

Long-term use of opioid prescriptions and prospects for innovation in prevention, treatment and pain management

Enterprise Research and Development
Clinical Innovation Report

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Executive Summary

Long-term use of opioid prescriptions to address pain is contributing to substantial public health challenges and increased pressures on the health care system. In this clinical innovation report, we begin with a review of the current landscape of opioid use (in [Section 1](#)) and identify several main factors contributing to growing dependence and opioid use disorders. A primary factor behind this public health crisis is broad access to opioid prescriptions, including overprescribing, which enables both misuse and unauthorized use of prescription opioids. These problems are confounded by related factors and incentives that drive individuals to transition to the use of illegal substitutes, including heroin. Health system weaknesses in effectively identifying and treating opioid use disorders and preventing relapse also hinder scalable approaches to addressing the challenges associated with opioid use and misuse. Finally, a major contributor to this challenge is a lack of prevention approaches that could help to treat the underlying factors that lead people to begin and continue opioid use.

Developing approaches that could reduce inappropriate opioid use, identify those at risk, help patients manage underlying health problems associated with pain, and address opioid use disorders requires information about the characteristics and scope of the affected population and the reasons for opioid use. In [Section 2](#), we discuss results of our analysis of UnitedHealthcare administrative claims data to fill gaps in the evidence base about the current state of opioid use, with a focus on the population using opioids on a long-term basis (prescriptions of 35 days or more). The analysis covers UnitedHealthcare members in the commercial business segment, Medicare Advantage plans and Medicaid managed care plans, examining utilization and costs with a focus on long-term users of opioids and stratifying opioid users by age and gender. It also explores the underlying conditions leading to opioid use, an important consideration as efforts evolve to address the many challenges associated with prescription opioid use. Findings include:

Long-term use of opioid prescriptions. Rates of long-term opioid use are close to 14 percent in the Medicare Advantage population and 4 to 5 percent in the commercial and Medicaid population. More notable, however, is the share of the population who use opioids for most of the year; about one-quarter of long-term opioid users have prescriptions for 300 or more days. Additionally:

- The prevalence of opioid use is higher among women than it is among men, regardless of type of health coverage. Almost two-thirds of long-term opioid users are female.
- Age-related rates of opioid use are highest for the population age 45 to 64 in Medicare and Medicaid and may reflect specific health care needs of populations eligible for those programs.

Reasons for opioid use. Our findings demonstrate that the overwhelming majority of patients with opioid prescriptions have non-cancer diagnoses, and that these patients tend to have musculoskeletal and connective tissue disorders, especially spondylosis (back pain), that can be costly to treat. About 70 to 75 percent of individuals who use opioids on a long-term basis have musculoskeletal/connective tissue conditions. Those underlying conditions are the main contributors to overall medical spending for long-term users in the commercial population; the share of total medical spending for long-term opioid commercial users related to musculoskeletal conditions (primarily back pain) was 24 percent, while in the Medicare Advantage and managed Medicaid populations it was 14 percent.

Spending for opioid prescription drugs. Spending for opioids represents approximately 3 to 4 percent of combined medical and drug spending for the long-term opioid population, with variation by segment. Average annual spending for opioid prescription drugs was about \$550 to \$650 per person for long-term users in 2015, though the broader financial and social impact stemming from opioid use is much higher. Total spending on a per-person basis (including individual out-of-pocket costs and the portion paid by health plans) is higher in the commercial population than in the Medicare Advantage or Medicaid populations, 8 percent and 15 percent higher, respectively. Several factors underlie those findings:

- Unit prices of opioid prescription drugs for all long-term users are 12 percent higher for commercial plans than for Medicare Advantage plans and 23 percent higher for commercial plans than for Medicaid plans. Those unit prices have increased by about 15 percent in the last two years for Medicare and Medicaid health plans.
- Opioid prescription use (days supply) is higher for the managed Medicaid and Medicare Advantage populations than for the commercial population.
- Most spending for opioid prescriptions in the study populations is for the highest users, those with 300 or more days' supply. Those users accounted for 66 to 80 percent of total spending on prescription opioids for long-term users.
- The opioid drug costs per patient for the population of highest users are almost three times more than the average amount for long-term users, in part because patients with a 300+ day supply have about twice the number of prescriptions per patient compared to long-term users on average.
- Additionally, this population of the highest users has a more costly mix of drugs than long-term users overall; unit prices for drugs taken by people with a 300+ day supply are 40 percent higher than those for all long-term users in the commercial and Medicare Advantage populations (and 20 percent higher in the Medicaid population).
- Most spending for opioid prescriptions in the population of 300+ day users – roughly 80 percent – is for patients with underlying musculoskeletal conditions, regardless of source of coverage.
- The use of high-cost drugs, particularly on a long-term basis to treat musculoskeletal pain, makes it more difficult and costly for the health care system to address the underlying problems of dependence and opioid use disorder. About 25 percent of Medicare and Medicaid long-term users use seven of the most common high-cost drugs; notably, those who are 300+ day users with musculoskeletal conditions are much more likely to use those high-cost drugs.

In **Section 3**, we discuss the range of efforts underway at the federal and state levels and across health system stakeholders to address the problems of opioid dependence and opioid use disorder. Many of those initiatives focus on restricting access to opioids and supporting treatment for opioid use disorder. Predictive analytics can help stakeholders identify at-risk users and improve prescribing practices and targeted outreach in the medical community. Advances in therapy programs to treat opioid use disorder, such as medication-assisted treatment, offer opportunities to enhance treatment effectiveness and present new opportunities for value-based benefit design.

Less emphasis today falls on addressing “upstream” causes of chronic pain and activities that prevent and manage those causes, and many programs do not distinguish between the different characteristics of the patients who use prescription opioid medications and the underlying conditions leading to pain. Evolving programs focusing on chronic pain management offer opportunities to reduce spending and improve health outcomes. Those approaches could make a significant difference in this public health crisis by preventing the cycle of opioid use, dependence and substance use disorder.

Section 1. Background on the Challenges Associated with Opioid Use

Introduction

An emerging public health challenge relates to the use of opioids, medications frequently prescribed to treat chronic pain arising from a range of conditions. In 2014, providers wrote about 240 million prescriptions for opioids – a substantial increase over the previous two decades (see Figure 1.1).^{1,2} A corresponding increase in the prevalence of opioid use disorders has raised widespread concern.^{3,4} Health system stakeholders are focused on addressing this problem for individuals dealing with chronic pain, while recognizing opioids can be a central part of treatment for individuals with cancer and other advanced illnesses.

Problems with dependence and addiction are widespread. The number of people reporting nonmedical use (i.e., using prescription opioids without a prescription or not as prescribed) has grown, totaling 10 million in 2013.⁵ Additionally, approximately 2 million people were dependent on or abusing prescription painkillers in 2014, according to public health officials.⁶ Four in 10 Americans personally know someone who has experienced a substance use disorder involving prescription opioids.⁷

The rise of opioid use disorders - and the related use of illegal opioids such as heroin - has serious implications for the health care system. Over 33,000 individuals died in 2015 from overdoses involving prescription and illegal opioids, and research shows growing rates of opioid use disorder across a range of demographics and parts of the country.⁸ Spending estimates associated with prescription opioids are about \$130 billion annually (in direct and indirect costs) and include: use without a prescription, abuse, dependence, misuse, and opioid-related overdose.⁹

Public health officials, including those at the Centers for Disease Control and Prevention (CDC) and the Surgeon General's office, have initiated efforts to educate the public about the opioid problem and directed resources toward potential solutions.^{10,11} Recent federal legislation approaches opioid use disorder from multiple angles, including expanding access to treatment.¹² The provider community has begun to focus on prescribing practices and the underlying factors that contribute to the problem.¹³

Despite those efforts, important gaps exist for stakeholders in understanding the scope of the problem and the population at risk for opioid use disorder. Additional information can help to improve and target approaches that can reduce inappropriate opioid use, reduce the burden of opioid use disorder, and help patients address underlying health problems associated with pain.

What are opioids?

Opioids are a class of drugs commonly prescribed to individuals struggling with pain, including those with chronic conditions, cancer and advanced illness. Opioids for pain relief include naturally occurring morphine and synthetic drugs such as oxycodone, hydrocodone, codeine, fentanyl, and others.¹⁴ Opioid medications (in pill, capsule, patch or trans-mucosal form) work by reducing the perception of pain and producing a feeling of well-being, by attaching to specific receptors in the brain, spinal cord, gastrointestinal tract and other organs in the body.

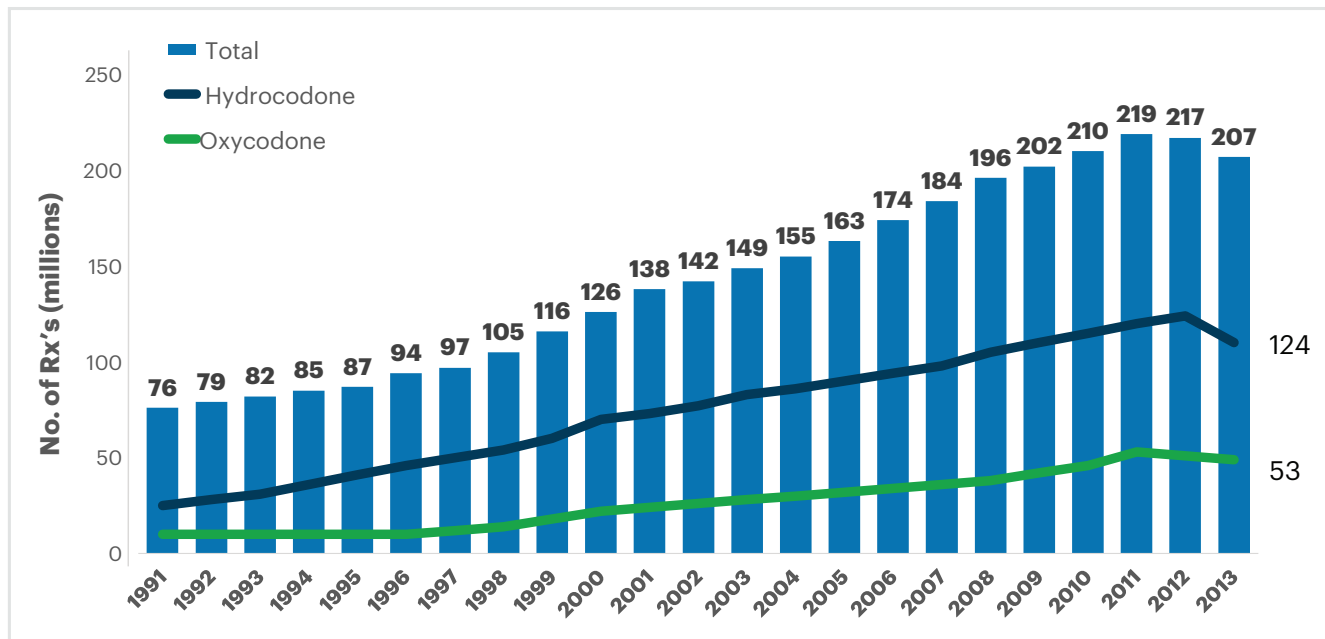
One of the drawbacks of opioid medications is that when patients use them for a long period, their bodies inhibit production of natural opioids and increase their reliance on the prescribed opioids.¹⁵ Chronic exposure to opioids can result in physical dependence, which can lead to difficulties discontinuing use and put patients at risk for developing an opioid use disorder.^{16,17} Some characteristics of that disorder include compulsive drug-seeking tendencies and tolerance - the need for patients to take increasing dosages to receive the same results.¹⁸

People who use opioids for nonmedical reasons may employ multiple channels to access the drugs, for example, taking the prescriptions of family members, friends or partners.¹⁹ In some cases, individuals may snort or inject the drugs to increase their euphoric effects, combine opioids with alcohol or take more pills at once than prescribed. Those unable to access or afford prescription opioids may seek cheaper, illegal substitutes including versions of fentanyl – a powerful synthetic opioid - and heroin, an opioid derived from morphine. Heroin is delivered through injection or inhaling and is highly addictive due to its rapid delivery to the brain.²⁰

Use of opioids

Figure 1.1 shows the growth in the number of opioid prescriptions since 1991. Over half of those prescriptions were for hydrocodone (e.g., Vicodin®) and oxycodone (e.g., Percocet®, OxyContin®). Recent years saw a decline in hydrocodone prescribing. Although opioid prescriptions commonly help individuals after surgery and during physical medicine/rehabilitation, almost half of these prescriptions originate with primary care providers (PCPs).²¹

Figure 1.1 - Growth in Opioid Prescriptions



Source: National Institute on Drug Abuse (NIH), Opioid Prescriptions Dispensed by US Retail Pharmacies IMS Health, Vector One: National, years 1991-1996, Data Extracted 2011. IMS Health, National Prescription Audit, years 1997-2013, Data Extracted 2014.

Gender differences exist in the use of prescription opioids and the pathways to use. Research shows that women are more likely than men to be prescribed opioids and to report nonmedical use in the past year. Other studies have shown that older women are more likely to have long-term use than younger women or men of any age, and they may be more susceptible to adverse medical effects, such as reactions with other medications.²² More generally, older adults tend to use prescription opioids more often than younger ones.^{23,24}

Individuals with longer initial prescription periods are at risk of becoming long-term users. A recent report from the CDC found that among persons prescribed at least one day of opioids, the probability of continued opioid use at one year was 6 percent and at three years was 3 percent. When the first episode of use was for eight days or more, the probability of using those drugs for more than a year increased to 13.5 percent; when the first episode was for 31 days or more, the probability increased to 30 percent. Patients initiated on long-acting opioids had the highest probabilities of long-term use.²⁵ This report also reinforced the demographic differences highlighted by prior research: patients who continued opioid therapy for longer than one year were more likely to be older, female, have a pain diagnosis before opioid initiation, initiated on higher doses of opioids, and publicly or self-insured, compared with patients who discontinued opioid use in less than a year.

Role of pain in opioid use

Approximately 100 million adults suffer from acute and chronic pain; estimated prevalence rates for chronic pain range from 12 percent to 55 percent of the U.S. population.^{26,27} Acute pain is usually severe and short-lived, while chronic pain may be mild or severe and is present for a significant period.²⁸ The International Association for the Study of Pain (IASP) defines chronic, non-cancer pain as a pain without apparent biological source that has persisted beyond the time of normal tissue healing, or three months. Back pain is one of the more common types of chronic pain; about 80 percent of the U.S. population will suffer from an episode of low-back pain at some time in their lives, and many episodes become chronic within six months of occurrence.^{29,30} In a 2014 National Health Interview Survey related to chronic pain, most respondents reported experiencing low-back pain (28 percent), followed by migraine or severe headaches (15 percent), neck pain (15 percent), and face or jaw pain (5 percent).³¹ Women reported higher rates of pain in those areas compared to men, and other researchers have found that middle-aged women and the elderly are more likely than other groups to visit a physician for pain.³²

Over the last 25 years, increased emphasis on identification and treatment of pain by the medical community and broader health industry has corresponded with an increase in physicians prescribing opioids for chronic pain. The American Pain Society and the American Academy of Pain Medicine have endorsed opioid use for non-cancer pain, though they recommend that physicians use caution when prescribing, in part due to the risks of opioid use disorder. Although uncertainty remains about the long-term effectiveness of opioids for pain management and their ability to improve quality and functioning for patients with chronic pain, prescription opioids remain central to current approaches to treat pain.^{33,34}

Compounding this problem, a rise in direct-to-consumer marketing of prescription medications also has increased the popularity of opioids.^{35,36,37} One study demonstrated that physicians were more likely to prescribe oxycodone after a direct request from a patient reporting pain.³⁸

Today, physicians prescribe opioids to an estimated 20 percent of patients who present with pain unrelated to the treatment of cancer.^{39,40} Prescribing patterns differ, however, and researchers have found wide variation in rates of opioid prescribing among physicians practicing within the same emergency department.⁴¹ In that study, rates of long-term opioid use were higher among patients who had not previously used opioids but had received treatment from what the researchers called “high-intensity” opioid providers.

Differences in prescribing rates by state and region illustrate a lack of consensus in the medical community regarding the use of opioids.^{42,43} Although they represent a significant share of prescribers, primary care providers often are ambivalent about opioids; in a 2014 survey of primary care physicians, most experienced stress in managing patients with chronic pain and were concerned with misuse of medications and use disorders.⁴⁴ While those providers showed adequate knowledge of opioids, they did not feel they had received necessary training, and survey results indicated a reluctance to manage opioid prescribing among patients.

Consequences of opioid use disorder

Increased use of opioid prescriptions has corresponded with a rise in hospitalizations, overdoses and other negative consequences, such as hospitalizations associated with opioid-related infections. Studies show a positive relationship between the volume of opioid sales and the morbidity and mortality associated with these medications.⁴⁵ Overall rates of overdose deaths from both prescription and illegal opioids are rising, and over 60 percent of drug overdoses in the United States in 2014 involved opioid abuse, misuse and opioid use disorder.^{46,47}

Growing use of illegal opioids, such as heroin and versions of fentanyl, compounds the problem. Heroin is a less expensive option for opioid users and may be easier to obtain than prescription opioids; about 80 percent of heroin users began their opioid use with prescription pain medications.^{48,49} In 2015, 591,000 Americans had a substance use disorder that involved heroin, and 12,990 died from overdose.^{50,51}

An evolving body of research finds gender and age differences in patterns of opioid complications, misuse and overdose. With a lower body mass and differences in metabolism, absorption and elimination, women using prescription opioids have a more rapid progression to dependence than men.⁵² Among individuals seeking treatment, women often have a more severe clinical profile than men, including psychiatric needs. There is also a higher incidence of psychological distress in women, and women may be more susceptible to certain phases of addiction, like craving and relapse.^{53,54} Conversely, opioid use in men corresponds with more legal and behavioral problems.⁵⁵ Over the past decade, women aged 55 to 64 have experienced the largest increase in accidental opioid overdose deaths compared to men and other age groups.⁵⁶ Age also has been linked to adverse outcomes, with older adults, who often use multiple medications, more likely to suffer falls, fractures and delirium.⁵⁷

Many opioid users have other substance use issues, and those also vary by gender. While women are more likely than men to have co-occurring behavioral health disorders (including mood disorders), men are more likely to use alcohol, marijuana and other substances.^{58,59} Additionally, men are at higher risk for heroin addiction.⁶⁰

Treatment for dependence and opioid use disorder

Opioid use disorders account for about 20 percent of admissions to treatment centers for drug and alcohol abuse.⁶¹ Common substance use treatment programs feature abstinence (the hallmark of 12-step programs) but those programs, in some cases, are not very effective for opioid users, whose brain function has been significantly altered.⁶² Pharmacologists assert that effective treatment programs include medication and behavioral therapies in both outpatient and inpatient settings.⁶³ These programs, called medication assisted treatment (MAT), combine psychological/mental health treatment with medication and other services.

Current medications for opioid dependence and use disorder include: 1) opioid agonist medications (e.g., methadone and buprenorphine), which provide a partial opioid effect that helps in suppressing withdrawal symptoms and cravings, and 2) opioid antagonists (e.g., naloxone or naltrexone) that block the impact of opioids and combat overdose. Buprenorphine offers both a partial opioid effect and combats the effect of opioids, making it an important part of many treatment programs. The market for medications to address opioid use disorder and overdose has grown substantially, with significant interest in finding abuse-deterrent formulations.

While many products are generic, treatment costs are rising, potentially leading to negative impacts on access. Additionally, some specialty manufacturers are developing newer formulations or extended-release products (e.g., morphine, oxycodone and hydrocodone). One analysis found that per member per month costs for a new formulation of buprenorphine rose 38 percent between 2011 and 2013.⁶⁴

Challenges in addressing widespread opioid use

Several factors contribute to the opioid-related problems facing the country today:

Wide access to opioids through overprescribing and unauthorized users. The proliferation of opioid prescribing has led to wide access of opioid prescription drugs and a rise in unauthorized users.⁶⁵ Patients who misuse prescribed medications may engage in “doctor shopping” to obtain opioid prescriptions from multiple providers.⁶⁶ While most opioid overdoses originate with prescriptions, many of the people who overdose were not the original patients prescribed the medications.⁶⁷ This is especially true among adolescents and young adults with unsanctioned opioid use, who are most likely to obtain prescription opioids from friends or family with prescriptions.⁶⁸

Incentives to transition to low-cost illegal opioid substances. Restrictions on pain clinics and raids on “pill mills” have reduced both access to prescriptions and subsequent overdose rates in some states.⁶⁹ These practices, however, may have the unintended consequence of leading to increases in heroin use and related overdose as prescription medications become less available and more expensive than street substitutes.^{70,71} Researchers link the rise in heroin use initiation since 2007 with decreased availability and increased prices for prescription opioids during the same time period.⁷² In Florida, for example, as oxycodone-related deaths decreased, heroin-related deaths increased more than nine-fold (from 48 in 2010 to 447 in 2014).⁷³ Reliance on heroin could be reduced by greater availability of medications to treat substance use disorder and reduce the probability of relapse, but these options are limited due to restrictions on distribution and prescribing of narcotics under federal law and regulation (opioids are Schedule II controlled substances classified by the Drug Enforcement Agency).

Inadequate health system ability to identify and address opioid use disorders. Guided by public policies, many programs focus on preventing and treating unauthorized, non-medical opioid use, and have had some success in reducing the number of *new users*.^{74,75} However, across the health system problems remain. Clinicians may not have the necessary training to identify and address opioid dependence among their patients, and prescription drug monitoring programs do not flag all those who potentially need treatment.⁷⁶ Physicians also have difficulty in diagnosing patients at risk for opioid use disorder because many do not exhibit obvious “drug seeking behavior.” Many patients are reluctant to report their own concerns with drug dependence because they might risk being cut off from needed pain treatment.

A further challenge is that treatment programs face high demand; states report that about three-quarters of their treatment programs are at 80 percent or greater capacity, and concerns are growing about the ability of physicians to refer patients to appropriate care.⁷⁷ The cost of newer drugs used in those treatment programs is rising, which is likely to make these programs more expensive.

Lack of treatment alternatives to manage chronic pain. One of the barriers to reducing opioid use is the limited availability of alternatives for identifying, managing and treating pain. Treatments for conditions like back pain frequently vary from evidence-based care and are often associated with misuse and overuse of opioids. In its 2016 National Pain Strategy, the National Institutes of Health (NIH) notes that clinicians often do not receive adequate training on the causes of pain and pain management techniques, and that more data are needed to understand the characteristics and outcomes of chronic pain conditions.⁷⁸ In many cases, patients are responsible for their own care management, without ongoing and meaningful guidance; this undermines their treatment and can lead to opioid drug misuse. The NIH advocates a patient-centered approach combining appropriate medication with treatment for the causes of pain and supplementary therapies, but substantial gaps remain in this area.

Section 2. Analysis of UnitedHealthcare Data on Prescription Opioid Use

Addressing the challenges of opioid dependence and abuse requires understanding the demographics of the population of patients using those drugs, the length of prescriptions, and the reasons for initiating them. To help fill this gap in knowledge, UnitedHealthcare (UHC) analyzed administrative claims data to explore the characteristics of patients with long-term opioid prescriptions, with an emphasis on non-cancer users. The analysis also focused on spending and use of opioids as well as the underlying clinical conditions of individuals with long-term opioid use.

This paper incorporates data from three segments of UHC membership: Medicare Advantage, Medicaid managed care and the commercial fully insured business. The Medicare Advantage population includes individuals also enrolled in Medicare Part D coverage during the 2014 to 2015 period. The managed Medicaid population also includes members enrolled in UnitedHealthcare plans during that period. The commercial fully insured business includes individuals who had six months of continuous enrollment in 2014 and 2015. Table 2.1 features summary statistics for the study population.

Adapting the methodologies of prior researchers to our available data, we defined long-term users as individuals with a 35-day or greater supply of opioids within a six-month period.^{79,80} By restricting the discussion to long-term users, we isolated the characteristics of the individuals most susceptible to misuse and potential dependence or opioid use disorder.⁸¹ We also focused our analysis on individuals with a 300+ day supply and refer to them as the “highest users”.

Long-term use of prescription opioids

Table 2.1 provides top-line and detailed information about the use of opioids by business segment. About one-quarter of Medicare Advantage members had an opioid prescription in 2015. For commercial members, that figure was 17 percent and for members in managed Medicaid plans it was 15 percent. The relatively higher share of Medicare Advantage members using opioids is consistent with research showing higher prevalence of opioid use in older populations and accounts for higher use by patients with cancer and at the end of life.⁸²

Examination of long-term use of opioids shows that about 14 percent of Medicare Advantage members use opioids for 35 days or more. A lower share of commercial and managed Medicaid members – 4 to 5 percent – use opioids on a long-term basis. A closer look at those long-term users reveals that many are using opioids substantially beyond 35 days. Of those long-term users across all segments, about 60 to 65 percent used opioids for 90 days or more. Notably, the category of individuals using opioids for 300 days or more accounted for roughly one-quarter of the long-term users across all member segments: 26 percent in Medicare Advantage, 27 percent in Medicaid managed care and 22 percent in the fully insured commercial plans.

Table 2.1 - Summary Statistics for Opioid Use, 2015

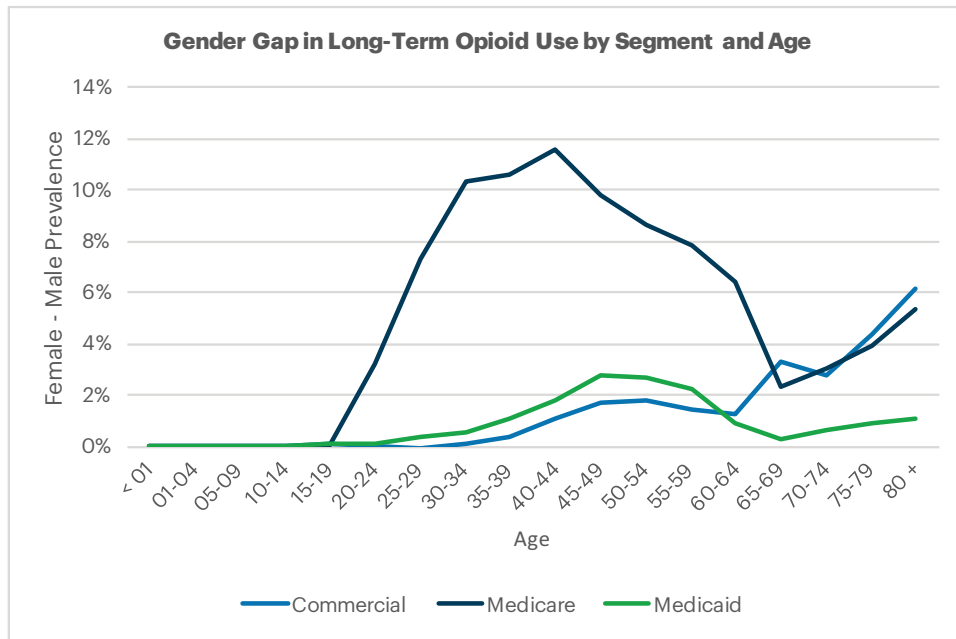
	Commercial Fully Insured	Medicare Advantage	Medicaid Managed Care
Opioid Users as a Percent of Members			
% members using any opioids	16.8%	25.2%	15.1%
% 35+ day supply	3.8%	14.1%	4.8%
% 90+ day supply	2.3%	8.6%	3.1%
% 180+ day supply	1.5%	6.0%	2.1%
% 300+ day supply	0.8%	3.7%	1.3%
Distribution of Long-Term Users (35+ Day Supply)			
% with 90+ day supply	61%	62%	66%
% 180+ day supply	39%	43%	45%
% 300+ day supply	22%	26%	27%
Long-Term User Demographics			
% non-cancer	81%	74%	86%
% female	54%	64%	62%
<i>Memo: % female in segment population</i>	49%	58%	55%
Prevalence of Long-Term Use Within Selected Age Cohorts			
45-49	5.8%	38.3%	15.6%
50-54	7.0%	40.3%	18.1%
55-59	8.0%	39.7%	18.1%
60-64	8.7%	33.1%	16.1%
65-69	10.9%	10.0%	6.5%
70-74	9.5%	10.5%	3.2%
<i>Memo: % 65 and older in segment population</i>	1.9%	87.4%	5.3%

Source: UnitedHealthcare analysis of 2015 administrative claims data

Gender and age variation

Table 2.1 shows that across all segments, a greater proportion of long-term opioid users are female than male, consistent with research findings described in Section 1.⁸³ The most prominent gender gap is among Medicare Advantage members; in that population, 64 percent of long-term users are women, while only 58 percent of the underlying plan population is female. Additional analysis shows that 16 percent of female Medicare Advantage members are long-term opioid users, compared to 12 percent of male members. Similar but smaller gender-related gaps exist in the commercial and managed Medicaid populations. Figure 2.1 illustrates the relative magnitude of those gaps across business segments.

Figure 2.1 - Gender gap by age, by business segment, 2015

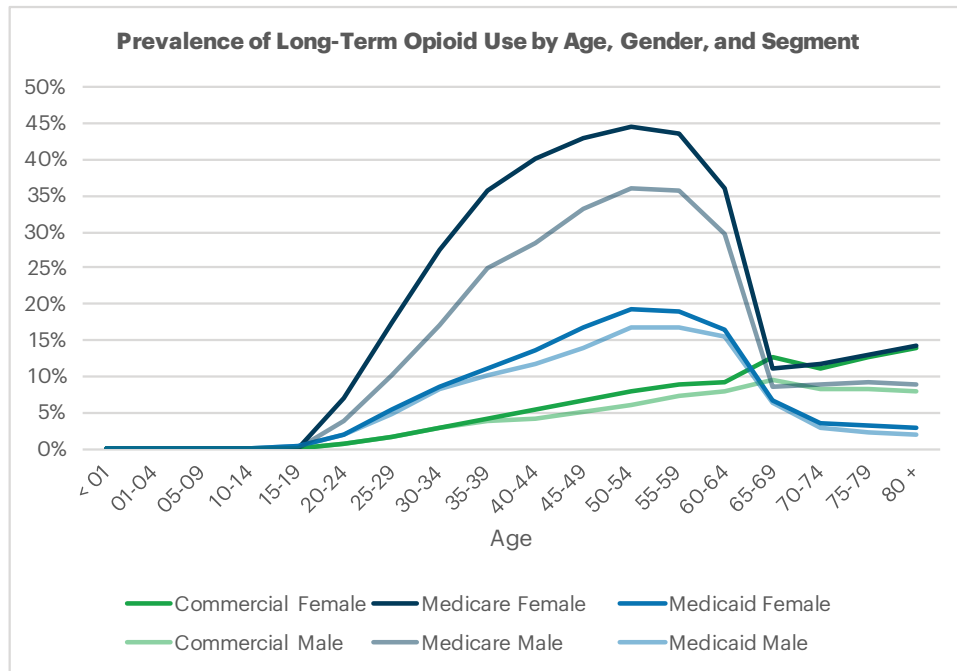


Source: UnitedHealthcare 2015

Figure 2.2 provides additional detail on the prevalence of long-term opioid use by gender and age for each of the member segments. In the Medicare Advantage population, 33 to 40 percent of members between the ages of 45 and 64 are long-term opioid users. This may be due to the differential needs of the under-65 Medicare population that qualifies for Medicare based on a disability determination or end-stage renal disease. Findings are consistent with research by MedPAC regarding higher use in this population in Medicare Part D more broadly.⁸⁴

Because most of the Medicare Advantage population in this analysis is older than 65, prevalence rates mask potential issues in younger individuals, who may be more likely, on average, to have conditions where treatment includes opioid prescriptions. Relatedly, long-term opioid use in the 45- to 64-year old population in Medicaid plans shows the cohort has higher-than-average use of opioids for that segment and has a prevalence higher than the same cohort in the commercial population.

Figure 2.2 – Prevalence of long-term opioid use by age cohort, gender, and business segment, 2015



Source: UnitedHealthcare 2015

Underlying clinical conditions

Roughly three-quarters of long-term opioid users in the Medicare Advantage population are patients with non-cancer pain; the balance of the population uses opioids to help treat the effects of cancer. An even higher share of long-term users in the commercial and Medicaid populations are non-cancer patients, respectively 81 percent and 86 percent. (See Table 2.1.)

To capture more detail on the forces driving opioid use, we analyzed the prevalence of underlying health conditions for the population using opioid treatment on a long-term basis. Specifically, we identified the most common conditions those individuals have using classifications from the Agency for Health Research and Quality (AHRQ) and the shares of overall medical spending for those conditions in each business segment. (See Table 2.2.)

Across business segments, about 70 to 75 percent of individuals with long-term opioid use were diagnosed with an underlying musculoskeletal/connective tissue condition. Other conditions, such as circulatory and injury-related, also are common among individuals using opioids on a long-term basis. For example, in Medicare Advantage about 65 percent of individuals using opioids had an underlying circulatory condition. For users in Medicaid managed care plans, about 40 percent had a condition related to injury or poisoning.

Those conditions accounted for a notable share of medical costs. In Medicare Advantage plans, patients with circulatory conditions and musculoskeletal/connective tissue conditions were the top drivers of medical spending in long-term users of opioids, accounting for 16 and 14 percent of spending for those patients respectively. In the commercial segment, 24 percent of spending by long-term users of opioids was for musculoskeletal/connective tissue conditions, a figure higher than the share for Medicare Advantage or Medicaid plans (14 percent in both segments).

The highest users of opioids are more likely than all long-term users to have underlying musculoskeletal conditions that account for a high proportion of overall medical spending (roughly 80 to 85 percent of the population has those conditions). In the commercial population of users with more than a 300-day supply of opioids, about 30 percent of medical spending is for patients with musculoskeletal conditions.

Table 2.2 - Conditions and composition of medical spending for long-term opioid users, 2015*

AHRQ Category	Commercial Fully Insured		Medicare Advantage		Medicaid Managed Care	
	Users With Condition	Share of Total Spending	Users With Condition	Share of Total Spending	Users With Condition	Share of Total Spending
Chapter	Long-Term Users					
Musculoskeletal/connective tissue	71%	24%	70%	14%	75%	14%
Circulatory	41%	9%	65%	16%	50%	11%
Injury and poisoning	30%	10%	34%	9%	40%	9%
Respiratory	38%	4%	49%	9%	49%	7%
Cancer	16%	18%	22%	10%	14%	10%
Condition						
Spondylosis	NA	12%	NA	6%	NA	7%
Osteoarthritis	NA	5%	NA	4%	NA	2%
Chapter	Long-Term Users with a 300+ Day Supply					
Musculoskeletal/connective tissue	NA	30%	80%	17%	85%	17%
Circulatory	NA	9%	65%	14%	55%	10%
Injury and poisoning	NA	9%	37%	9%	42%	8%
Respiratory	NA	4%	50%	8%	54%	7%
Cancer	NA	10%	19%	9%	15%	9%
Condition						
Spondylosis	NA	18%	NA	8%	NA	9%
Osteoarthritis	NA	3%	NA	3%	NA	2%

Source: UnitedHealthcare analysis of 2015 administrative claims data

NA: Not Applicable

*Patients may have multiple conditions; numbers of "Users With Condition" are not additive

A more granular view of spending among long-term users shows that spondylosis (back pain, see Box 2.1) is the highest single category for spending across all business segments. Analysis of commercial members with medical claims for back pain provided us with additional insights. For example, spondylosis is the most common condition reported for patients in the 30 days prior to opioid use.

Box 2.1 - Spondylosis and osteoarthritis

Spondylosis is the name of intervertebral disc degeneration with or without myelopathy (disease of the spinal cord) or radiculopathy (where a nerve or nerves do not function properly, causing pain and other symptoms).^{85,86} In a prior community-based population study, 11.5 percent of respondents reporting lower back pain had lumbar spondylosis.⁸⁷ Care for spondylosis, also referred to as degenerative disc disease and spinal osteoarthritis, often involves spinal manipulation, physical therapy and pain medications.⁸⁸ Osteoarthritis occurs when the protective cartilage on the ends of the bones wears down over time. It can damage any joint in the body but most commonly affects the joints in the hands, knees, hips and spine. The CDC reports that osteoarthritis affects 13.9 percent of adults aged 25 and older and 33.6 percent of those 65 and older.⁸⁹

Spending for opioid prescription drugs

Table 2.3 provides details on spending and use of opioid prescriptions for each business segment. Spending for opioid drugs represents about 3 to 4 percent of combined medical and drug spending for the long-term opioid population across segments, with average annual opioid drug spending about \$550 to \$650 per person for long-term users of those drugs. Total spending on a per-person basis (including individual out-of-pocket and health plan share) is higher in the commercial population than in the Medicare Advantage or Medicaid populations, 8 percent and 15 percent higher respectively.

Table 2.3 - Spending and utilization for opioid prescriptions

	2015	Commercial Fully Insured	Medicare Advantage	Medicaid Managed Care*
Long-Term Users: Opioid Prescription Cost and Use				
Opioid prescriptions as share of total spending		3%	4%	4%
Average drug cost per person per year (total)		\$639	\$590	\$554
Average drug cost per person per year (health plan)		\$527	\$511	\$561
Average days' supply per person per year		196	203	210
Unit cost average per person per day (total)		\$3.26	\$2.90	\$2.64
Unit cost average per person per day (health plan)		\$2.69	\$2.51	\$2.67
Average prescriptions per patient		8.5	8.4	9.9
300 + Day Users: Opioid Prescription Use Compared to All Long-term Users				
% of opioid prescription spending by long-term users		70%	80%	66%
Average drug cost per person per year (health plan)		\$1,663	\$1,571	\$1,386
Ratio to all long-term users		3.2	3.1	2.5
Unit cost average per person per day (health plan)		\$3.79	\$3.44	\$3.11
Ratio to all long-term users		1.4	1.4	1.2
Average prescriptions per patient		16.3	17.0	18.1
300+ Day Users: Share of Opioid Prescription Spending by Member Condition				
Musculoskeletal/connective tissue		78%	80%	76%
Injury and poison		35%	37%	39%
Circulatory		42%	58%	49%
Members with Spondylosis				
Spending on opioid prescriptions as % of opioid spending for all long-term users with any condition		63%	61%	52%
Spending for members with 300+ day's supply as % of spending for all long-term users with spondylosis		78%	82%	74%

Source: UnitedHealthcare analysis of 2015 administrative claims data

*Unit cost (total and health plan) in Medicaid managed care differ slightly because of methods used

The role of volume and unit prices. Utilization of opioids is higher for the managed Medicaid and Medicare Advantage populations than for the commercial population. Among long-term users, the average days' supply per year is 210 days for the managed Medicaid population, compared to 203 days for Medicare Advantage and 196 days for the commercial business.

In contrast, average unit prices for all long-term users are 12 percent higher for commercial plans than for Medicare Advantage plans and 23 percent higher than for Medicaid plans. The difference could be due to a range of factors, including the mix of drugs used in the population. About 27 percent of managed Medicaid spending on opioids for long-term users was for drugs used in the treatment of opioid use disorders, compared to 17 percent of spending in the commercial sector.

Overall, unit prices for long-term users are about twice those for short-term users, suggesting the mix of drugs to treat those individuals may include an elevated share of high-cost drugs. Unit costs have increased by about 15 percent in the last two years for the Medicare and Medicaid populations, suggesting the drugs used in those programs and/or the composition of the population may be changing.

Spending for the highest users. The analysis found that across business segments, opioid drug spending for individuals using opioids for 300 or more days comprised a substantial share of opioid spending for all long-term users. The top 26 percent of users in Medicare Advantage plans pay 80 percent of the total cost for all long-term users. Similarly, 22 percent of users with 300 or more days' supply in the commercial business account for 70 percent of the opioid costs for all long-term users. In Medicaid managed care plans, 27 percent of opioid users have a 300+ day's supply, with those users accounting for 66 percent of the total cost for opioid prescriptions for all users.

The per-patient costs for prescription opioids for the highest users are about three times more than the average amount for all long-term users (3.2 times as much in the commercial business and 2.5 times as much in managed Medicaid). Higher utilization (days and prescriptions) contributes to this differential; the number of scripts per patient using drugs for 300 or more days is about two times the number for long-term users on average. Additionally, this population uses a more costly mix of drugs, as unit prices for drugs taken by people with a 300 or more days' supply are about 40 percent higher than for all long-term users in the commercial and Medicare population and 20 percent higher in the Medicaid population. About 25 percent of Medicare and Medicaid long-term users rely on seven of the most common high-cost drugs; however, those who are 300+ day users with musculoskeletal conditions are more likely to use those high-cost drugs.

A substantial share of spending on opioids for patients using drugs for 300 or more days is for those with musculoskeletal conditions. In the Medicare Advantage program, about 80 percent of spending on opioids for the 300 day+ population is for members with those conditions, and most of that amount is for members with back pain. Similarly, in the commercial sector 78 percent of individuals using opioids on a very long-term basis (300+ days) have an underlying musculoskeletal condition, many with a specific diagnosis of spondylosis. In the managed Medicaid population, spending on opioid prescriptions for individuals with musculoskeletal conditions was 76 percent of all opioid spending for 300+ day users.

Spending for low-back pain. The costs of opioid prescriptions for members with spondylosis represent a notable share of all prescription opioid spending for long-term users – about 60 percent in the Medicare Advantage and commercial population and roughly 50 percent in the managed Medicaid population. For those members using opioids on a long-term basis to treat spondylosis, about 75 to 80 percent of spending is for the sub-population of individuals using those drugs 300 days or more a year.

Box 2.2 - OptumLabs and analysis of the costs of opioid use disorders

OptumLabs uses an analytic tool called the Natural History of Disease to identify members with an opioid use disorder diagnosis in claims data. The tool identifies the cost of members with that diagnosis compared to a matched population. Recent analysis found that the costs of individuals with an opioid use disorder were \$1,000 to \$1,200 more expensive on a per member per month basis, with costs persisting for at least five years after diagnosis.

These demographic, diagnosis and spending trends have important implications for health care, as discussed in Section 3 and Section 4 of this report.

Section 3. Options for Addressing the Prescription Opioid Challenge

Health system stakeholders, including providers, public and private payers, federal and state policymakers, public health experts and others have begun to address system-wide issues related to misuse of opioid prescriptions, limited access to addiction treatment options, and the lack of approaches to address chronic pain, with the following three approaches:

- Restrictions and initiatives to curtail inappropriate prescribing and use
- Enhanced programs to address opioid use disorder and overdose
- Better treatment alternatives to manage chronic pain

Below, we discuss these current efforts, their effects on the specific populations most exposed to prescription opioids, and associated pain-related disorders (discussed in the analysis in Section 2) and offer examples from UnitedHealth Group's ongoing initiatives in this area.

Restrictions and initiatives to curtail inappropriate opioid prescribing and use

Barriers to opioid prescription and dispensing. Efforts are underway at the federal and state levels to place limitations on prescription and dispensing of opioids. For example, Florida regulated pain clinics and restricted health care providers from directly dispensing prescription painkillers from their offices, resulting in a decrease in overdose deaths from oxycodone. Ohio restricted emergency departments and acute care facilities from providing patients with opioid prescriptions lasting more than three days, implemented "press pause" at 80 milligrams of a morphine-equivalent daily dose in the treatment of chronic, non-terminal pain, and limited pills per prescription and the use of long-acting opioids for acute pain outside of the emergency department.⁹⁰ New Jersey recently established a maximum limit of five days on the length of opioid prescriptions.⁹¹

Approaches that monitor filling of prescriptions help address situations in which patients "doctor shop" to get multiple prescriptions and where providers have unusual prescribing patterns. For example, state prescription drug monitoring programs have proven effective at reducing doctor shopping.⁹² In 2012, New York required prescribers to check the state's prescription drug monitoring program prior to prescribing painkillers, resulting in a 75 percent drop in patients obtaining the same drugs from multiple prescribers.⁹³

Private health plans increasingly incorporate monitoring programs to flag potential indicators of misuse, such as exceeding normal quantity limits, filling prescriptions from multiple doctors and long-term use (see Box 3.1).^{94,95} Some health plans also have implemented patient review and restriction programs, also called "lock-in" programs, which limit members with a pattern of visiting multiple pharmacies and prescribers for narcotics to a single designated pharmacy and/or provider.⁹⁶

Additional health plan efforts focus on prescribers. Two methods of promoting shorter-term prescriptions include limiting the length of the initial opioid prescription and requiring doctors to obtain authorization prior to prescribing more than a 30-day supply of prescription pain killers.^{97,98}

Box 3.1 - OptumRx initiatives to address opioid prescribing practices

OptumRx conducts a range of initiatives that ensure appropriate prescribing. Activities include: prescriber and pharmacy surveillance, analysis and intervention, point-of-service concurrent drug utilization review (C-DUR) edits, refill limits, utilization management programs (e.g., dispensing limits and prior authorization), retrospective claims analysis, patient outreach and education, and case management services. Among commercial health plan members in 2015, this suite of OptumRx programs resulted in a 41 percent decrease in the number of opioid prescriptions written, a 45 percent decrease in the number of physicians prescribing opioids and a 41 percent decrease in the number of pharmacies dispensing opioids.

Improved guidelines for prescribers and physician outreach. Public health officials and private payers encourage appropriate prescribing practices for opioids (see Box 3.2). In March 2016, the CDC clarified and updated recommendations made by professional organizations, states and associations that stress that opioids should not be first-line therapy, that providers should use non-opioid therapy to treat chronic pain and should initiate therapy with the lowest possible effective dosage.⁹⁹ Private plans encourage network providers to adopt safe prescribing guidelines and discuss options and risks with patients before initiating long-term opioid therapy.¹⁰⁰

Training programs for providers can help them identify patients at risk for abuse, discontinue opioid prescriptions, and implement guidelines. The Food and Drug Administration (FDA) has recommended increasing the number of prescribers who receive training for pain management and safe prescribing of opioids.¹⁰¹ Clinical practice tools also support physicians in prescribing appropriate doses based on pain level.

Box 3.2 - OptumRx prescriber and patient education

OptumRx conducts education and outreach programs with patients and providers based on evidence-based best practices (e.g., from the CDC). Efforts help patients understand treatment recommendations, particularly for those who are first-time opioid users. Education includes information about appropriate dosing, side effects and safety risks, alternative pain management options, proper storage and disposal of medications, and the importance of not sharing medications. On the provider side, approaches target prescribers whose patterns of opioid prescribing deviate significantly from their peers and from national best practices. Communications emphasize the use of caution in prescribing opioid agents and the need to refer to state-level prescription drug monitoring databases. Furthermore, OptumRx notifies providers if members are receiving drugs from multiple providers. Education initiatives focus on helping providers understand how to best care for patients who may have become physically and/or psychologically dependent upon opioids, suggesting treatment alternatives and safe opioid tapering strategies.

Prevention and targeted outreach using big data. Data analytics about the populations that most frequently use prescription opioids and risk factors for dependence can help to develop care pathways that recognize risk factors for abuse (see Box 3.3). Targeted approaches, including education and awareness campaigns and “first-fill” education, are ways to help patients who may be unaware of the risks of opioid use disorder. Other approaches include investigating which patients are the most likely to develop opioid use disorder or engage in doctor shopping, and offering treatment alternatives. Those diversion-detection tactics may help to target specific populations more effectively than broader bans on prescribing and dispensing. They also may offer additional insights into prescribing behavior and inform the development of future guidelines and interventions for high-volume prescribers.

Box 3.3 – Optum Behavioral Health and OptumRx prevention and member outreach

Optum Behavioral Health and OptumRx combine their clinical and analytic expertise to enhance opioid use disorder prevention. They refine existing identification and stratification rules to find members who are at risk earlier in the progression of their disorders. They also recently completed an opioid use disorder prediction algorithm that relies on machine learning. It includes medical, behavioral and pharmacy data that generate a prospective risk score for each member, achieving a 74 percent positive predictive value in the most acute members. Powerful analytics enhance opportunities to customize outreach and interventions targeting individuals at the highest risk.

Enhanced programs to address opioid use disorder and overdose

Support for medication and treatment programs. Increasing access to treatment programs for opioid use disorder is a focus of federal and state efforts. Specific treatment approaches include medication-assisted treatment (MAT), which consists of approved medications in combination with behavioral therapies (see Section 1). This evidence-based treatment includes screening, assessment (to assess the severity of the opioid use disorder), lab monitoring and case management services, in combination with substance use disorder treatment and pharmacotherapy.¹⁰² Research suggests that MAT results in fewer inpatient hospitalizations and admissions to psychiatric and rehabilitation hospitals.¹⁰³ However, concerns exist that patients continue to use opioids during their treatment programs or misuse the drugs they are taking as part of MAT programs.

Expanding the number and type of providers who can provide MAT addresses access issues, helps prevent overdoses and mortality, and makes treatment programs more effective. This is due, in part, to the greater availability of medications to treat substance use disorder and reduce the probability of relapse, which can reduce shifts to heroin use.¹⁰⁴ Although longstanding federal law only permits physicians who meet certain requirements to treat opioid use disorder with specific medications approved by the FDA (e.g., buprenorphine), policymakers are considering initiatives to safely increase access while reducing the risk of drug diversion.¹⁰⁵ Recent federal legislation, the Comprehensive Addiction and Recovery Act (CARA), permits nurse practitioners and physician assistants to prescribe buprenorphine after completing educational requirements.¹⁰⁶

In addition to expanding the scope of providers who can administer MAT, CARA promotes training for first responders and law enforcement officials in addressing opioid use disorder, authorizes funding for evidence-based treatment and interventions, and promotes access to recovery resources. Additional funding (December 2016) provides \$1 billion to prevent opioid abuse and improve access to treatment programs.

Enhancing and expanding treatment for overdoses. Increasing the availability of naloxone (an opioid antagonist) in MAT programs can help reduce the risk of overdose. (Prescribers, however, have limited capabilities for storing the injectable agent, which may reduce the impact of this approach.)¹⁰⁷ About 40 states and the District of Columbia have passed laws that expand naloxone access. Some of these states allow persons who act in good faith or police officers to administer these opioid antagonists without the risk of criminal prosecution.¹⁰⁸ Private health plans have developed programs to increase naloxone access for law enforcement and pharmacists so that they can quickly reverse overdoses. For example, one health plan has made naloxone available for pharmacists to dispense to patients without individual prescriptions in pharmacies in 37 states.

Further efforts to prevent overdoses focus on law enforcement issues. As of July 2015, 31 states and the District of Columbia have enacted “911 Good Samaritan” laws, which provide immunity for victims and witnesses who act in good faith to seek medical assistance when they believe an overdose is occurring.¹⁰⁹

Benefit design and opioid use disorder treatment. Coverage for and access to opioid use disorder treatment are part of existing law and regulation. For example, MAT is an essential health benefit under the Affordable Care Act. The Medicare Part D program has rules that prevent Part D plans from having formularies or plan benefit designs that limit access to MAT through utilization management strategies or high cost-sharing.¹¹⁰

Private health plans have taken steps to expand treatment options for opioid use disorder. Reduced copays paired with utilization review targeting misuse are approaches that can improve access to high quality care. Developing high-performance networks of providers that treat the disorder, including through MAT services, is an emerging strategy (see Box 3.4). Plans also provide support to help providers promote the classification of substance use disorder as a “chronic disease” to educate patients and minimize the stigma associated with seeking treatment.¹¹¹ Additionally, some plans identify members with a history of opioid abuse and help connect them with needed behavioral health support services.¹¹²

Box 3.4 - Optum MAT network and bundled payment approach

Optum works with preferred providers who treat opioid use disorders and has built a nationwide network of providers offering evidence-based medication-assisted therapy (MAT). This therapy typically includes the use of buprenorphine and naltrexone for opioid treatment paired with psychosocial care, lab monitoring and peer support. Optum leads the industry in the use of bundled payment approaches – featuring an all-inclusive monthly per member rate – with a separate reimbursement for medication.

Optum Behavioral Health also collaborates with CleanSlate Centers in Massachusetts, Pennsylvania and Indiana. Its care model offers MAT treatment that relies on a combination of focused therapy to address the source of opioid use disorders, harm reduction approaches, and medication to prevent cravings and reduce the effects of opioid withdrawal. The program offers different care pathways based on patient risk levels (e.g., non-responding, maintenance) and relies on a robust training program for its clinician team. Based on Optum’s “heat maps” that identify areas of need for treatment services, CleanSlate is expanding into an additional 14 markets in these states in 2017: CT, WI, TX, FL, OH, AZ, MO and KY. Opportunities exist to expand this model more broadly.

UHC and Optum recently launched an anonymous 24/7 treatment helpline that connects individuals to needed treatment. This free helpline also provides educational materials to employers to help them reach employees dealing with substance use and offers recovery toolkits to patients and their caregivers.

Development and dissemination of new therapies for opioid use disorder and chronic pain. The search for improved therapies and approaches to improve appropriate use of opioids continues across the health system. The FDA is pursuing interventions including enhanced safety labeling particularly regarding extended release/long-acting opioid prescriptions, requirements for new real-world, post-market data, and improved treatment of both opioid use disorder and pain, including encouraging generic abuse-deterrent formulations.¹¹³

Comparative effectiveness research can help determine the relative impact of treatment options for opioid use disorders and compare individual treatment drugs and combinations (see Box 3.5).¹¹⁴ Research in this area supports the use of psychosocial counseling in addition to pharmacological treatments as the most effective way to treat opioid dependence.

Box 3.5 - OptumLabs

OptumLabs leverages its extensive data assets and analytic capabilities to research the short- and long-term comparative effectiveness, dose-response and adverse events associated with opioid use. In partnership with academic, federal and public health authorities, OptumLabs is developing and benchmarking enterprise-wide, patient-level outcome measures in four critical categories: prevention, chronic pain management, treatment of substance use and care of mothers and infants exposed to opioids. This work can support the development of performance dashboards, track the impact of various enterprise-level approaches, and assist with reporting of meaningful outcomes to inform data-driven decisions at health plan, service line, enterprise and state levels.

Better treatment alternatives to manage chronic pain

Effectively preventing opioid misuse requires moving “upstream” and addressing the initial diagnosis of chronic pain. There are substantial gaps in this area and opportunities exist for further innovation that targets the populations at greatest risk for opioid misuse and use disorder, such as women and those with musculoskeletal pain.

Adopting integrated and targeted approaches to address pain. Organizations involved in health care delivery and public and private payers are addressing underlying issues related to pain, including integrated approaches that include medical, behavioral and pharmacy components, such as those recommended by the Department of Health and Human Services in its National Pain Strategy.¹¹⁵ This approach aligns with recommendations by industry experts calling for patients to have individualized, integrated, multi-modal plans of care for pain treatment that may include pharmacological treatments (such as over-the-counter analgesics), physical therapy and complementary approaches (such as therapeutic massage) in combinations tailored to individual patients.¹¹⁶ To explore the use of long-term opioid therapy to treat chronic non-cancer pain and its management more broadly, the Patient-Centered Outcomes Research Institute has funded 46 research studies.¹¹⁷

Primary care models for pain management. Supporting primary care practices in developing models that incorporate new guidelines and incentives for reduction in variation of treatment for pain is an important way to address “upstream” challenges. Specifically, targeted documentation and structured assessments in those models can help physicians better treat patients.¹¹⁸

Benefit design and pain management. Health plans are exploring ways to expand treatment for pain in ways that deter opioid abuse. For example, some plans have invested in pain management education for providers, facilitating interdisciplinary collaboration to ensure that pain is effectively treated while minimizing opioid overprescribing.¹¹⁹ Other plans conduct research and offer guidelines for alternative therapies for pain management, and leverage technology and benefit design to improve pain co-management by patients and providers (see Boxes 3.6 and 3.7).

Box 3.6 – OptumLabs, Optum Consumer Solutions Group and UnitedHealthcare – alternative approaches to musculoskeletal pain research and translation initiative

This initiative is a multi-year innovation and translation program that aims to improve guideline adherence and the quality and affordability of non-pharmacologic management and treatment of musculoskeletal (MSK) disorders, a leading driver of health care costs and lost work productivity. Recent clinical guidelines from the American College of Physicians have strongly recommended non-opioid approaches to MSK pain, and this initiative will assess variation across regions and providers, especially in the share of episodes involving the use of opioids. Optum conducts research with its data assets and research partners and translates findings into innovation across the delivery system (e.g., through decision-support tools, coverage policy, value-based benefit design and quality measurement). The initiative will generate ideas for approaches to reduce opioid dependence by enhancing use of alternative therapies for conditions, such as chronic back pain, that achieve better long-term outcomes with fewer complications, and will examine co-morbidities and implications of short- and long-term opioid use.

Connected health. New approaches in digital therapy and drug/software combinations are increasingly addressing substance use disorder, pain, depression and other conditions. Approaches include mobile or smartphone applications, sensors and home monitoring, telehealth and internet-based interventions for self-management, and virtual reality applications.

Mobile medical applications that feature behavioral therapy may help to treat opioid use disorder, sometimes in combination with pharmacotherapy – specifically, smartphone applications tied into clinician-facing web interfaces.¹²⁰ A review of mobile technologies for managing chronic pain found evidence for lower costs and improved outcomes.¹²¹

- A preliminary study in Norway using a smartphone application for women with musculoskeletal pain found significant reduction in symptom levels.
- Another study found that a pain-tracking application with twice daily SMS text messaging for social support reduced daily pain for patients with chronic non-cancer pain.¹²²
- Another study demonstrated that a smartphone-delivered intervention with diaries and personalized feedback can reduce catastrophizing, increases in functional impairment and symptom levels in women with chronic widespread pain following inpatient rehabilitation.¹²³

Wearable sensors and home monitoring technologies such as activity sensors, door sensors and medication device tracking can help researchers and clinicians monitor pain in an unobtrusive manner.¹²⁴ Telehealth services can help primary care physicians reduce chronic pain through better monitoring and reduced opioid use, initiation or dose escalation.¹²⁵ Centralized telecare management, coupled with automated symptom monitoring, has been associated with improved pain and depression outcomes in cancer patients receiving care in geographically dispersed oncology practices.¹²⁶

Researchers also have found that web-based therapies provided to people in their homes can help them manage chronic pain, including therapies that emphasize peer support and social networking. A recent Cochrane review of the effectiveness of internet delivery of therapies for pain management indicates that psychological treatments, including cognitive behavioral therapy, delivered via the internet may help adults with non-headache pain to reduce pain, disability, depression and anxiety.¹²⁷ A study of internet-based interventions consisting of structured self-administered therapy programs offered in weekly modules demonstrated decreased pain levels and improved function.¹²⁸

Box 3.7 - Enterprise Research and Development – technology suite supporting pain management

The Enterprise Research and Development (ERD) team leverages technology and practice redesign to help members and their providers co-manage chronic pain more effectively with continuous and comprehensive monitoring for symptoms and support for coping. This approach connects patients to services that enable them to improve day-to-day management of their conditions. Specifically, the team is piloting an approach that enhances co-management through video education (e.g., physical therapy exercises), daily monitoring and regular communication/coaching with the practice. Those services use cognitive behavioral therapy with a focus on pain avoidance beliefs and behaviors, as well as self-regulatory and pain management skills (e.g., attention diversion and stress-coping mechanisms) to improve back-pain management and avoid prolonged opioid use and other adverse outcomes.

Limbr is a technology suite that leverages “small data” in several ways for patients with chronic pain: passive day-to-day quantification, personalization of interaction, social facilitation and accountability, and digital interaction that informs clinical expertise and treatment adaptation and sends nudges via telemedicine. The Limbr platform supports enhanced clinical care and adherence to a care plan for individuals with chronic pain. Patient applications enable daily capture of important patient metrics (e.g., ability to cope with activities), communication with coaches, access to care plans, physical therapy instructions and videos. Outcomes include longer-term function and avoidance or minimization of opioid usage and dependence. In collaboration with Cornell Tech and the Hospital for Special Surgery, ERD is conducting a research study (LIMBR Study) on the impact of this approach and will measure adherence to care plans, including physical therapy, and patient adoption and satisfaction. Early results show improvement in patient quality of life and compliance with physical therapy for back pain.

Section 4. Discussion and Suggestions for Future Research

The growth in opioid use and prescribing has been a central factor in the health system's evolving approaches to treating pain. Limitations on alternative treatment options for pain persist, and disparities in patient access to available options create barriers to curbing these trends.¹²⁹ Efforts to address the widespread use of prescription opioids are underway at the federal and state levels and across health system stakeholders, but initiatives often focus on restricting access to opioids and supporting treatment for opioid use disorder. Less emphasis falls on addressing "upstream" causes of chronic pain and activities that prevent and manage symptoms and pain levels, and treatment strategies and recommendations often fail to distinguish between the different characteristics of patients who use prescription opioid medications and their underlying conditions leading to pain.

Our findings demonstrate that the overwhelming majority of patients with opioid prescriptions does not have a cancer diagnosis; these patients tend to have musculoskeletal and connective tissue disorders, especially spondylosis and osteoarthritis, which lead to pain. We also found that the prevalence of opioid use is higher among women and increases with age. In addition, opioid use is a substantial cost driver, with long-term opioid prescriptions averaging from \$550 to \$650 annually per person. A large portion of overall opioid costs arise from patients with a 300-day supply.

A central focus of efforts to address opioid abuse disorder – and the impact on the health system – should consider the sources of chronic pain and train providers on opioid use in relation to other pain management strategies. Successful pain management programs offer integrated approaches that are individualized and recognize the risk factors for opioid dependence. Payers can encourage innovation by developing and providing incentives for interventions that address underlying sources of chronic pain. Multimodal approaches also are important in cases of opioid use disorder and can treat medical and behavioral health issues. Increasingly, those approaches include the use of emerging technology. Our findings suggest that gender-responsive approaches to prevention and treatment may help to address the specific challenges faced by women and that lead them to initiate opioid prescriptions.

While this paper highlights the relationship between demographics and opioid use, additional work is needed to understand the mechanisms behind the substantial variation of opioid use between men and women of different ages. Future research should isolate the effects of gender and age respectively and explore whether these differences arise from differing diagnoses, disparate treatment from physicians and disciplines, patient perceptions of opioid use, or some combination thereof. Further research is needed to assess the effectiveness of long-term opioid use for pain management. Likewise additional analysis could help to determine the outcomes associated with different pain management models. Finally, researchers should examine the trajectory from legitimate use of prescription medications to medication dependence leading to opioid use disorder. By learning more about the timeframes and associated risk factors, researchers and clinicians can better time assessment and interventions.

By using evidence-based techniques to minimize overprescribing, address the transition to illegal opioids, enhance treatment programs for opioid use disorder, and promote better treatment alternatives to manage chronic pain, stakeholders can stem the tide of abuse and overdose and ensure high-quality patient care, with the overall goal to improve population health.

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