Prescription Drug Misuse in America

A Report on Marijuana and Prescription Drugs
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary</td>
<td>2</td>
</tr>
<tr>
<td>Prescription Drug Misuse is Prevalent</td>
<td>6</td>
</tr>
<tr>
<td>Marijuana: The Most Misused Drug</td>
<td>8</td>
</tr>
<tr>
<td>Recreational Marijuana Users More Likely to Misuse Other Drugs</td>
<td>9</td>
</tr>
<tr>
<td>Research Methodology</td>
<td>11</td>
</tr>
<tr>
<td>References</td>
<td>12</td>
</tr>
</tbody>
</table>

A PDF of this report and additional content are available at [QuestDiagnostics.com/HealthTrendsPDM](http://QuestDiagnostics.com/HealthTrendsPDM)
Summary

Despite relaxed public attitudes and new decriminalization laws in several states (Figure 1), a large body of evidence chronicles the adverse health impacts of marijuana. The drug, derived from the leaves, stems and other parts of the hemp plant *Cannabis sativa*, contains delta-9-tetrahydrocannabinol, or THC, a psychoactive chemical which affects areas of the brain associated with pleasure, memory, thinking and coordinated movement.

Evidence suggests that smoking marijuana raises certain health risks, particularly on neurological functioning. These risks seem to be most pronounced for the developing adolescent brain. Marijuana is also associated with cardiovascular and mental health risks in adults. In addition, marijuana smoke contains known carcinogens, although links to lung cancer have not been well substantiated.\(^1\)

Marijuana use is associated with other forms of drug abuse. While some research questions if the link between marijuana and other drug abuse is causal,\(^2\) other studies find that marijuana use typically precedes the use of potentially more dangerous drugs, such as cocaine and heroin. A recent study published in the *Journal of Adolescent Health* found that men and women who had used marijuana were 2.5 times more likely to later misuse prescription drugs compared to those who abstained.\(^3\)

**Figure 1. Legal Status of Marijuana Use by State**

- **Legalized Recreational and Medical Marijuana Laws**
- **Medical Marijuana Laws**

*Source: National Conference of State Legislatures NCSL, 2013*
Regardless of these risks, marijuana is the most widely used illicit drug in the world. The use of marijuana in the United States is increasing. In 2010, more than 29 million Americans (11.5%) age 12 or older reported using marijuana within the past year—a significant increase over rates reported each year from 2002-2008, according to the National Institute on Drug Abuse. Other research suggests a decrease in perceived risk of marijuana use in young adolescents corresponds with increased risk of marijuana use (Figure 2).

In recent years, new legislation permitting the use of marijuana for medicinal purposes or recreation has gained ground at the state level. Eighteen states and the District of Columbia now permit marijuana use for medicinal purposes. In November 2012, a majority of voters in Colorado and Washington voted to legalize adult social use of marijuana. Despite increasing efforts to legalize marijuana, the Obama Administration has stated its opposition to any form of drug legalization.

**FIGURE 2. MARIJUANA USE AMONG 12TH GRADERS* VS. PERCEIVED RISK**

<table>
<thead>
<tr>
<th>Year</th>
<th>Using</th>
<th>Perception of Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>25.8%</td>
<td>32.4%</td>
</tr>
<tr>
<td>2010</td>
<td>24.5%</td>
<td>34.8%</td>
</tr>
<tr>
<td>2012</td>
<td>20.6%</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

36.4% equates to about 11 students in the average class.

*Past year use.

Source: University of Michigan Institute for Social Research and NIDA, 2012
Is Marijuana Medicine?
While its health risks are well documented, marijuana also has several potentially beneficial health effects, according to supporters. These benefits include relief from nausea caused by chemotherapy, stimulated appetite in patients with AIDS, and general pain relief. THC is an FDA-approved medication, but marijuana (which has 400 chemical compounds in addition to THC) is not.8

In 2009, the American Medical Association adopted a resolution encouraging the federal government to review marijuana’s status as a federal Schedule I controlled substance “with the goal of facilitating the conduct of clinical research and development of cannabinoid-based medicines.”

In 2011, the Department of Justice Drug Enforcement Administration reiterated its position that marijuana be classified as a Schedule I controlled substance. According to the DEA position, current evidence demonstrates that “smoked marijuana has a high potential for abuse, has no accepted medicinal value in treatment in the United States, and (suggests) there is a general lack of accepted safety for its use even under medical supervision.”9

About this study
In light of growing marijuana use in the United States, this Quest Diagnostics Health Trends report focuses on the role of marijuana in the use, and misuse, of prescription and other illicit drugs, based on de-identified results of patients tested by Quest Diagnostics in 2011 and 2012. The report also provides insights into trends in the use and misuse of pain medications and other commonly abused prescription drugs based on a new analysis of de-identified test results from 2012. This analysis is further compared to an analysis of 2011 data originally published in the report Quest Diagnostics Health Trends: Prescription Drug Misuse in America (April 2012).

The study is based on patients tested using the Quest Diagnostics prescription drug monitoring service. This service tests for up to 26 commonly prescribed and abused drugs, including pain medications, central nervous system medications and amphetamines, as well as certain illicit drugs, such as marijuana and cocaine. All specimens are screened by immunoassay-based methods and all positive results are confirmed by mass spectrometry, the most sensitive and specific drug testing method.

Test results are provided to physicians using our proprietary medMATCH® reporting method. Using this service, a physician submits a test order for a patient that specifies the medication(s) prescribed for the patient and other drugs, including illicit, indicated for testing. Consistent results are those which indicate that only the prescribed drug(s) for the patient was detected. Inconsistent results suggest the patient misused their medication(s) in one of three ways: by not using the prescribed drug, using other drugs instead, or combining the prescribed drug(s) with other drugs.

Each of the three patterns of misuse has the potential to put a patient’s health at risk. A patient who does not take a prescribed drug will not receive potentially efficacious treatment for a medical condition and contributes to healthcare waste. A patient who uses non-prescribed drugs does so without a clinician’s supervision. And a patient who combines drugs without a physician’s guidance increases the potential for dangerous drug combinations.

Quest Diagnostics medical and health informatics experts analyzed 227,402 de-identified urine specimen results performed between January 1, 2011 and December 31, 2012. The study included results of patients of both genders, ranging in age from 10 years and older, from 49 states and the District of Columbia.
Our analysis included results of testing services ordered by physicians, such as family practitioners and internists, serving patients in a primary care setting. We also included results of specialists that may be expected to use our prescription drug monitoring services, including psychiatrists and neurologists, and for patients under care at pain management clinics and hospitals. We did not include results of patients tested by drug rehabilitation clinics, given the unusually high rates of drug inconsistency expected within this clinical segment, or from clinicians, such as addiction specialists, focused on drug addiction.

The company’s Quest Diagnostics Health Trends studies are performed in compliance with applicable privacy regulations, the company’s strict privacy policies and as approved by the Western Institutional Review Board.

Our findings include:

- **Prescription drug misuse continues to be highly prevalent.** About 60% of patients failed to use their prescription drugs as indicated by their ordering physician in 2012, compared to 63% in 2011. Despite increased public attention on the epidemic of prescription drug abuse in recent years, our data suggests prescription drug misuse continues to be a healthcare concern for a significant percentage of patients prescribed opioids, sedatives, stimulants and other medications.

- **Marijuana was the most misused drug.** Non-prescribed marijuana was detected in more than one in four patients (26%) with inconsistent test results. These findings confirm other research that demonstrates that marijuana is the most commonly abused illicit drug in the United States. 3

- **Recreational marijuana users were more likely than non-users to misuse other drugs.** Nearly half (45%) of patients who used marijuana recreationally also used other non-prescribed drugs—most commonly sedatives and narcotic pain killers—compared to approximately one third (36%) of non-marijuana users. These findings build on prior research correlating recreational marijuana use with other forms of drug abuse. In addition, prescribed marijuana users were not significantly more likely to inappropriately use other drugs.

- **Recreational marijuana users were not more likely than non-users to divert or skip medications.** Based on test results, recreational marijuana users were as likely as non-users to not use their prescription medications. A patient may not take a prescribed drug due to financial constraints and diversion, including illegal drug sales.
Prescription Drug Misuse is Prevalent

The overwhelming majority of patients tested continued to misuse their prescription drugs, based on a comparison of testing data from 2011 versus 2012. Our study found high rates of inconsistency with clinician orders in both years among tested patients prescribed a range of drugs, including opioid pain medications, such as oxycodone (including OxyContin®), central nervous system depressants like alprazolam (including Xanax®), and the stimulant amphetamine (such as Adderall®). The percentage of patients tested who misused these and other commonly abused medications declined modestly, to 60% in 2012 compared to 63% in 2011 (Figure 3).

In 2012, among patients with inconsistent results, 33% tested positive for the prescribed drug(s) and at least one other additional drug, compared to 32% in 2011. Twenty-five percent tested positive for a drug, but not the one for which they were prescribed, compared to 28% in 2011.

A large number of patients also showed no drug, including medications specified by the ordering physician, was detected by lab testing in both years: about 42% showed no drugs reported in 2012, compared to 40% in 2011. Financial constraints limiting the ability to buy medications, as well as illegal sales of prescription drugs (diversion), may largely explain this pattern.

Opioid medications continued to comprise the overwhelming majority of medications prescribed (69% in 2012 and 71% in 2011). Opioids include codeine, hydrocodone, hydromorphone, morphine, oxycodone and oxymorphone. Given the high rates of misuse, these findings suggest a substantial number of Americans taking medications, including powerful and potentially addictive opioids, may be putting their health at risk.
We also found high patterns of misuse in women and men of all ages and health plan categories in both years (Table 1).

In light of our findings, healthcare providers and policy makers may consider taking additional measures to educate patients in the dangers of prescription drug misuse and monitor for medication compliance.

### TABLE 1. PRESCRIPTION DRUG MISUSE IN AMERICA

<table>
<thead>
<tr>
<th>Study Features</th>
<th>2012</th>
<th>2011</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of de-identified urine results</td>
<td>151,405</td>
<td>75,997</td>
<td></td>
</tr>
<tr>
<td>Overall inconsistency rate</td>
<td>60%</td>
<td>63%</td>
<td>The majority of patients continued to misuse their medications</td>
</tr>
<tr>
<td>Among inconsistent results, percentage tested positive for the prescribed drug(s) and at least one other additional drug</td>
<td>33%</td>
<td>32%</td>
<td>Suggests high rates of potentially dangerous drug combinations</td>
</tr>
<tr>
<td>Among inconsistent results, percentage tested positive for a drug, but not the one for which they were prescribed</td>
<td>25%</td>
<td>28%</td>
<td>Suggests high rates of drug use without a clinician's oversight</td>
</tr>
<tr>
<td>Inconsistent results in which no drug specified by the ordering physician was detected</td>
<td>42%</td>
<td>40%</td>
<td>Many patients do not take their medications – perhaps due to financial restraints or through illegal sale of medications</td>
</tr>
<tr>
<td>Inconsistency rate by gender</td>
<td>59.5% for males</td>
<td>63% for males and females</td>
<td>Men and women abuse prescription drugs equally</td>
</tr>
<tr>
<td>Inconsistency rate across age groups</td>
<td>In both years, most age groups had rates of misuse of 50% or higher</td>
<td>Every age group is at risk</td>
<td></td>
</tr>
<tr>
<td>Inconsistency by Health Plan category</td>
<td>• 70% Medicaid</td>
<td>• 72% Medicaid</td>
<td>A slight decrease in inconsistency rates was observed in each Health Plan category</td>
</tr>
<tr>
<td></td>
<td>• 58% Medicare</td>
<td>• 61% Medicare</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 59% Private Payer</td>
<td>• 62% Private Payer</td>
<td></td>
</tr>
</tbody>
</table>

Source: Quest Diagnostics, 2011 - 2012
Marijuana: The Most Misused Drug

In our study, marijuana was the most frequently detected non-prescribed drug. Non-prescribed marijuana was detected in more than one in four patients (26%) with inconsistent test results (Figure 4).

Opiates, benzodiazepines, oxycodone, cocaine and methadone were the next most frequently misused drug classes among patients with inconsistent test results.

These findings reinforce other research that shows marijuana is the most commonly abused drug, surpassing other illicit drugs and commonly abused medications.

FIGURE 4. MOST FREQUENTLY DETECTED NON-PRESCRIBED DRUG CLASSES

Source: Quest Diagnostics, 2011 - 2012
Recreational Marijuana Users More Likely to Misuse Other Drugs

Of those samples that tested positive for recreational marijuana, nearly half (45%) of patients also tested positive for other non-prescribed drugs. By comparison, of all samples negative for marijuana, approximately one third (36%) showed evidence of having used other non-prescribed drugs. These findings build on prior research correlating recreational marijuana use with other forms of drug abuse.

In addition, more than one third (37%) of positive marijuana results linked to prescription cannabinoids (pharmaceutical preparations) were also positive for one or more non-prescribed drugs. Although this data shows a significant percentage of patients prescribed cannabinoids also misused other drugs, it does not suggest they were less responsible than other patient populations (Figure 5).

FIGURE 5. PERCENT OF SAMPLES POSITIVE FOR AT LEAST ONE NON-PRESCRIBED DRUG

Source: Quest Diagnostics, 2011 - 2012
Among recreational marijuana users, the most frequently detected additional non-prescribed drugs were sedative medications, such as alprazolam and oxazepam (a tranquilizer that is also a metabolite of benzodiazepine drugs such as diazepam and chlordiazepoxide), and narcotic pain killers, such as hydromorphone, a metabolite of hydrocodone and also a prescribed drug (Figure 6).

Based on this analysis, patients who use marijuana recreationally are 1.3 times more likely to use other non-prescribed drugs, including sedatives and narcotic pain killers, than non-marijuana users. Clinicians may wish to more closely counsel and monitor patients suspected of recreational marijuana use in order to help minimize other forms of drug abuse.

Based on our test data, recreational marijuana users were only slightly more likely than non-users not to use their prescription drugs. A patient may not take a prescribed drug due to financial constraints and diversion, including illegal drug sales. As many as 7.9% of patients who tested positive for non-prescribed marijuana were negative for their prescribed medications, as compared to 7.4% for non-prescribed marijuana users.
Research Methodology

Study Objectives

The objectives of our study were to assess and identify the most frequently detected non-prescribed drugs and identify patterns of misuse among inconsistent patient samples.

We assessed:

- Inconsistency rates across a range of demographics
- The patterns of misuse, including: (1) use of non-prescribed illicit or prescription drugs in combination with a prescribed medication; (2) the use of additional, non-prescribed (illicit or controlled) drugs; and (3) the failure to use prescribed drugs
- The patterns of misuse as a function of non-prescribed marijuana use and use of prescription cannabinoid drugs

Strengths and Limitations

Our study’s strengths include its size and geographic scope, and its use of validated test results by the highly reliable mass spectrometry method. Its limitations include geographic disparities (only 31 states had more than 1,000 specimens tested), and the inability to validate or contextualize test results with medical records. Like any lab test, a clinical determination of drug misuse requires consideration of several factors, including test results, patient history and symptoms, made in context of a full medical exam.

Laboratory testing does not identify addiction, physical dependence or impairment due to drug use. A negative result typically indicates that the patient did not take the drug. Patient variations, including hydration state, time since last drug use, and genetic differences in drug metabolism, as well as methodology limitations, can contribute to a failure to detect drugs in a small minority of specimens.

Moreover, it is possible that in some cases, patients in our study were referred to testing because their physicians suspected a high possibility of misuse, while the index of suspicion was lower for others who were not tested. In addition, some physicians may have neglected to indicate all prescription drugs a patient was taking on a patient’s report.

Our analysis assesses patterns of prescription drug misuse for the population served by physicians ordering tests from Quest Diagnostics. Quest Diagnostics provides testing services to approximately half of all physicians and hospitals in the U.S. Quest Diagnostics does not serve all physicians, and these insights may not be reflective of the general population.
Quest Diagnostics Health Trends

Quest Diagnostics Health Trends is a series of analyses on the status of the nation’s health. Each analysis is based on utilizing the Quest Diagnostics database, the largest private clinical laboratory database in the United States. Consisting of de-identified data on more than 1.5 billion patient encounters since 2000, the database provides laboratory information on the vast majority of conditions and diseases affecting Americans. Quest Diagnostics Health Trends reports are designed to identify and track disease and wellness benchmarks to inform patients, healthcare professionals, and policy makers about the current status of the nation’s health.

Quest Diagnostics Health Trends reports include Allergies Across America™, the largest study ever conducted on allergy and asthma testing in the U.S. (2011), as well as peer reviewed and publicly available reports on gestational hypothyroidism, gestational diabetes, sexually transmitted diseases, type 2 diabetes, cardiovascular disease, H1N1 influenza, vitamin D deficiency, and rotavirus. For more information, visit QuestDiagnostics.com/HealthTrendsPDM.

Quest Diagnostics (NYSE: DGX) is the world’s leading provider of diagnostic information services.

References
