 809.xx-818.xx, 821.xx-827.xx, 829.xx, 940.1-940.5, 940.9, 941.00-941.59, 942.00-942.05, 942.09, 942.10-942.59, 943.00-943.06, 943.09-943.59,	Regional Sprains, Burns, Spine Fracture, Hip Fracture, Other Fractures. Other Dislocations (not hip), Acute Pancreatitis
Abdominal Pain	789.00-789.07, 789.09, 789.60-	Abdominal Pain, Abdominal Tenderness
Arthropathy	696.0, 711.00-711.99, 712.80-712.99, 713.0, 713.1, 713.2, 713.3, 713.4, 713.5, 713.6, 713.8, 714.89,	Arthropathy, Arthritis, Arthropathies, Polyarthropy, Polyarthropathies
Back Pain	722.83, 724.02, 724.1, 724.2, 724.5, 724.8	Backache, Symptoms Referable to Back, Lumbago, Pain in Thoracic Spine, Post-laminectomy Syndrome of Lumbar Region, Spinal Stenosis
Cancer Pain	338.3	Neoplasm Related Pain
Cervical Radiculopathy	723.1, 723.2, 723.3, 723.4, 723.5, 723.6	Panniculitis, Torticollis, Brachial Neuritis, Radiculitis, Cervicobrachial Syndrome, Cervicocranial Syndrome, Cervicalgia
Diabetic Neuropathy	250.60-250.63, 357.2	Diabetes Mellitus with Neurological Manifestations, Polyneuropathy in Diabetes
Fibromyalgia	729.1	Myalgia and Myositis
Genitourinary Pain	256.8, 257.8, 625.8, 625.9	Ovarian Dysfunction, Testicular Dysfunction, Symptoms Associated with Female Genital Organs
Gout	274.00-274.03	Gouty Arthropathy
Headache	339.00-339.05, 339.09-339.12, 339.20-339.22, 339.3, 339.41-339.44, 339.81-339.85, 339.89, 784.0	Headache, Cluster Headache, Headache Syndrome, Paroxysmal Hemicrania, Neuralgiform Headache, Hemicrania Continua, Trigeminal Autonomic Cephalgias, Tension Type Headache, Post-Traumatic Headache

Pain Cohort	ICD-9 Codes* (prior to Q42015)	Key Words
Joint Pain	720.0, 720.1, 720.2, 720.81, 720.89, 725, 729.0, 719.40-719.49	Inflammatory Spondylopathies, Sacroiliitis, Spinal Enthesopathy, Polymyalgia Rheumatica, Ankylosing Spondylitis, Rheumatism, Fibrositis, Pain in Joint
Limb Pain	353.6, 354.4, 355.71, 729.5	Causalgia of Limb, Phantom Limb, Pain in Limb
Lumbar Radiculopathy	724.4	Thoracic or Lumbosacral Neuritis or Radiculitis
Migraine	346.00-346.03, 346.10-346.13, 346.20-346.23, 346.30-346.33, 346.40-346.43, 346.50-346.53, 346.60-346.63, 346.70-346.73	Migraine, Chronic Migraine, Persistent Migraine, Other Forms of Migraine, Variants of Migraine, Hemiplegic Migraine, Menstrual Migraine
MS	340	Multiple Sclerosis
Multiple Dystrophy	359.0, 359.1, 359.21, 359.23	Multiple Dystrophy, Myotonic Chondrodystrophy
Neuralgia	350.1, 729.2	Neuralgia, Nueritis, Radiculitis
Neuropathy	337.00, 337.09, 337.1, 355.1, 356.1, 356.2, 356.3, 356.4, 356.8, 356.9, 357.1, 357.3, 357.4, 357.5, 357.6, 357.7, 357.81, 357.82,	Neuropathy, Neuropathies, Polyneuropathy, Polyneuritis, Refsum's Disease, Meralgia Paresthetica, Muscular Atrophy, Sciatica
Osteoarthritis	715.00, 715.04, 715.09-715.18, 715.20-715.28, 715.30-715.38, 715.80, 715.89-715.98, 716.20-716.39, 716.60-716.68, 721.0, 721.1, 721.2, 721.3, 721.41, 721.42	Osteoarthrosis, Allergic Arthritis, Monoarthritis, Climacteric Arthritis, Spondylosis with Myelopathy, Cervical Spondylosis, Lumbosacral Spondylosis, Thoracic Spondylosis
Other Pain	307.89, 338.0, 338.19, 338.21, 338.29, 338.4, 780.96	Central Pain Syndrome, Pain Disorder Psychological Factors, Pain Due to Trauma, Generalized Pain, Chronic Pain, Acute Pain
Painful Bladder Syndrome	595.1, 788.41	Chronic Interstitial Cystitis, Urinary Frequency
Postherpetic Neuropathy	053.10-053.14, 053.19	Postherpetic Trigeminal Neuralgia, Herpes Zoster with Nervous System Complication, Herpes Zoster Myelitis, Postherpetic Polyneuropathy, Geniculate Herpes Zoster
Rheumatoid Arthritis	714.0, 714.1, 714.2, 714.30-714.33, 714.4, 714.81	Rheumatoid Arthritis, Felty's Syndrome, Chronic Postrheumatic Arthropathy, Rheumatoid Lung, Juvenile Rheumatoid Arthritis
Spinal Cord Injury	952.00-952.19, 952.2, 952.3, 952.4, 952.8, 952.9	Spinal Cord Injury, Cord Syndrome, Spinal Bone Injury, Lesion of Spinal Cord, Caudia Equina Spinal Cord Injury
Surgically-induced Pain	338.18, 338.22, 338.28	Postoperative Pain, Post-Thoracotomy Pain

Appendix B. Common High Cost or High Volume Conditions for Comparison [9]

Condition	ICD- 9
Diabetes	250.60,250.61,250.62,250.63,250.00,250.01,250.02,250.03,250.10 250.11,250.12,250.13,250.20,250.21,250.22,250.23, 250.30,250.31 250.32,250.33,250.41,250.42, 250.43,250.50,250.51,250.52,250.53 250.70,250.71,250.72,250.73,250.80,250.81,250.82, 250.83,250.90 250.91,250.92,250.93
Asthma	493.00,493.01,493.02,493.10,493.11,493.12,493.81,493.82,493.90 493.91,493.92
Congestive Heart Failure	402.01,402.11,402.91,404.01,404.03,404.11,404.13,404.91,404.93 398.91,428.0,428.1,428.20,428.21,428.22,428.23,428.30,428.31 428.32,428.33,428.40,428.41,428.42,428.43,428.9
Hypertension	401.0,401.1,401.9,402.00,402.01,402.10,402.11,402.90,402.91,403.00, 403.01,403.10,403.11,403.90,403.91,404.00,404.01,404.02,404.03,404.10 404.11,404.12,404.13,404.90,404.91,404.92,404.93,405.01,405.09,405.11 405.19,405.91,405.99

Appendix C. Description of Codes for Non-Medical Opioid Misuse/Abuse [5]

Description	ICD- 9
Opioid type dependence	304.0X,304.00,304.01, 304.02,304.03,304.7X, 304.70, 304.71, 304.72,304.73
Non- dependent opioid abuse	305.5X, 305.50, 305.51, 305.52, 305.53
Opioid Poisoning	965.00, 965.00, 965.02, 965.09

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