Reducing substance abuse in patients receiving prescription opioids for chronic non-cancer pain: a quality improvement and patient safety study in a primary care setting

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ABSTRACT

Background: Chronic non-cancer pain is a common cause of primary care physicians’ office visits.

Objective: To determine the impact of adopting screening and monitoring measures in primary care settings on the illicit substance use behavior of patients receiving opioid analgesic prescriptions.

Methods: This was a retrospective analysis of data on patients who were prescribed opioid analgesics for chronic non-cancer pain between 2014 and 2017 Q1 (i.e., first quarter of 2017). Study participants were patients who sought medical care at our academic primary care clinic practice that is part of an internal medicine residency program. Participants were adults (>18 years) who were considered eligible for opioid analgesics for chronic non-cancer pain.

Interventions: (1) Roll out of the chronic non-cancer pain management policy to clinic staff; (2) pain medication contracts with patients; (3) random urine drug screen (UDS) testing performed on patients during their clinic visits; 4) a didactics curriculum for internal medicine residents to highlight the key elements in utilizing and interpreting UDS results; (5) adding alerts to the electronic medical record that notifies clinic staff of discrepancy between patients’ prescribed medications and UDS findings, as well as for quick identification of patients who had violated a stipulation of the contract; (6) mandatory regular utilization of Michigan State’s online prescription monitoring records; and (7) employment of an on-site behavioral specialist for patients with mental illness or at risk of drug abuse.

Main outcomes and measures: The main endpoint was the percentage of illicit drug use detected per year.

Results: A total of 8096 UDS samples were collected over the study period. Mean (SD) participant age was 52 (SD 12) and 51% were male. Urine samples which had at least one illicit substance constituted 41% of the samples in 2014 prior to intervention. We found a significant decrease in the percentage of illicit substances after initiation of the intervention to 37% in 2015, 19% in 2016, and 12% in 2017 Q1 (p < 0.001).

Conclusion: Adopting a system-wide screening and monitoring measures in a primary care setting can significantly reduce the amount of illicit drug use among patients receiving an opioid prescription for non-cancer pain. This has important implications for patient safety and the current opioid epidemic in the USA. Further studies are needed to evaluate similar interventions in other settings such as a pain clinic.

1. Introduction

Chronic non-cancer pain comprises approximately 20–50% of primary care physicians’ office visits [1]. ‘Back symptoms’ are among the top 20 leading causes of office visits according to data released by the Center of Disease Control in 2015 [2]. Due to the intense and broad advertisement for pain medications in the last decade and the campaigns to include pain as the fifth vital sign in patient care, more pain medications are being prescribed, and data suggest that the threshold for prescribing opioid analgesics has dropped [3]. Data from the National Ambulatory Medical Care Survey taken at two points in time (1980 and 2000) show that opioid prescriptions have increased during this time period from 8% to 11% and from 8% to 16% for acute and chronic pain, respectively [3]. Moreover, there was a sharp increase in the prescription of more potent opioids (like morphine, hydrocodone, and oxycodone) from 2% to 9% of office visits [3]. Initial data over the previous three decades suggested the low potential of addiction to these medications which has lead to their widespread use [4]. However, the 2016 National Survey on Drug Use and Health portrays a different picture [5]. From the nearly 28.6 million Americans aged 12 or older who have used illicit drugs in 2016, 3.3 million admitted to abusing prescribed pain relievers, second...
only to marijuana use. Based on these numbers, it is not surprising that acetaminophen–hydrocodone ranked among the top 10 medications discussed in an office visit during 2015 [2].

The report also suggested that 239,000 adolescents were users of prescribed pain relievers, representing 1% of the adolescent population [5]. Almost one-third of people aged 12 and over who used drugs for the first time in 2009 began by using a prescription drug without a prescription. In addition, teenagers abusing opioids are much more likely to use alcohol, cocaine, and ecstasy than those who do not abuse opioids [6]. Primary care physicians are at the forefront of this ongoing problem since chronic non-cancer pain visits constitute approximately 40% of all visits in primary care settings [7]. In Michigan, more than 21 million prescriptions were provided in 2014. Nearly half of these were for drugs classified as having a high potential for abuse and dependence by the US Drug Enforcement Agency [8]. Prescribing physicians face a daunting job prescribing these medications for the right patients since some patient will malinger pain to obtain a prescription drug. Statistics show that about 91 people in the USA die every day from an overdose of prescription painkillers and that the number of deaths due to opioid prescription drugs has exceeded the number of deaths caused by heroin and cocaine combined [9,10]. Another problem encountered in this setting is patients’ use of other illicit drugs like marijuana, cocaine, and heroin among others which pose a great risk of fatal interaction with prescription opioids. Hence, it is imperative that careful patient selection and adequate monitoring are put in place in primary care clinics taking care of non-cancer pain patients. This study aimed to determine the effect of adopting screening and monitoring measures in primary care settings on the behavior of patients receiving opioid analgesic prescriptions in regard to their illicit drug use.

2. Methods

2.1 Data source

We retrospectively reviewed data on patients who were prescribed opioid analgesics for chronic non-cancer pain between 2014 and 2016 at two academic primary care clinics practices that are part of the Division of Internal Medicine at Wayne State University School of Medicine. As part of our clinic practice, patients receiving opioid prescription undergo random urine drug screen (UDS) routinely. The results of these drug screens were retrospectively reviewed to determine patient compliance with their opioid prescription as well as contaminant use of the illicit drug. The study was considered exempt from formal review by the Wayne State University institutional review board (IRB) because it does not meet the definition of Human Participant Research that is subject to IRB oversight.

2.2 Intervention

The measures implemented in our clinic include (1) rolling out of the chronic non-cancer pain management policy to the entire division of general medicine and clinic staff, (2) pain medication contracts with patients (3) random UDS testing performed on patients during their clinic visits, (4) creating a didactics curriculum for internal medicine residents to highlight the scope of the ‘opioid epidemic’ and to help them in interpretation of different UDS results and how these results relate to patient compliance, (5) adding alerts to the electronic medical record (EMR) that notifies clinic staff of discrepancy between patients’ prescribed medications and UDS findings, as well as for quick identification of patients who had violated a stipulation of the contract, (6) mandatory regular utilization of the State’s Prescription Monitoring Program records, and (7) employment of an on-site behavioral specialist for patients with mental illness or at risk of drug abuse. Implementation of these measures started towards the end of 2014.

2.3 Statistics

We compared the results of UDS in these patients before (i.e., 2014) and after (i.e., 2015–2016) implementing the new policies adopted by our clinics. The main endpoint was the percentage of illicit drug use for each year. In addition, we evaluated the percentage of no-abnormality detected, medication found not on requisition, and medication needing review as secondary endpoint. Statistical difference between the 3 years was evaluated via chi-square test, and p value <0.05 was considered statistically significant.

2.4 Results

A total of 8096 UDS samples were collected over the study period. Patient demographics include mean age 52 (SD 12), 51% male, and 93% African-American. Concurrent mental illness (35%) was predominantly depression (24%) in this patient population. Pain, which was mainly in the back (25%) and knee (13%), was musculoskeletal in 72% of the cases (Table 1).

Urine samples which had at least one illicit substance constituted 41% of the samples in 2014. Despite the increase in the number of UDS samples per year, there was a significant decrease in the percentage of illicit substances after initiation of the policies to 37% in 2015, 19% in 2016, and 12% by the end of the first quarter of 2017 (2017Q1) (p < 0.001) (Figure 1).
Marijuana, detected by the presence of tetrahydrocannabinol (THC), was the most common illicit substance consumed by our patients. The number of THC-positive samples decreased by about three-quarters, from 33% in 2014 to 8.3% in 2017. A similar trend was noted in cocaine and heroin use (Figure 2). Also, we found an increase in samples reported as ‘no-abnormality detected’. There was a significant turnaround in the prevalence of positive UDS samples in our clinic compared to the mean in the State of Michigan (Figure 3).

3. Discussion

This retrospective study explores the effects of adopting system-wide screening and monitoring measures in a primary care setting on the behavior of patients receiving opioid analgesic prescriptions in regard to their illicit drug use. We demonstrated a positive impact on patient’s use of illicit drugs as illicit-positive UDS samples decreased by more than 50% for the most common substances used. This also supports the theory that many patients seek illicit drugs to control their pain symptoms, and once provided with pain medications in a safe and monitored environment, they would abstain from street drugs.

There is conflicting evidence in the literature about the effectiveness of interventions like UDS and opioid treatment agreements in achieving a positive outcome in patients. The impact of the multiple interventions applied in our patient cohort can be found in different studies assessing these interventions individually. Calsyn et al. found that establishing a contract agreement between physicians and patients fighting addiction has led to longer abstinence times, as measured by UDS at 9 weeks post-contract. They also reported a larger proportion of patients in the contract group that have remained abstinent of opioids and cocaine after 18 months [11]. Another study reports that establishing such contracts prolongs the duration of abstinence from benzodiazepines and marijuana in particular which mirrors the results in our study [12]. However, in a systematic review of 102 articles, Starrels et al. found weak evidence on the effectiveness of opioid treatment agreements and also UDS in reducing opioid misuse in chronic non-cancer pain patients [1].

UDS is important in detecting changes in patients’ behavior, like a developing addiction problem to prescribed opioids or concurrent use of illicit substances that might have a life-threatening effect, especially if used with opioids. It may also indicate if the patient is not using his prescribed pain medication but using them for financial gain like selling them to a third party. Detecting such a change in behavior is at the core or proper patient management. Relying solely on

Table 1. Baseline characteristics.

| Demographics |                |                |                |
|--------------|----------------|----------------|----------------|
|              | Age, mean (SD) | 52 (12)        |                |
| Male, %      |                | 51             |                |
| Ethnicity, % |                |                |                |
| African-American | 93           |                |                |
| Caucasian    | 7              |                |                |
| Smoking, %   |                | 47             |                |
| Alcohol, %   |                | 46             |                |
| Comorbidities|                |                |                |
| Mental illness, % | 24         |                |                |
| Depression   |                | 11             |                |
| None         |                | 65             |                |
| Diabetes, %  |                | 32             |                |
| Hypertension, % | 59           |                |                |
| Chronic Obstructive Lung Disease (COPD), % | 13 |                |                |
| Pain characteristics |          |                |                |
| Location, %  | Back           | 25             |                |
| Knee         | 13             |                |                |
| Shoulder     | 8              |                |                |
| Hip          | 6              |                |                |
| Others       | 48             |                |                |
| Mechanism, % | Musculoskeletal | 72           |                |
| Neurological | 8              |                |                |
| Visceral     | 5              |                |                |
| Autoimmune   | 5              |                |                |
| Others       | 10             |                |                |

Figure 1. Our clinic urine drug screen results for 2014–2017.
observable patients’ behavior or patients’ self-reporting of drug use is futile, and UDS becomes an important tool and as an external source of information about patients’ behavior. Part of the intervention in our clinic was to emphasize the importance of the randomness of UDS to nullify predictability. Some centers suggest performing UDS on the patient at each office visit, while some experts recommend at least three random UDS in the first 12–15 months followed by a once every year protocol. We feel random UDS is a better, more practical approach [10,13]. Manchikanti et al. studied the impact of random UDS in affecting patients’ behavior with regard to illicit substance use. The investigators in that study reported a positive impact with the prevalence of positive UDS in that cohort of 500 patients around 8% which was less than studies done two years earlier which reported that prevalence around 22%. Our study results have more strength in supporting these findings. The sample size in our study was approximately 7300. We relied on data provided to our clinic by our partner Ameritox® labs which allowed us to test the urine samples for more than 20 illicit and controlled substances versus the 4 substances detected in the above-mentioned study [6]. Our study detected the impact of a system-based intervention, with random UDS part of but not the sole intervention. We were able to demonstrate a longer sustained effect over a period of 3 years that reflected the prevalence of illicit substance
use before and after the intervention. Utilizing UDS poses an ethical challenge to physicians as to the interpretation of the tests because of the possibility of false positive or negative results and because of the consequences of these results may lead to termination of the patient’s contract, especially if the physician chooses to apply a ‘zero tolerance’ or ‘once chance’ rule. Therefore, discussions with patients in the initial encounter and explaining to them the outcomes of abnormal UDS are crucial in establishing a strong physician–patient relationship. If questions or doubts arise about a patient’s UDS, a full history should be taken from the patient about their pill-taking habits, pill storage, and pain level [10]. Discussing the result with the toxicology lab is also a constructive step in that regard, and resident education is also crucial in delivering the message to patients in a manner that strengthens physician–patient relationship. The didactic curriculum was developed and implemented by three experienced faculty facilitators, including a board-certified palliative care physician. It was delivered as 3-h interactive workshops in chronic pain management and responsible opioid prescribing to groups of 15 post-graduate year (PGY) 1–PGY 3 residents. Residents from all postgraduate years were included in these workshops as an assessment conducted prior to developing this curriculum showed that all of the program’s residents (PGY 1–PGY 3) did not feel confident in the management of chronic pain patients.

The workshops were comprised of two parts. The first part was an interactive session, designed to be delivered in 60 min, to introduce the basic concepts of chronic pain management and responsible opioid prescribing. This part also included case-based discussions. To incorporate any additional recent evidence-based recommendations, the presentation has been updated over time to include the recent Centers of Disease Control and Prevention (CDC) guidelines for the treatment of chronic pain and responsible opioid prescribing.

The workshop’s second part was a simulated role-playing experience with feedback. The role-play cases were developed by three experienced faculty based on their own clinical experiences. To evaluate the workshop, pre- and post-surveys were administered to all residents at the beginning and conclusion of each workshop session, respectively [14].

One of the limitations of the study is that it could be argued that the significant decline in the prevalence of the illicit use in our study population is due to the number of patients who were no longer prescribed opioids due to non-adherence or who choose to go to a clinic with less strict rules. Our study did not document the number of patients who were dropped out of our opioid prescription program or opted to change care to another clinic, but this can be countered statistically by the fact that the number of patients and UDS samples have been almost steady each year. Moreover, because of the possibility of addiction or diversion of prescribed pills for financial gains, we believe adding an on-site behavioral/addiction is crucial in creating a patient-centered safe environment for prescribing opioid medications. In the recent 2016 guidelines released by the CDC for prescribing opioids for chronic pain, this is a recommendation category: A; evidence type: 2 [15]. It is our belief that the addition of the on-site specialist contributed significantly to this drop in illicit drug prevalence on UDS. Patients were referred to the on-site behavioral specialist using the EMR. However, once patients agreed to scheduling an appointment with the on-site behavioral specialist, we arranged for a same-day brief meeting between them to establish rapport and encourage patients to attend their scheduled appointment.

In summary, we demonstrated that adopting a system-wide screening and monitoring measures in a primary care setting can significantly reduce the amount of illicit drug use among patients receiving an opioid prescription for non-cancer pain. This has important implications for patient safety and the current opioid epidemic in the USA. Further studies are needed to evaluate the similar intervention in other settings such as pain, rheumatology, and orthopedics trauma clinics.

Disclosure statement
No potential conflict of interest was reported by the authors.

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References
[1] Starrels JL, Becker WC, Alford DP, et al. Systematic review: treatment agreements and urine drug testing to reduce opioid misuse in patients with chronic pain. Ann Intern Med. 2010;152(11):712–720.
[2] Rui P,OT, National Ambulatory Medical Care Survey: 2015 State and National Summary Tables.
[3] Caudill-Slosberg MA, Schwartz LM, Woloshin S. Office visits and analgesic prescriptions for musculoskeletal pain in US: 1980 vs. 2000. Pain. 2004;109(3):514–519.
[4] Portenoy RK, Foley KM. Chronic use of opioid analgesics in non-malignant pain: report of 38 cases. Pain. 1986;25(2):171–186.
[5] Samhsa, C.F.B.H.S. and Quality, Key Substance Use and Mental Health Indicators in the USA: Results from the 2016 National Survey on Drug Use and Health. 2017.
[6] Manchikanti L, Manchukonda R, Pampati V, et al. Does random urine drug testing reduce illicit drug use in chronic pain patients receiving opioids? Pain Physician. 2006;9(2):123–129.
[7] Arning K, Baron R. Evaluation of symptom heterogeneity in neuropathic pain using assessments of sensory functions. Neurotherapeutics. 2009;6(4):738–748.
[8] Michigan Prescription Drug and Opioid Abuse Task Force. 2015; Available from: https://www.michigan.
[9] Prescription Opioid Overdose Data | Drug Overdose | CDC Injury Center; 2018.

[10] Kaye, A.D., Marshall, Z.J., Lampert S.M., et al. Ethical perspectives on urine drug screening for pain physicians. Pain Physician. 2014;17(5): E559-E564.

[11] Calsyn DA, Wells EA, Saxon AJ, et al. Contingency management of urinalysis results and intensity of counseling services have an interactive impact on methadone maintenance treatment outcome. J Addict Dis. 1994;13 (3):47–63.

[12] Hartz DT, Meek P, Piotrowski NA, et al. A cost-effectiveness and cost-benefit analysis of contingency contracting–enhanced methadone detoxification treatment. Am J Drug Alcohol Abuse. 1999;25(2):207–218.

[13] Fanciullo G, Katz N, The role of urine toxicology screening in patients on chronic opioid therapy. Abstract presented at the American Academy of Pain Medicine, 2001.

[14] Vettese TE, Thati N, Roxas R. Effective chronic pain management and responsible opioid prescribing: aligning a resident workshop to a protocol for improved outcomes. MedEdPORTAL. 2018;14: 10756.

[15] Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain—USA, 2016. Jama. 2016;315(15):1624–1645.