# IMPROVING ADHERENCE TO OPIOID PRESCRIBING CDC GUIDELINES FOR CHRONIC PAIN

by

AEMEN ZAMIR

DISSERTATION

Presented to the Faculty of the Medical School
The University of Texas Southwestern Medical Center
In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF MEDICINE WITH DISTINCTION IN QUALITY IMPROVEMENT

The University of Texas Southwestern Medical Center
Dallas, TX

ACKNOWLEDGMENTS

Thank you to Dr. Gary Reed, Dr. Enas Kandil, Eleanor Phelps, Dr. Jerzy Lysikowski, Rabina Acharya and the entire Quality Improvement department at UTSW for their help.

ABSTRACT

IMPROVING ADHERENCE TO OPIOID PRESCRIBING CDC GUIDELINES FOR CHRONIC PAIN

AEMEN ZAMIR
The University of Texas Southwestern Medical Center, 21
Supervising Professor: Gary Reed, M.D.

**Background**: *The Centers for Disease Control and Prevention have released treatment guidelines for chronic pain care as concerns about opioid overuse and abuse increase. Additionally, The Texas Medical Board has outlined their policy for the use of medication for non-malignant chronic pain purposes in Rule 170.3 of the Texas Administrative Code. Some of the requirements include a signed pain management agreement, regular review of the Prescription Monitoring Program, a urine drug screen, and documentation of completion of requirements in patient's medical records.*

**Objective**: *Establish baseline adherence to TMB policy for opioid prescribing and implement electronic medical record tools to facilitate completion of requirements*

**Methods**: *A preliminary chart review of patients on the opioid registry, an intervention in early phase of implementation meant to easily identify patients receiving opioids for chronic pain, was conducted to determine baseline adherence to Rule 170.3 amongst physicians. Several CDC guidelines which corresponded with TMB requirements were chosen. Post-intervention data was collected from the chronic opioid registry regarding the percentage of patients who had annual review of Prescription Monitoring Database, a urine drug screen, a pain management agreement, and documentation of completion of requirements in patient's medical records.*

**Results***: Of the 206 patients studied through chart review pre-intervention, only 6% had all three TMB mandated elements in their charts. After implementing the EMR tools meant to facilitate completion of TMB laws and CDC guidelines, the percentage of patients with a urine drug screen and review of PDMP increased while the percentage of patients with a pain management agreement in their chart decreased.*

**Conclusion***: Poor compliance in the UTSW system necessitates tools that will streamline the process for completing and documenting the requirements. The implementation of the EHR tools and the opioid registry best practice alerts, as they were rolled out by the Opioid Task Force, helped facilitate completion of requirements.*

TABLE OF CONTENTS

## Introduction

Prescription opioids, often prescribed for chronic and acute pain relief, represent a class of drugs that present the danger of abuse and misuse. Common types of prescription opioids are oxycodone (OxyContin), hydrocodone (Vicodin), and morphine [Rosenblum et al. 2008]. While prescription opioids play a large part in reducing human suffering and alleviating pain for acute conditions and post-surgical pain, their use comes with alarming complications such as their ability to induce tolerance and withdrawal symptoms. Tolerance occurs when the body no longer responds to a certain dose as strongly as it did before, necessitating increased amounts to stimulate the same analgesic effects. Withdrawal symptoms occur because the production of endogenous opioids in the body is inhibited with repeated use of opioids, accounting for the discomfort that follows when the drugs are discontinued (Benyamin et al. 2008). These qualities have played a role in making opioids the leading abused prescription drug.

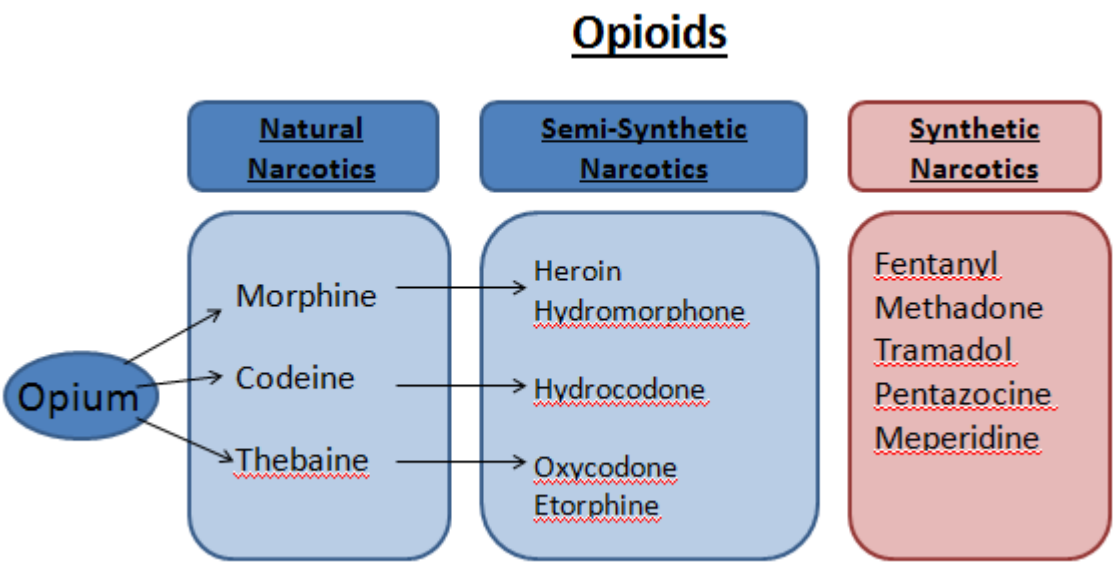



*Figure 1. Classification of common opioids*
*Source: Adapted from National Institute on Drug Abuse. 2016*

## Background

Safe opioid prescribing and monitoring presents a unique challenge to prescribers due to the alarming rates of misuse and abuse. According to the CDC in 2016, the overall prescribing rate was 66.5 per 100 persons. While this number is part of a declining trend, it highlights the prevalence of opioid prescriptions and the scope of their reach [9]. The use of opioids for chronic pain, often defined in journals as pain lasting for three or more months, may increase the risk for addiction and adverse behaviors [14]. Health care providers must balance the utility and efficacy of opioids with the long-term risks they pose to patients. They report uncertainty regarding the best approach for treating chronic pain and express concern over undertreating pain and overusing opioids. [9].

Treatment guidelines for chronic pain, as mandated by law and other regulatory agencies, may assist physicians in prescribing opioids to patients with favorable outcomes. Guidelines have been introduced at national, state, and local levels to guide physician decision making and prescribing practices. The Center for Disease Control introduced voluntary recommendations for prescribing opioids for chronic pain in 2016 based on a systemic review of literature and input from an advisory committee [7]. These guidelines are intended to be extra safety measures which will help primary care physicians prescribe opioids with more confidence, but concern has been raised over whether these requirements help or hinder physicians and patients. The guidelines address initiation of opioids, dosage and duration selection, and risks and harms of opioid use (CDC Guidelines).

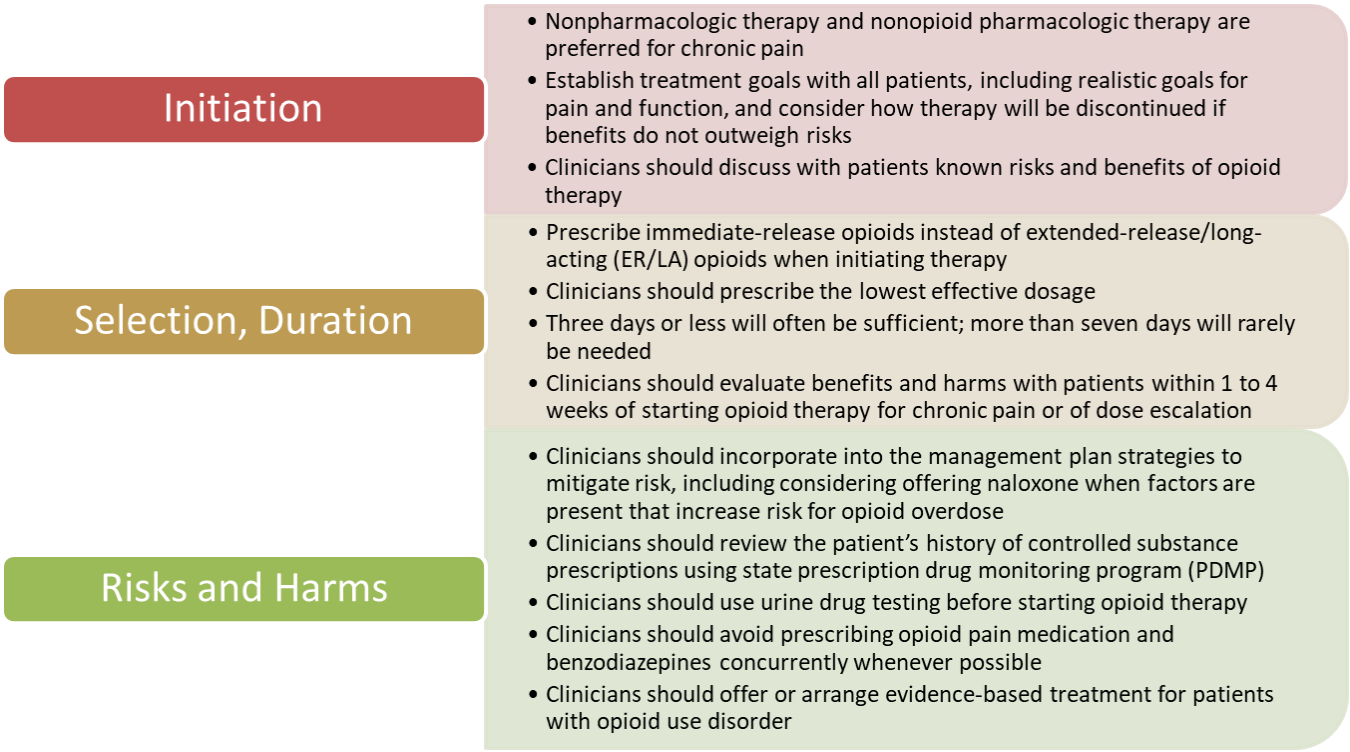



*Figure 2. CDC Guidelines for Prescribing Opioids for Chronic Pain*
*Source: Adapted from Centers for Disease Control and Prevention. 2016*

**Rationale**

On the state level, the Texas Medical Board seeks to address the opioid epidemic through their policy for chronic pain care as outlined in Rule 170.3 of the Texas Administrative Code [13]. Some of the requirements delineated include regular review of the prescription data in the Prescription Monitoring Program, a baseline urine drug screen or documentation explaining the patient is exempt due to low risk, a pain management agreement between the physician and the patient outlining patient responsibilities and a discussion of the risks and benefits, and documentation of completion of requirements in patient's medical records.

The TMB requirements align closely with the CDC best practice guidelines for prescribing opioids for chronic pain. Physicians are expected to prescribe in accordance with TMB state law but may find that challenging now due to the extra steps they have to take. As

institutions across the nation attempt to address these guidelines, several undertakings have had reported success at improving care of chronic pain through the implementation of interventions, such as the use of a registry integrated within EHR to identify patients at risk for adverse events [6]. Additionally, clinical dashboards have been used successfully in quality improvement initiatives [8]. One study looked at the impact of developing a centralized opioid prescribing dashboard in the electronic health record where prescribers could easily identify patients on chronic opioid therapy. The dashboard also showed whether each patient had a urine drug screen within the past six months, an uploaded "opioid treatment agreement" in the chart, and documentation of pain assessment. In the Community Health Center Inc. in Connecticut, this dashboard led to an increase in the use of OTAs, UDTs, pain and functional assessment questionnaires and demonstrated that an EMR dashboard may be useful for opioid analgesia [2].

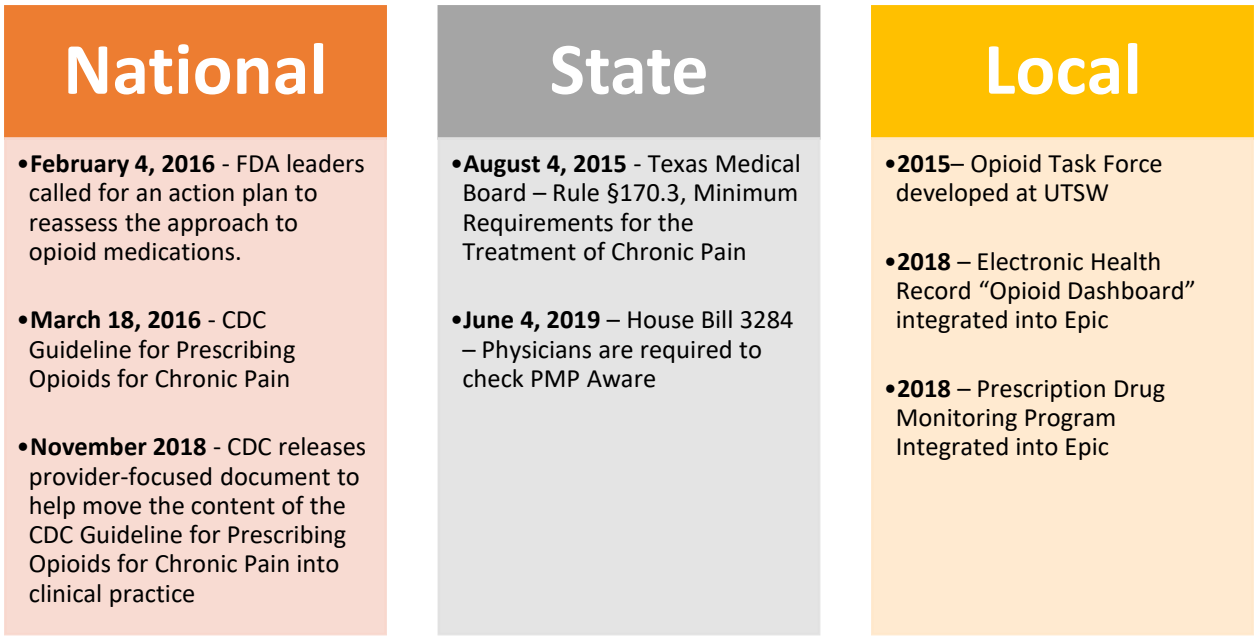



*Figure 3: National, State, and Local Interventions*

## Available Knowledge

Previous studies have looked at compliance within the UT Southwestern system and found that 3.1% of patients had a urine drug test, signed pain management agreement, and documentation of referencing the prescription monitoring database in their charts [1]. The population studied, however, did not all fall under the category of patients receiving opioids for chronic care due to discrepancies in medication documentation. Therefore, the actual percentage of patients with all the required elements in their charts may have been lower.

## Specific Aims

The project aim is to improve adherence to CDC guidelines and TMB rules amongst physicians in the UT Southwestern system to greater than 90% by June 2021.

Specific aims include:

- Increase % of patients who receive a urine drug test annually while on chronic opioid therapy
- Increase % of patients who have a signed pain management agreement in their chart
- Increase % of patients with documentation that a PDMP was checked

## Methods

An initial Plan, Do, Study, Act cycle was conducted to determine which clinics were prescribing chronic opioid therapy and at what volume. Since each clinic identified had its own process flow for intaking patients and completing paperwork, an intervention was needed that could be implemented in several unique settings and would be accessible to all physicians regardless of specialty. Determining which clinics have the highest volume of patients on chronic

opioid therapy would also help guide education regarding the opioid dashboard once developed and implemented. Patients on chronic opioid therapy in the UTSW system were identified. The providers and clinic names of their most recent opioid prescriptions were documented. General Internal Medicine clinics and Physical Medicine and Rehab composed of 54% of the prescriptions. Multidisciplinary Spine and Geriatric Care also contributed heavily to the prescriptions.

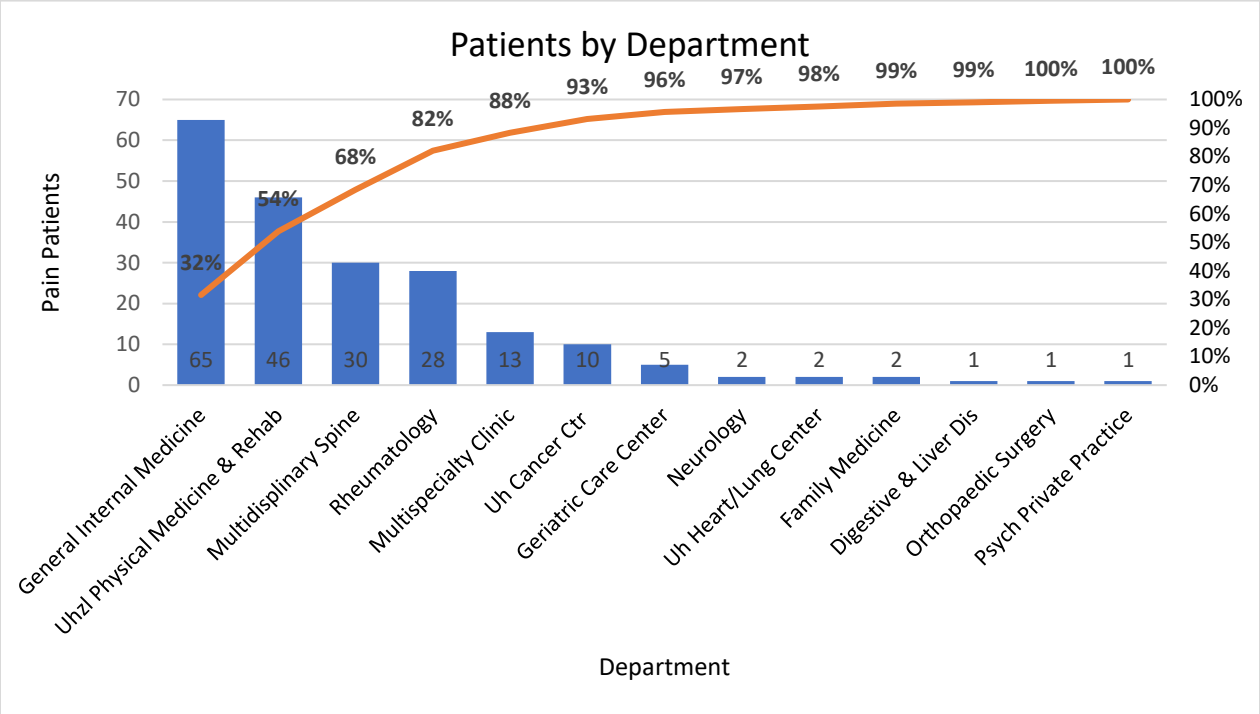



*Figure 4: Pareto Chart of Patients by Department*

Then, a chart review conducted on 206 patients aged 18 and older receiving chronic opioid therapy in the UTSW system was conducted. After excluding patients receiving opioid therapy for cancer pain and charts that were locked for privacy purposes, there were 206 patients studied. While conducting the chart review, both patient demographics and completion of selected measures were recorded. Charts had to be manually reviewed for each element.

For a pain management agreement, the Media tab was reviewed to look for upload of a signed document that fulfilled the requirement. Notes were also reviewed to see if there was reference to completion of an agreement, even if one wasn't uploaded onto the chart. Phrases like "pain management agreement," "treatment plan," "pain management contract," and "pain contract," were searched for in the notes. If a treatment plan was referenced but there was nothing uploaded into the chart, the requirement was marked as incomplete.

For urine drug screen, the Results tab was reviewed to look for a completed urine drug screen. If the results were more than a year old, the drug screen was marked as outdated. If a urine drug screen was mentioned in the patient chart in one of the notes, but no results were found, that was documented as well. There were several orders that counted as a completed drug screen, including "urine drug screen," "urine toxicology," and "opiates screen." If the provider discussed the patient not needing a urine drug screen in the chart, this was also considered completion of the requirement.

For the Prescription Monitoring Program requirement, patient charts were reviewed using the Search function to look for phrases that suggested the provider reviewed the Texas Prescription Monitoring Program prior to prescribing opioids. Phrases such as "PDMP," "prescription database," "Texas Prescription Monitoring Program," and "prescription review," were searched for and recorded as completion of requirement.

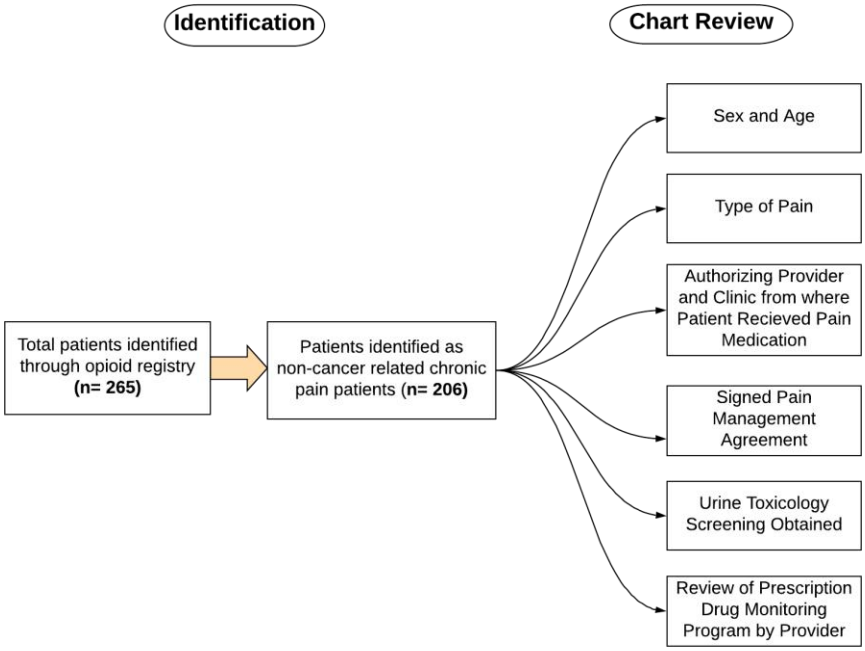



*Figure 5: Chart Review Criteria*

Final review showed that only 6% of patients had a signed pain management agreement, completed urine drug screen, and documented review of the PDMP in their chart. Preliminary study of patients on the opioid registry revealed the following findings**:**

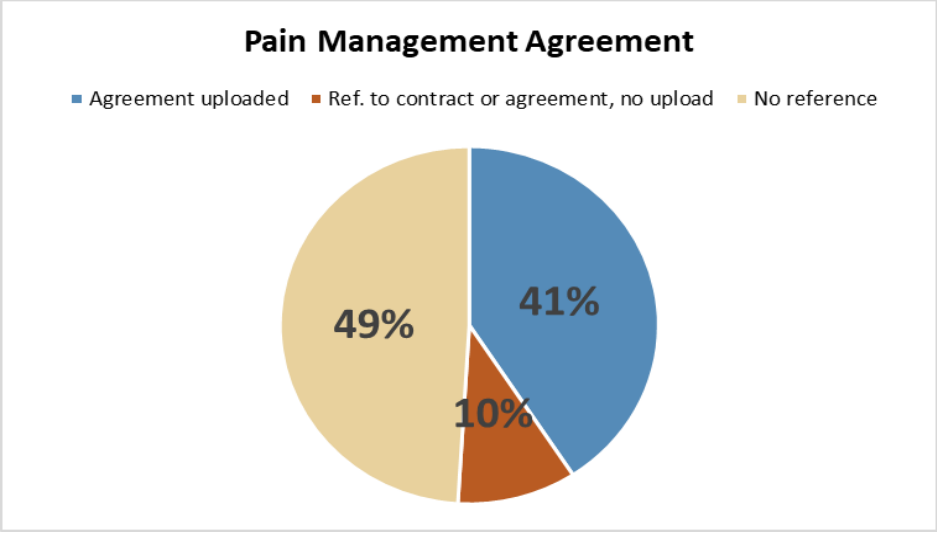



*Figure 6: Completion of Pain Management Agreement*

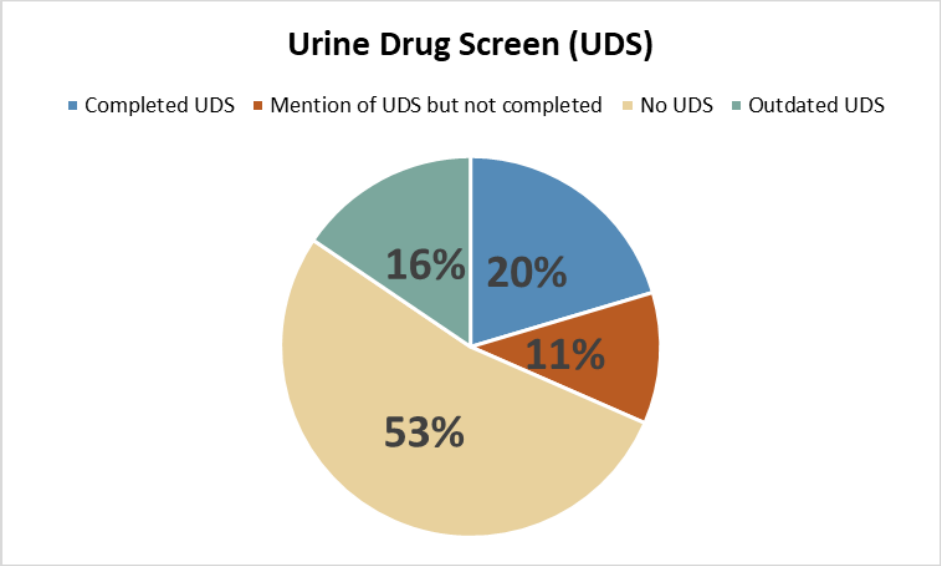



*Figure 7: Completion of Urine Drug Screen*

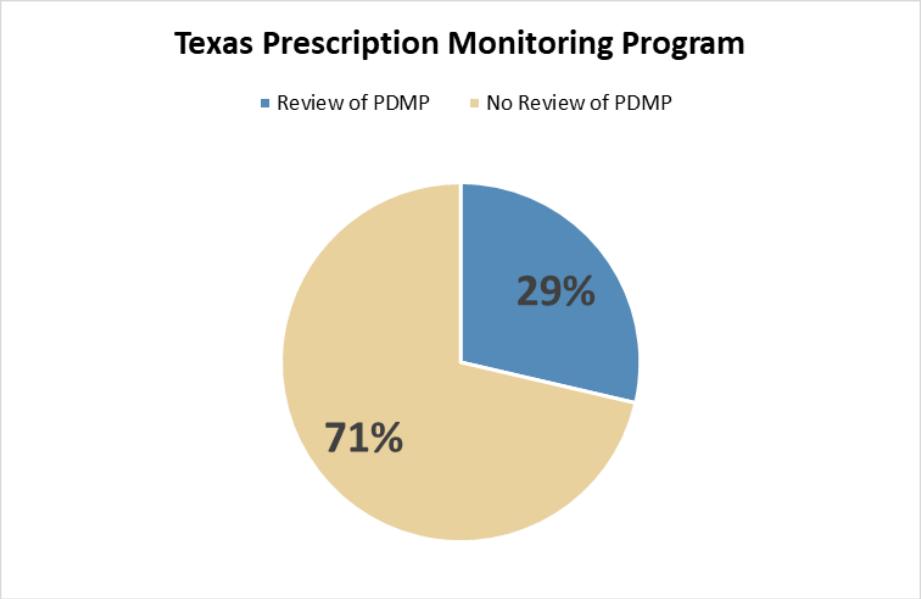
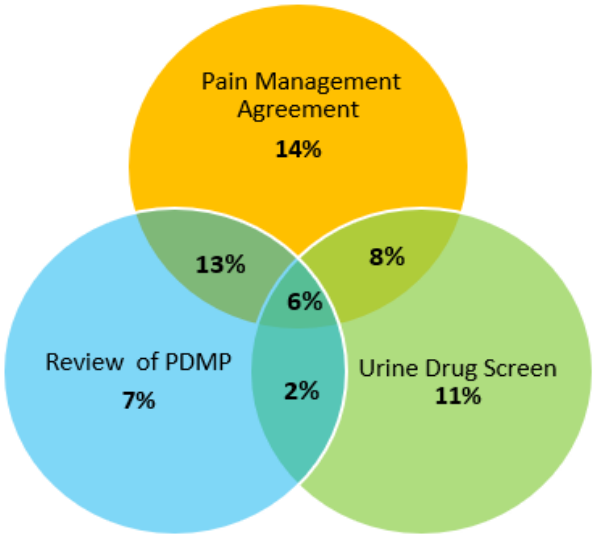



*Figure 8: Review of Prescription Monitoring Program*




| Pain Management Agreement | Completed | Mentioned but not Completed/Uploaded | | Not Mentioned or Completed |
|---|---|---|---|---|
| | 41% | 10% | | 49% |
| **Urine Drug Screen** | **Completed** | **Mentioned but not Completed** | **Outdated** | **Not Mentioned or Completed** |
| | 20% | 11% | 20% | 53% |
| **Review of Texas Prescription Monitoring Program** | **Completed** | | **Not Completed** | |
| | 21% | | 79% | |

*Figure 9,10: Completion of Requirements amongst UTSW Patients*

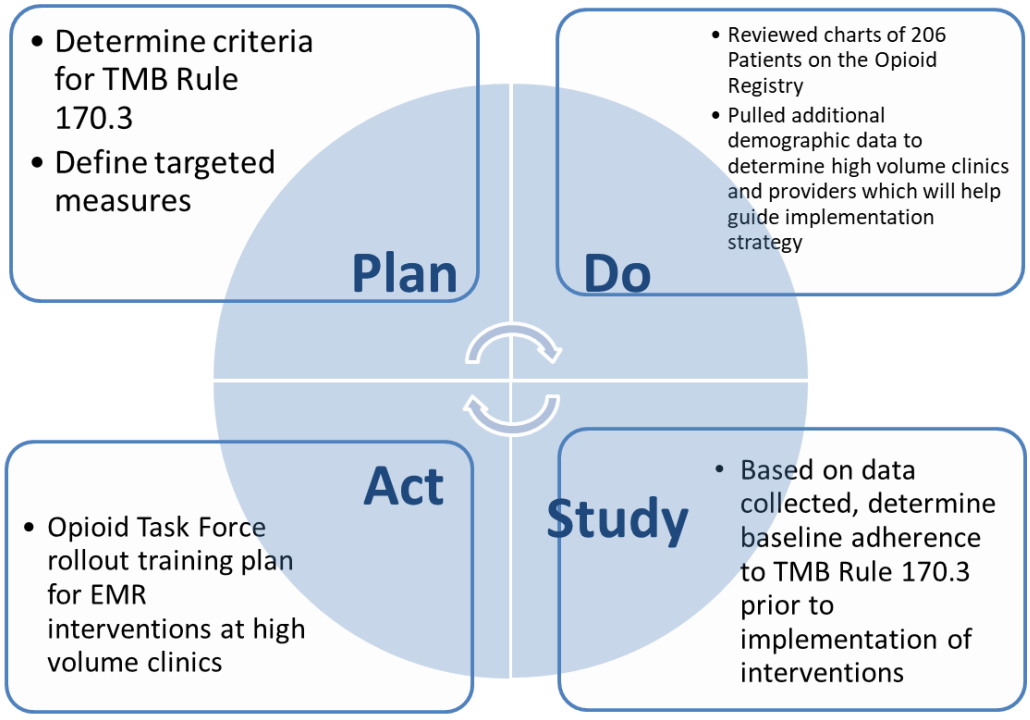



*Figure 11: First PDSA cycle*

After establishing that there is significant room for improvement in completing the requirements for chronic opioid prescribing, interventions were planned with barriers in mind. A qualitative study was conducted through surveys to find out potential reasons why providers weren't adhering or documenting completion of TMB requirements. The EMR tools meant to serve as the intervention were developed with these considerations in mind. A second PDSA cycle was done three years after initial chart review. This PDSA cycle was designed to look at post-intervention completion of requirements.

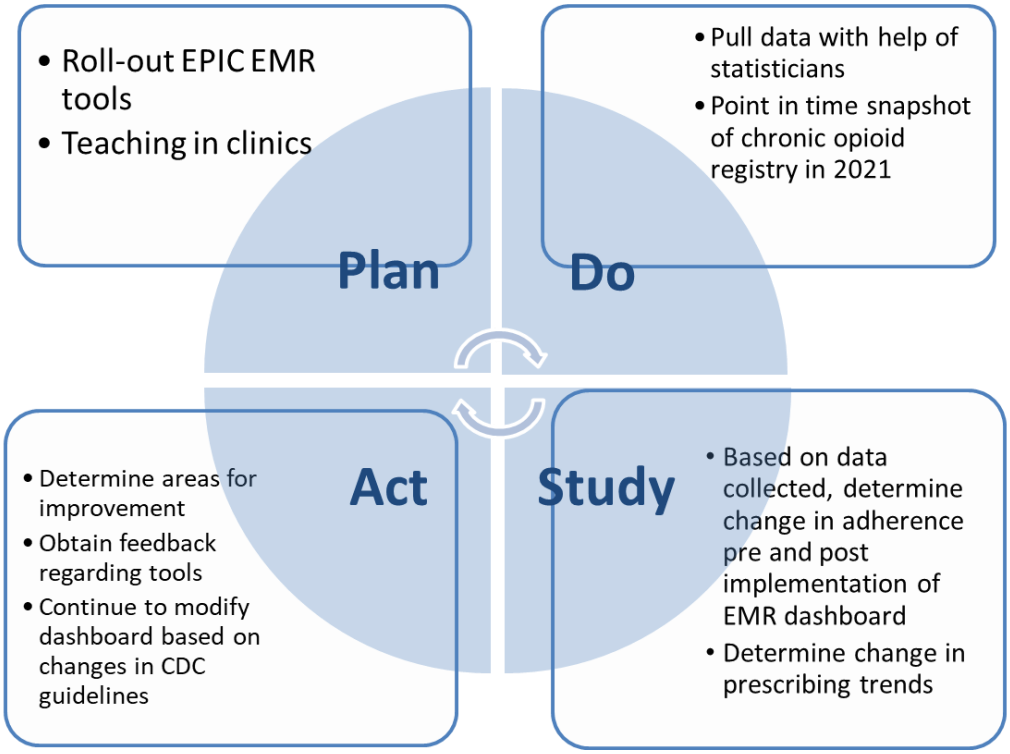



*Figure 12: Second PDSA Cycle*

**Intervention(s)**

The Opioid Task Force, a multidisciplinary team led by several UTSW physicians and IT faculty, developed a Chronic Opioid Therapy Electronic Health Record tool that is meant to facilitate the process of fulfilling and completing the Texas Medical Board requirements and CDC guidelines. The dashboard is housed in EPIC, which is used by providers within the entire UTSW system. The tool can be accessed by any physician for any patient. When a patient is on chronic opioid therapy, the "Chronic Opioid' toolbar automatically gets added to their chart. From there, physicians can access a number of tools, including a pain management agreement template, Texas Medical Board Pain Management rule for reference, an integrated log-in link for the PDMP, and health maintenance reminders that remind prescribers to request a urine drug screen prior to initiation of therapy and periodically throughout. They can also calculate morphine milligram equivalents for the dosages they prescribed and use calculate pain severity using pain severity assessments.

Once the tools were developed, they were trialed by a couple of providers who gave feedback regarding ease of use and utility. Teaching for the tool was done in various clinics and in a grand round presentation. Roll-out of education was prioritized based on clinics with the highest volume of patients on chronic opioid therapy. Information was also disseminated broadly to all physicians via email.

A driver diagram was developed to demonstrate how the EMR tools may help improve adherence to both TMB Rule 170.3 and CDC guidelines for chronic opioid prescribing.

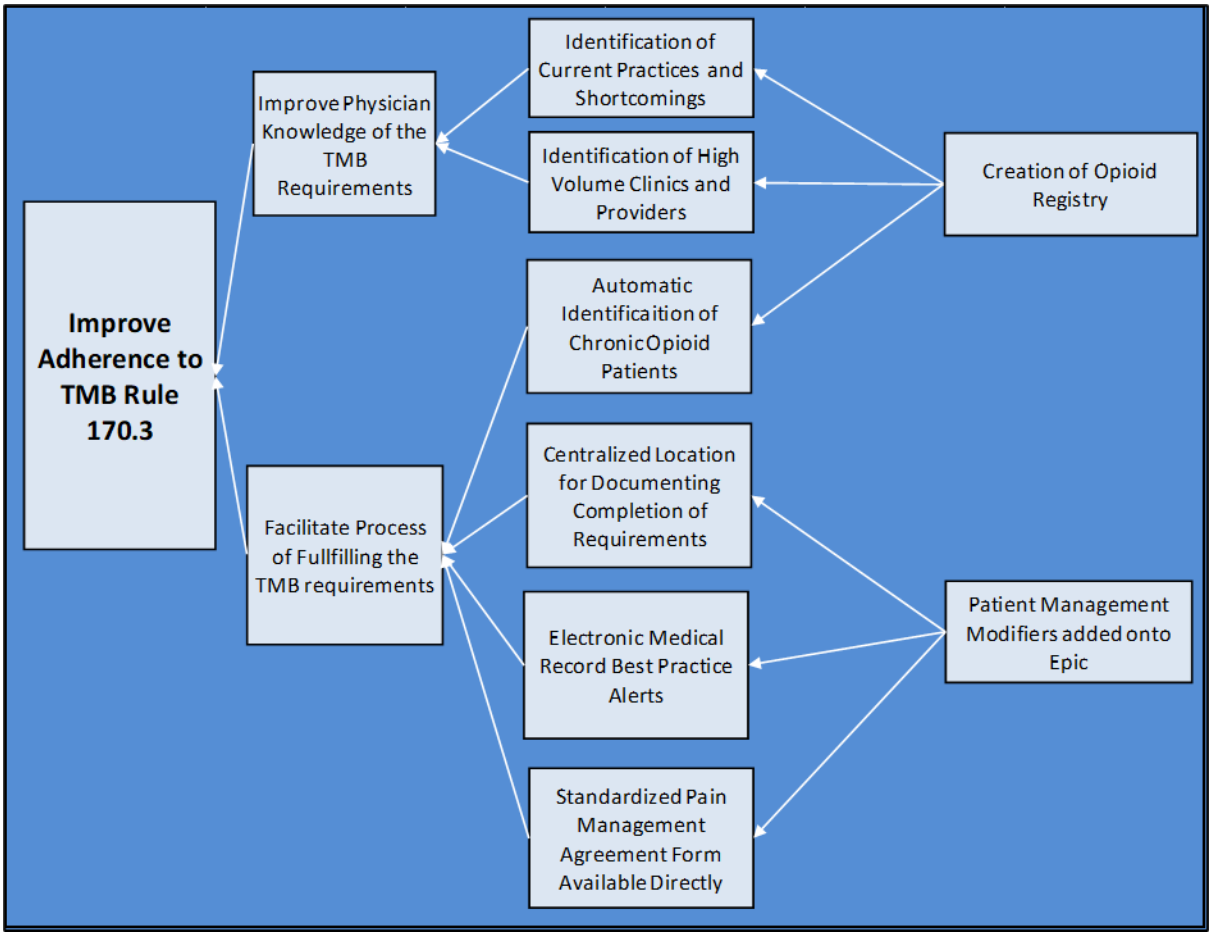



*Figure 13: Driver Diagram*

The tools were developed with the intention of making the process of fulfilling the requirements streamlined, centralized, and easy to remember. The inclusion of the TMB Rule in the dashboard also serves to educate physicians who are less familiar with the requirements about their importance.

The dashboard can be accessed for all patients, and the assessment scores can be used to help guide therapy for patients with short-term and cancer related pain as well. Patients who are receiving chronic opioid therapy, however, are flagged and automatically have the chronic pain health maintanance modifiers added into their chart

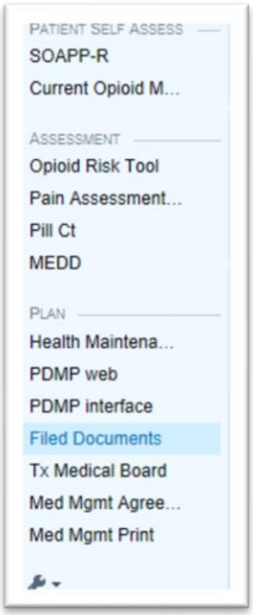



*Image 1: Opioid Dashboard Panel*
*Source: Taken from UTSW EPIC*

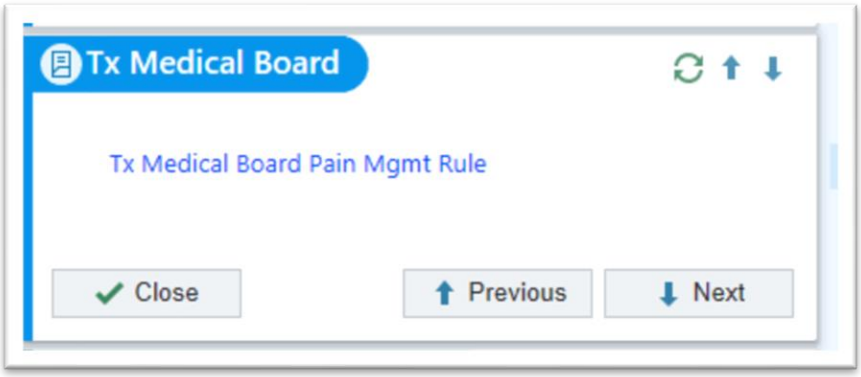



*Image 2: Link to Texas Medical Board Pain Management Rule*
*Source: Taken from UTSW EPIC*

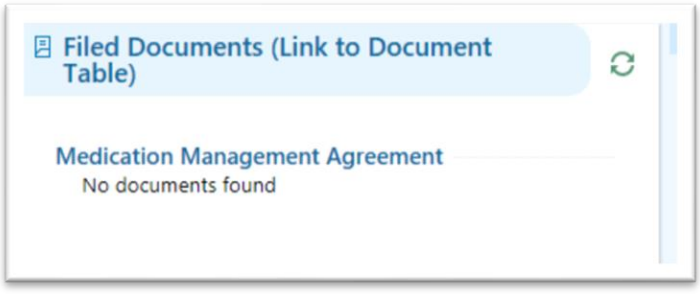



*Image 3: Centralized Location for Medication Management Agreement*
*Source: Taken from UTSW EPIC*


*Image 4: Smart Form for Medication Management Agreement*
*Source: Taken from UTSW EPIC*


*Image 5: Direct Link to Texas Prescription Monitoring Program*
*Source: Taken from UTSW EPIC*

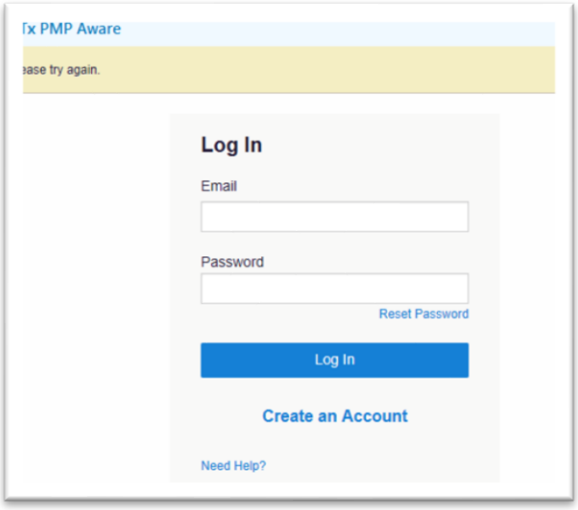



*Image 6: Tx PMP Aware Log-In Page Integrated into Epic*
*Source: Taken from UTSW EPIC*

**Measures**

The CDC, in conjunction with the guidelines they released, released a document outlining 16 clinical QI opioid measures that align with their recommendation statements. Three measures were chosen that directly align with TMB requirements for chronic opioid therapy. A fourth measure was chosen to measure trends in one of the CDC voluntary guidelines. Data pool was defined as all UTSW outpatient patients 18 years of age or older with ≥ 60 days' supply of opioids within a quarter.

Three process measures were chosen to represent completion of the TMB requirements.

1) The percentage of patients who had a **pain management agreement** on file
2) The percentage of patients on long-term opioid therapy who had documentation that a **PDMP** was checked
3) The percentage of patients on long-term opioid therapy with documentation that a **urine drug test** was performed at least annually

An additional fourth process measure was chosen to represent completion of a CDC guideline. Risk factors #2 and #3 were tracked over five years.

4) The percentage of patients on long-term opioid therapy with additional risk factors who were either **prescribed or referred to obtain naloxone**
    a. Risk factors defined as All UTSW outpatient patients 18 years of age or older with ≥ 60 days' supply of opioids within a quarter AND
    2) Diagnosis of opioid use disorder (OUD)

3) OR diagnosis of substance abuse

4) OR taking benzodiazepines concurrently

Opioids included in analysis were codeine, fentanyl transdermal, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone. Additionally, if patients had chronic use of a cough or cold formulation that contained codeine or another opioid in it, they were excluded. Additional data was looked at over several years to track changes in prevalence of substance use disorder and concurrent benzodiazepine prescriptions.

**Ethical considerations**

Patient data, including MRNs and prescription information, was kept on a password protected USB. Patient identifiers were removed from images obtained from patient charts in EPIC.

Treating chronic pain is challenging because of the uncertainty regarding the efficacy of different modalities. While physicians are largely in agreement regarding the treatment of pain associated with malignancies, many are unsure of what the best approach is for chronic non-malignant pain [7]. Guidelines and legal requirements are designed without consideration for patients' socioeconomic status and unique barriers to healthcare. Treating every patient with a one-size fits all approach inevitably leads to deleterious outcomes. Although these guidelines serve as reference points for physicians treating chronic non-cancer related pain, they should be tailored to fit the individual needs of the patient.

If a physician asks for completion of a drug screen, care should be taken to ensure the patient is actually able to complete the requirement and pay for the test. Time should be taken to explain the reason for obtaining such tests, otherwise providers run the risk of appearing

accusatory and alienating their patients. Similarly, pain management agreements should be written in language that is easy to follow and devoid of confusing medical terminology. The use of translators and properly translated documents is important to ensure proper communication between provider and patient. These aspects of the patient-provider relationship were not studied or controlled for. As large as 10% of the population in the US and Europe experience chronic pain that is debilitating enough to impact daily activities of living and quality of life [13]. Legal requirements should not lessen the quality of care provided by the provider.

**Results**

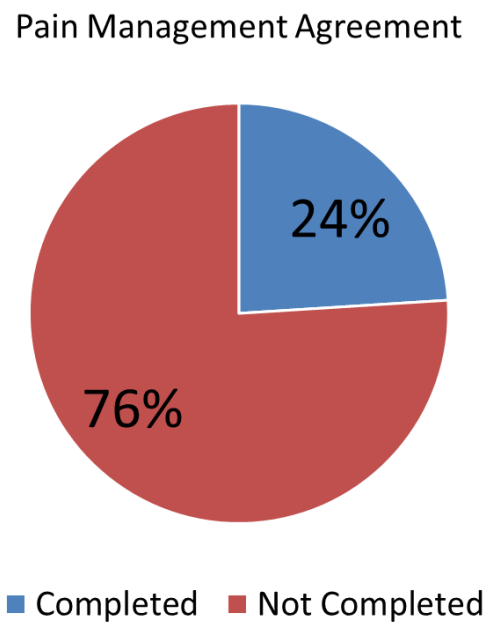



*Figure 14: Measure #1, The percentage of patients who had a pain management agreement on file*

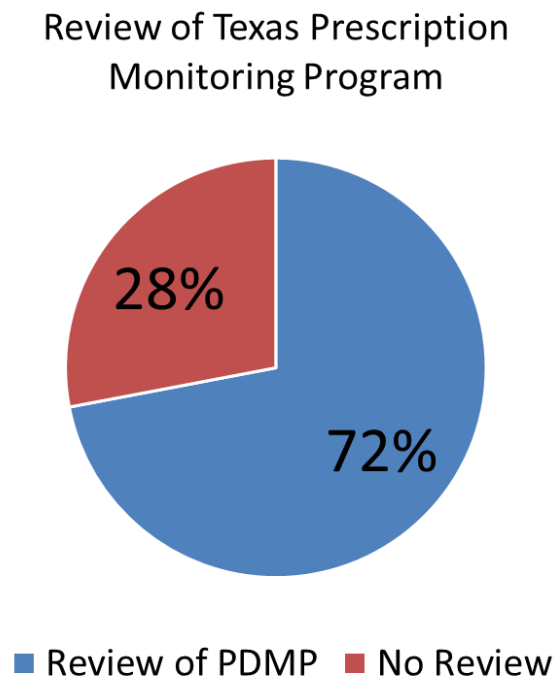



*Figure 15: Measure #2, The percentage of patients on long-term opioid therapy who had documentation that a PDMP was checked [in 2021]*

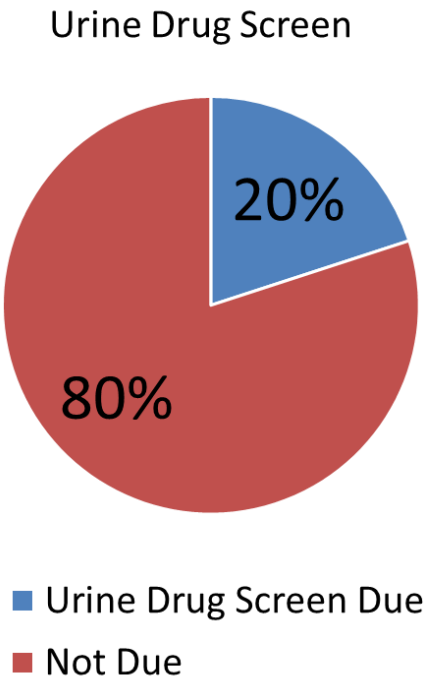



*Figure 16: Measure 3, The percentage of patients on long-term opioid therapy with documentation that a **urine drug test** was performed within last year*

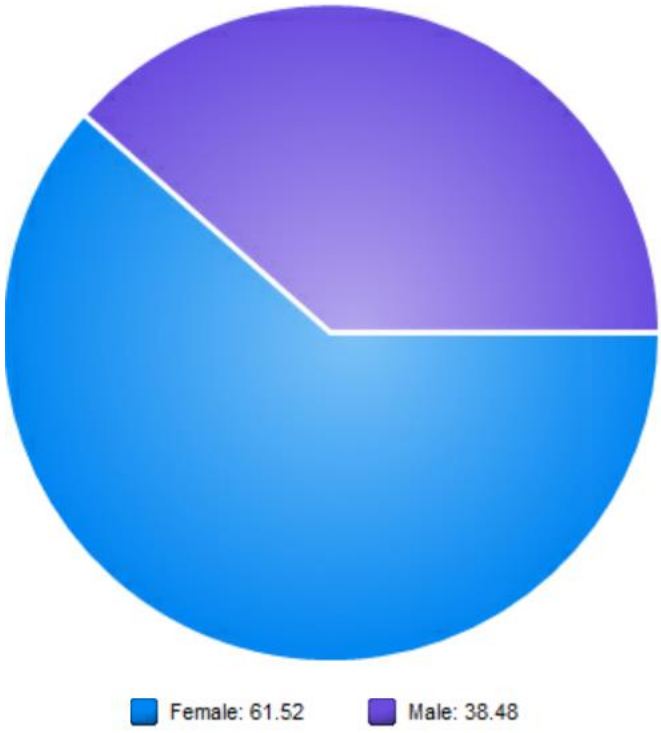



*Figure 17: Gender breakdown of patients on chronic opioid registry*

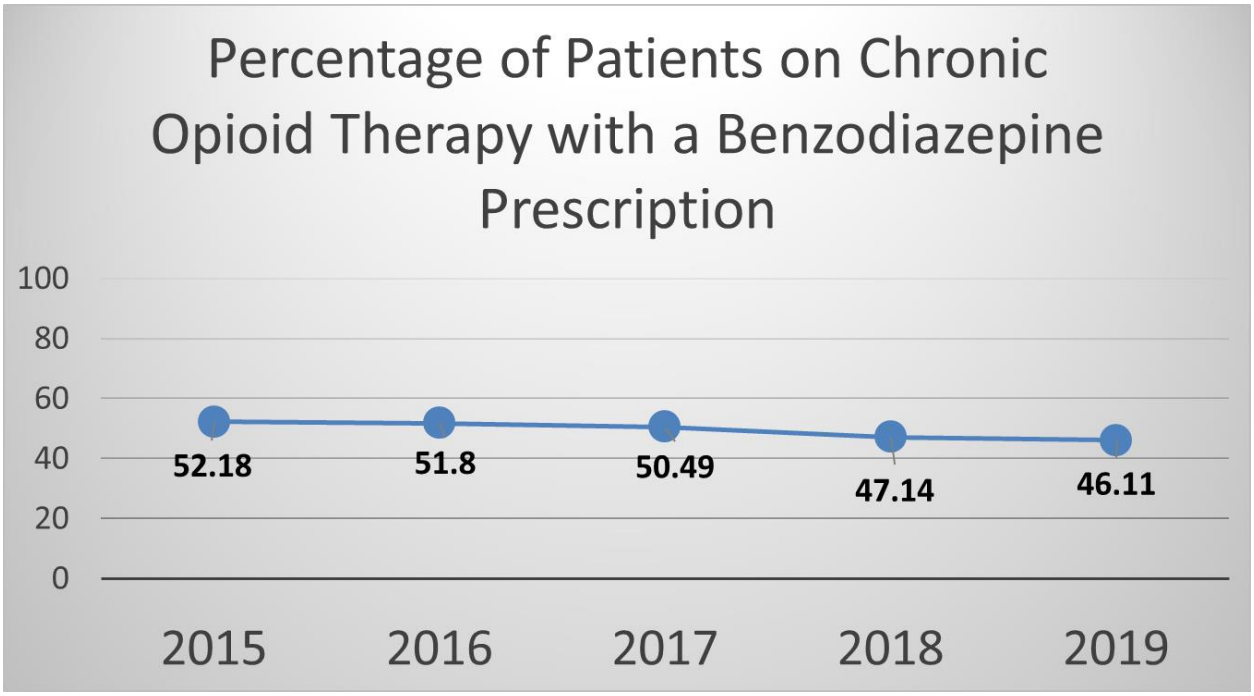



*Figure 18: The percentage of patients on chronic opioid therapy with a benzodiazepine prescription*

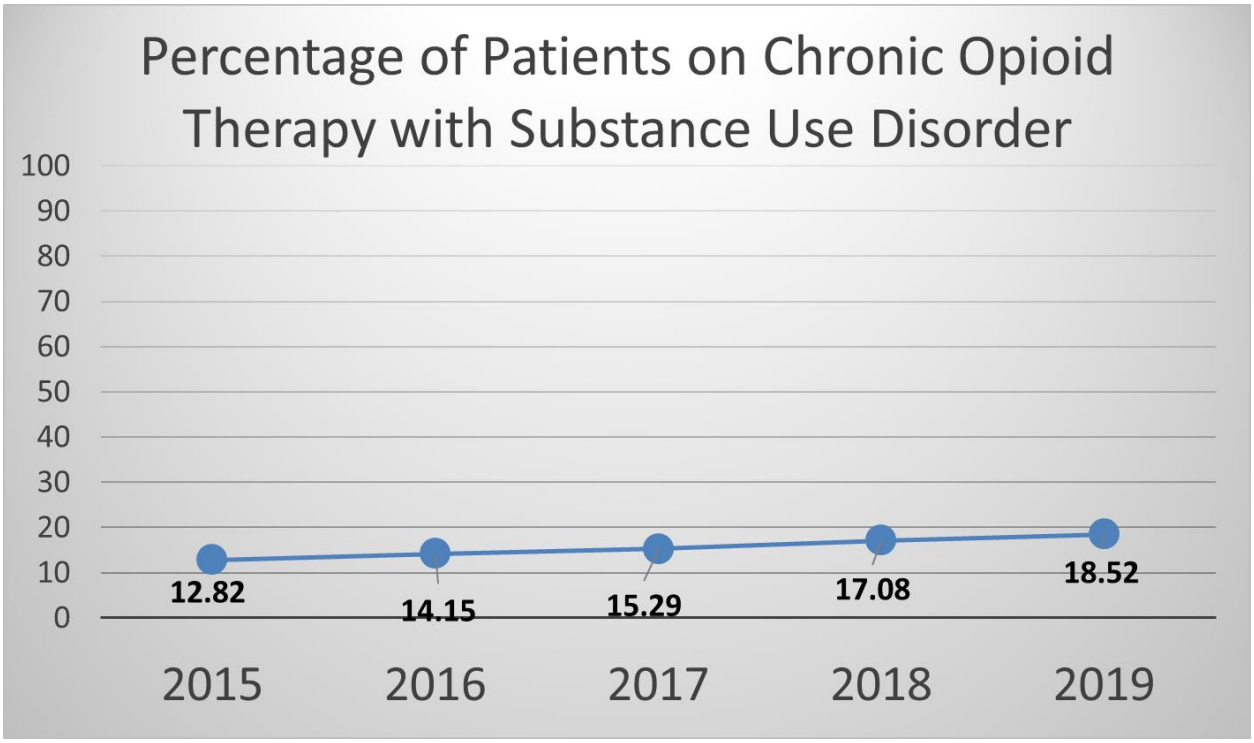



*Figure 19: The percentage of patients on chronic opioid therapy with a substance use disorder*

**Discussion**

Post-intervention data demonstrated that the percentage of patients who had a pain management agreement on file decreased while the percentage of patients on long-term opioid therapy who had documentation that a PDMP was checked and the percentage of patients with documentation that a urine drug test was performed increased. There were several limitations to the post-implementation data collection methods. Due to the design of the Chronic Opioid Registry, patients with cancer pain were included in the denominator. This may have led to over or underinflation of the actual percentage of patients with completed elements in their charts. The pre-implementation data did not include patients with cancer pain or palliative care patients. Caution should be taken when comparing the pre-intervention and post-intervention data due to the differences in patient population.

Post-intervention data demonstrated that 72% of patient encounters included a prescribing physician referencing the PDMP. Data from chart review in 2018 showed only 29% of patients had documentation. Prior to implementing a direct link to the Prescription Monitoring Program, providers were likely referencing the prescription registry but not documenting it in the chart. The pre-intervention percentage was low due to poor knowledge regarding the importance of documentation and not necessarily because providers weren't actually referencing the database. Several factors contributed to the increase in percentage of patient encounters where the PDMP was checked. First and foremost, the integration of a direct link to the patient chart in the PDMP allowed for automatic documentation of the date and time that the provider checked it. Due to the the direct link, every time the physician opened the database, the action was captured. The link also served as a reminder for physicians to reference the database more regularly and decreased the time needed to complete doing so. Texas House Bill 2561 was also passed which requires prescribers to check the patients PMP history before dispensing or prescribing opioids, benzodiazepines, barbiturates, or carisoprodol beginning September 1, 2019 [13]. All of these factors likely contributed to the increase in adherence to the CDC guideline regarding checking PDMP.

In 2018, 41% of patients had a pain management agreement uploaded into their chart. In 2021, the chronic opioid registry listed only 24% as having a completed chart. While this seems like a drop in percentage of patients with a completed agreement on file, this may be attributable to errors in data collection. Pre-intervention data was collected doing chart review while post-implementation data was collected using the chronic opioid registry. Patients may still have pain management agreements on file that had been uploaded into the media tab by providers. Providers may not have utilized the pain management agreement tool in the dashboard due to

lack of knowledge regarding the new centralized location. The post-intervention data only caught agreements completed using the dashboard tool. It is likely that many pain management agreements were not accounted for.

The percentage of patients with a "completed" urine drug screen increased from the pre-intervention to post-intervention period. One caveat is that the opioid registry considers "acknowledgement" of the health maintenance modifier that discusses a urine drug screen as completion of the task. The actual number of patients who had a urine drug screen completed within a year of data collection was likely much lower.

The percentage of patients who are treated with chronic pain and have a concurrent benzodiazepine prescription decreased between the period of 2015-2019. Meanwhile, the percentage of patients with a substance use disorder diagnosis in their chart increased. The prevalence of one risk factor is increasing while the other is decreasing. This data does not capture benzodiazepines obtained illegally or through family members, and likely underestimates the true proportion of patients who have access to opioids and benzodiazepines concurrently.

**Next steps**

In order to assess whether patient outcomes are being affected, patient satisfaction with pain management needs to be measured. Since patients with chronic pain are at a risk of being undertreated due to provider uncertainty, management of pain is an important balancing measure in this project. Additional methods of monitoring patient outcomes might involve tracking the number of new opioid use disorder diagnoses or emergency department visits for overdoses. Additionally, Press Gainey scores can be utilized to determine trends in patient satisfaction with their providers.

This project only looked at how the planned intervention addressed three of the CDC Guidelines. Ideally, the opioid dashboard tool will aid prescribers in practicing in accordance with all 12 guidelines. The first guideline suggests that prescribers provide adjunctive nonpharmacological treatment options as well. While providers usually attempt a multitude of treatment options for pain prior to initiating opioid therapy, this information can often be cumbersome to find in a patient's chart. A future iteration of the dashboard may have a section dedicated to a patient's treatment journey. This way, providers can easily see what non-pharmacological and non-opiate therapies have been attempted with each patient and use that to better tailor their care. They can also justify escalation of pain management by showing how previous modalities were ineffective.

CDC guideline eight discussed the importance of offering naloxone to patients who are considered higher risk for opioid overdose. Another tool that may be added into the dashboard is a quick identifier for patients at "higher risk" with the option of documenting a discussion regarding naloxone. This will prompt providers to consider whether their patients have risk factors and whether they should receive naloxone.

The opioid task force will also continue to obtain feedback from providers regarding the chronic opioid therapy dashboard tool and modify features as needed to maintain user friendliness. As studies are conducted and guidelines regarding pain treatment change, the EMR tools can be easily modified to reflect current best practices.

## Additional QI Tools

| Process Step/Input | Potential Failure Mode | Potential Failure Effects | SEVERITY (1 - 10) | Potential Causes | OCCURRENCE (1 - 10) | Current Controls | DETECTION (1 - 10) | RPN | Action Recommended | Resp. |
|---|---|---|---|---|---|---|---|---|---|---|
| What is the process step, change or feature under investigation? | In what ways could the step, change or feature go wrong? | What is the impact on the system/people if this failure is not prevented or corrected? | | What causes the step, change or feature to go wrong? (how could it occur?) | | What controls exist that either prevent or detect the failure? | | | What are the recommended actions for reducing the occurrence of the cause or improving detection? | Who is responsible for making sure the actions are completed? |
| Opioid Registry | Incorrect selection of patients (incorrect algorithm). Criteria selected by opioid prescription team doesn't align with the TMB definition of chronic pain. | Patient is not treated in accordance with TMB rule 170.3. Physician is not complying with TMB rule 170.3 | 9 | Incorrect input of algorithm into the the Epic data system or incorrect selection of algorithm in the first place. | 6 | Opioid prescription team meets regularly to fine tine the criteria for patient selection. The team has doctors who are familiar with the criteria. | 2 | 108 | Run the criteria used for the selection of patients through a higher up or through a TMB representative. | Opioid Prescription Policy Team |
| Best Practice Alerts | Best Practice Alerts don't pop up for patients who arent automatically added onto the registry. | New patients to the system who don't have all their previous medication history uploaded onto Epic may not be flagged as chronic opioid patients, therefore not endng up on the registry and not pulling up the best practice alerts. These patients will not be treated in accordance with TMB rule 170.3 | 9 | Physicians not taking into account the patient's current and past medicaiton history. If they aren't familiar with the criteria than they won't know to manually input the best practice alerts for patients who qualify as "chronic pain patients on opioids." | 7 | None as of now | 9 | 567 | Educate physicians on the criteria used to select patients for the registry. Educate physicians on the importance of the best practice alerts. Educate physicians on how to manually add the best practice alerts to patients they determine qualify. | Opioid Prescription Policy Rollout Team |
| Pain Management Agreement | Standardized Agreement Form does not come in multiple languages | A non-standardized form has to be written up for patients who don't speak english, therefore non-standardizing the process | 7 | Failure to use culturally competent balancing measures | 2 | Physicians have to manually detect this when discussing with patient | 10 | 140 | Translated versions of the pain mamangement agreement be made on Epic | Opioid Prescription Policy Rollout Team |

*Figure 19: Failure Mode Analysis Diagram*

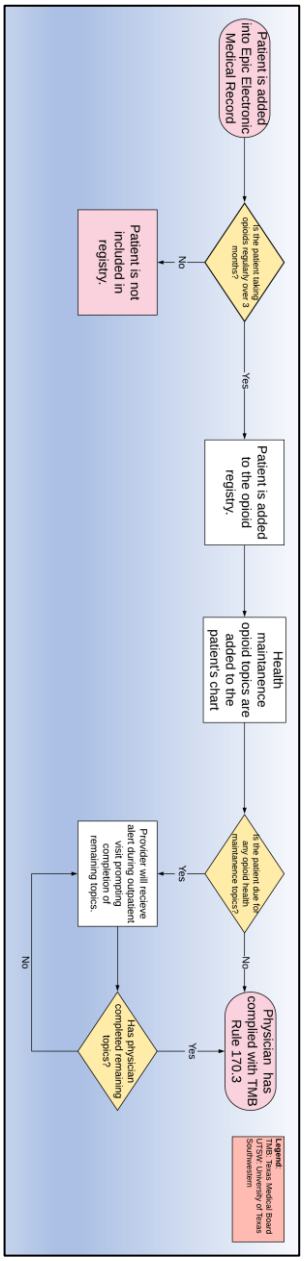



*Figure 20: Process Map for Planned Intervention*

References


1) “SQUIRE 2.0 Guidelines.” *SQUIRE*, squire-statement.org/index.cfm?fuseaction=page.viewPage&pageID=471&nodeID=1#title.
2) Anderson D, Zlateva I, Khatri K, et al. Using health information technology to improve adherence to opioid prescribing guidelines in primary care. Clin J Pain. 2015;31:573–579.
3) Anderson, Daren MD; Zlateva, Ianita MPH; Khatri, Khushbu BS; Ciaburri, Nicholas BS Using Health Information Technology to Improve Adherence to Opioid Prescribing Guidelines in Primary Care, The Clinical Journal of Pain: June 2015 - Volume 31 - Issue 6 - p 573-579 doi: 10.1097/AJP.0000000000000177
4) Bender, C. (n.d.). *Improving adherence to Texas Medical Board Rule 170.3 regarding requirements for the treatment of chronic pain* [Scholarly project]. Retrieved August 3, 2018.
5) Benyamin, Ramsin, MD, Andrea M. Trescot, MD, Sukdeb Datta, MD, Ricardo Buenaventura, MD, Rajive Adlaka, MD, Nalini Sehgal, MD, Scott E. Glaser, MD, and Ricardo Vallejo, MD. "Opioid Complications and Side Effec." *Pain Physician,* 2008, S105-120. Accessed February 28, 2017.
*6)* Campbell, C. I., Bahorik, A. L., VanVeldhuisen, P., Weisner, C., Rubinstein, A. L., & Ray, G. T. (2018, May). *Use of a prescription opioid registry to examine opioid misuse and overdose in an integrated health system.*
*7)* Centers for Disease Control and Prevention. Quality Improvement and Care Coordination: Implementing the CDC Guideline for Prescribing Opioids for Chronic

Pain. 2018. National Center for Injury Prevention and Control, Division of Unintentinal Injury Prevention, Atlanta, GA.

8) Daleiden EL, Chorpita BF. From data to wisdom: quality improvement strategies supporting large-scale implementation of evidence-based services. Child Adolesc Psychiatr Clin N Am. 2005;14:329–349.

9) Dowell D, Haegerich TM, Chou R. CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016. MMWR Recomm Rep 2016;65(No. RR-1):1–49. DOI: http://dx.doi.org/10.15585/mmwr.rr6501e1external icon

10) Gladden M, O'Donnell J, Mattson C, Seth P. Changes in Opioid-Involved Overdose Deaths by Opioid Type and Presence of Benzodiazepines, Cocaine, and Methamphetamine – 25 States, July-December 2017 to January-June 2018. MMWR Morb Mortal Wkly Rep 2019:68(34);737-744.

11) Kandil, E., MD, MSc. (july 2018). Combating the Opioid Epidemic in Dallas. *Dallas Medical Journal*, 16-18. Retrieved July 31, 2018, from https://www.dallas-cms.org/tmaimis/dcms/assets/files/news/ePulse/Kandil.pdf.

12) Kroch E, Vaughn T, Koepke M, et al.. Hospital boards and quality dashboards. J Patient Saf. 2006;2:10–19.

13) *Minimum Requirements for the Treatment of Chronic Pain*, in *22*, T.M. Board, Editor. 2015

14) Rosenblum, A., Marsch, L. A., Joseph, H., & Portenoy, R. K. (2008). Opioids and the treatment of chronic pain: Controversies, current status, and future directions. *Experimental and Clinical Psychopharmacology, 16*(5), 405-416. doi:10.1037/a0013628

15) Wide-ranging online data for epidemiologic research (WONDER). Atlanta, GA: CDC, National Center for Health Statistics; 2020. Available at http://wonder.cdc.gov.

16) Wilson N, Kariisa M, Seth P, et al. Drug and Opioid-Involved Overdose Deaths—United States, 2017-2018. MMWR Morb Mortal Wkly Rep 2020;69:

17) Al-Mahrezi A. Towards Effective Pain Management: Breaking the Barriers. *Oman Med J*. 2017;32(5):357-358. doi:10.5001/omj.2017.69

18) AMA J Ethics. 2015;17(6):521-529. doi: 10.1001/journalofethics.2015.17.6.nlit1-1506.

Vitae

Aemen Zamir is a 4th year medical student at The University of Texas Southwestern Medical Center. She attended The University of Texas at Dallas (2014-2017) and majored in biology as an undergraduate, where she became interested in the topic of opioids. Her interests include substance use disorders, toxicology, and palliative care. She'll be pursuing an internal medicine residency.