

ASSESS EFFECTIVENESS OF OPIOID PRESCRIPTION POLICIES
FOR ACUTE PAIN MANAGEMENT

by

ARTI MACHCHHAR

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 AND PATIENT SAFETY

The University of Texas Southwestern Medical Center
Dallas, TX

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ACKNOWLEDGMENTS

I would like to thank Dr. Gary Reed for his guidance, support, and encouragement throughout my medical education. I would also like to acknowledge all staff at the Office for Quality, Safety, and Outcomes Education at the University of Texas at Southwestern, namely Eleanor Phelps and Annette Irving for their academic support.

ABSTRACT

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ARTI MACHCHHAR

The University of Texas Southwestern Medical Center, 2022
Supervising Professor: Enas Kandil, M.D., MSc

Background: In 2017, the Department of Health and Human Services (HHS) declared the Opioid Crisis a public health emergency. Regulatory agencies and institutions have adopted several guidelines to ensure opioids are prescribed appropriately. In October 2014, the DEA changed the schedule of hydrocodone combination products (HCPs) from schedule III to schedule II narcotics. This led to a substantial rise in Tylenol 3 prescriptions at the University of Texas at Southwestern Medical Center (UTSW) due to the institutional guideline that prevents residents from prescribing schedule II narcotics without documented approval from an attending physician.

Objective: We sought to evaluate whether the UTSW guideline preventing residents from prescribing schedule II narcotics serves to improve patient safety and pain management.

Methods: Prescription data and associated patient demographic data was pulled directly from the UTSW electronic medical record (EMR) for one year prior to and following the rescheduling of HCPs. Additional data was pulled for the 2019 and 2020 calendar years. The proportion of T3 and schedule II narcotic prescriptions was calculated for all time periods and

stratified for age, race, provider type, and department.

Results: One year before the rescheduling of hydrocodone, the vast majority of prescriptions were schedule II narcotics at 98.92% and T3 was very rarely prescribed at 1.08%. In 2014 – 2015 following the rescheduling of HCPs, there was an overall decrease in opioid prescriptions and the proportion of T3 prescriptions rose to 49.94%. In 2019 and 2020, the overall number of opioid prescriptions increased to 17,297 in 2019 and 15,395 in 2020 and the proportion of T3 prescriptions decreased to 37.12% and 33.89% respectively.

Conclusion: The rescheduling of HCPs led to the dramatic shift in Tylenol 3 prescriptions, indicating that regulatory agencies and institutional guidelines are driving prescribing habits. Tylenol 3 is being prescribed at a significant rate however, information regarding its addictive potential, metabolic effects, and potential adverse effects remains relatively unknown. The drug policies and institutional guidelines discussed disproportionately affect people of color and lower socioeconomic class.

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CHAPTER 1: Introduction

Problem Description

In 2017, the Department of Health and Human Services (HHS) declared the Opioid Crisis a public health emergency. Approximately 11.4 million people misuse prescription opioids and over 130 people die every day from an opioid overdose¹⁷. According to HHS, the increased prescription of opioid medications is what led to the widespread misuse of both prescription and non-prescription opioids¹⁷. To combat this opioid epidemic, regulatory agencies and institutions across the country have adopted several guidelines to ensure opioids are prescribed appropriately. The University of Texas at Southwestern along with Parkland Health & Hospital System has implemented a policy preventing residents from prescribing schedule II narcotic without authorization from an attending physician.

Available Knowledge

The Controlled Substances Act (CSA) was enacted as a part of the Comprehensive Drug Abuse Prevention and Control Act in 1970⁹. Drugs or any substances considered controlled substances under the Controlled Substances Act are divided into five schedules based on their addictive potential as the determining factor⁹. Schedule I drugs are considered the most addictive and have no medical use⁹. This schedule includes illegal substances like heroin, ecstasy, and LSD⁹. Schedule II narcotics are considered highly addictive and include drugs like oxycodone and hydromorphone⁹. Schedule IIN drugs include simulants like amphetamine. Schedule III narcotics include Tylenol 3³. Schedule IIIN includes ketamine and anabolic steroids⁹. Schedule IV drugs include benzodiazepines⁹. Lastly, schedule V drugs include cough suppressants with codeine⁹.

Schedule II narcotics are highly addictive and carry a multitude of risks that physicians must be aware of. The high addictive potential of these drugs increases the risk of misuse which can lead to overdose and death³. Serious, life threatening respiratory depression can also occur, especially during initiation of these drugs and following a dose increase³. Of all accidental ingestions, opioids are the most common drug leading to accidental death^{3,7}. Despite these risks, schedule II narcotics are more effective for pain control compared to schedule III drugs, which contributes to their widespread use^{14,23}.

Hydrocodone along with hydrocodone combination products was the most frequently prescribed opioid in the US with 137.6 million prescriptions dispensed in 2013⁶. In October 2014, the Drug Enforcement Agency (DEA) changed the schedule of hydrocodone combination products from schedule III to schedule II narcotics⁸. The rationale behind the rescheduling was that adding a non-narcotic substance, like acetaminophen, does not diminish the abuse potential of the drug⁸. This level of consumption of hydrocodone and HCPs was sufficient to affect individual health and safety and be a threat to the community¹³. According to the DEA, twice as many high school seniors misused Vicodin, an HCP, than oxycodone, a schedule II narcotic⁸. With this widespread use, hydrocodone and HCPs were the most widely diverted opioid^{6,8,12}. When the DEA rescheduled HCPs to a more restrictive schedule II narcotic, residents were unable to prescribe these drugs in the outpatient setting without having an attending co-sign their order, thus causing an increase in Tylenol 3 (T3) prescriptions.

While many physicians believe that T3 has a lower addictive potential than schedule II narcotics, many providers are not as familiar with this medication or its potential side

effects. According to literature, T3 is as effective as 400mg of ibuprofen for pain relief². However, one study cited that more subjects reported adverse effects while taking T3 compared to the subjects taking Ibuprofen¹⁸. T3 is also more expensive than over-the-counter strength ibuprofen. Overall, Ibuprofen was tolerated better than T3 with no difference in patient satisfaction^{2,15}.

There are several documented contraindications to taking T3. Consistent use of T3 when pregnant can lead Neonatal Abstinence Syndrome⁷. Use when breastfeeding can also lead to serious adverse reactions in infants such as lethargy, feeding difficulty, and respiratory depression, which has resulted in overdose and subsequent death⁷. T3 is also contraindicated in certain children due to the risk of life-threatening respiratory depression⁷. T3 is contraindicated in children under the age of 12 and used with caution for children between 12 and 18 years of age⁵. Life-threatening respiratory depression mainly occurred following a tonsillectomy or adenoidectomy procedure, which is why T3 is contraindicated following these procedures for children of all ages⁵. Many children who suffered from severe respiratory depression had evidence of being ultra-rapid metabolizers of codeine due to a CYP450 2D6 polymorphism^{4,5}. Nursing mothers who were also ultra-rapid metabolizers were found to excrete large amounts morphine into breastmilk which resulted in catastrophic outcomes, such as overdose or death in infants^{7,22}. On the contrary, patients can be slow metabolizers resulting in undertreatment of pain due to the insufficient analgesic effects of T3^{4,7}.

Aim Statement

We sought to assess the effectiveness of one UTSW guideline preventing residents

from prescribing schedule II narcotics in the outpatient setting and whether this policy serves to improve patient safety within the acute pain patient population.

Our aim in this study was to determine the effect of opioid prescribing regulations on the amount of Tylenol 3 prescriptions one year prior to the rescheduling of HCPs, one year after, and for the 2019 and 2020 calendar years to assess the effectiveness of the UTSW guideline that prevents residents from prescribing schedule II narcotics in improving patient safety and pain management.

CHAPTER 2: Methods

Context

All residents practicing at UTSW and the Parkland Health & Hospital System abide by the same guidelines when prescribing controlled substances. Both hospital systems utilize the same EMR with some minute differences. Therefore, the opioid prescribing process does not differ between the two hospital systems. Similar, ideally identical, prescription data had to be pulled for both UTSW and Parkland. UTSW has fostered a reputation as a top-tier private hospital in Dallas-Fort Worth, while Parkland serves as the safety net hospital. As a result, both hospitals serve very different patient populations, with Parkland primarily serving the underserved, uninsured, and a disproportionately higher number of African Americans, Hispanic, Native Americans, and other patients of color.

Prescription data was pulled directly from the UTSW EMR for one year prior to and following the rescheduling of HCPs to establish a baseline of prescribing practices and evaluate the immediate response. Additional data was pulled for 2019 and 2020 to show current state prescribing practices and how they have evolved since the rescheduling of HCPs. The team included a statistician to define the parameters of the data pull, initiate the UTSW data request, and determine the analysis required of the data. An IT analyst performed the data pull and assisted with preliminary analysis.

A similar data request was made from Parkland for comparison. However, due to bureaucratic red tape and the constraints that the COVID-19 pandemic had placed on Parkland's IT department, this data request could not be met.

Measures

The first step in requesting this data was to develop a list of drugs, including various trade names, dosages, and formulations that were within the scope of this study. In addition to the prescription data itself, a wide range of demographic data was collected including age, race, sex, department, provider type, diagnosis, procedure (if applicable), and admission and discharge dates. Once the data was collected, all prescriptions determined to be inpatient orders were filtered out because inpatient orders do not require the additional co-sign from an attending physician.

Analysis

When analyzing this data, the overarching goal was to calculate the proportion of T3 and schedule II narcotics for all four time periods discussed (one year prior to and following the intervention, along with the 2019 and 2020 calendar years). After evaluating the annual trends, the data was stratified to assess for differences in prescribing habits between various demographics including age, race, provider type, and department. Aside from the proportions of T3 and schedule II narcotics, the total number of opioid prescriptions annually and for each demographic was also evaluated to assess for under-prescription or over-prescription of narcotics. The various analyses were to be duplicated with the data from Parkland to evaluate for differences in socioeconomic class. The process for prescribing opioid in the outpatient setting was also mapped for both T3 and schedule II narcotics to evaluate for bottlenecks and areas of inefficiency that may be influencing prescribing habits.

Interventions

The PDSA methodology was utilized throughout this study (Figure 1). In the

Planning Phase, we developed the list of drug names, dosages, and formulations within the scope of the study. Demographic data points as well as the time periods for the data pull were also determined. In the Do Phase, the data request was initiated and the current state opioid prescribing process was mapped. In the Study Phase, the data was analyzed for annual trends and trends in demographic data for all time periods. The current opioid prescribing process was also analyzed for potential interventions. Lastly, the Act Phase, which has yet to be initiated, would involve implementing the interventions determined in the Study Phase to target the current prescribing practices of residents.

Multiple quality improvement tools were utilized throughout the study. The SIPOC diagram was one of the first tools utilized to identify all of the relevant elements of the prescribing process prior to mapping out the process in detail (Figure 2). The key element of the high-level process is when the resident takes over the care of the patient and becomes responsible for prescribing all pain medication.

Once the critical phase in the process was identified through the SIPOC diagram, the current state outpatient opioid prescription process was mapped in detail (Figure 3). After the resident has performed the essential tasks involved in a clinic appointment and determined that the patient requires a prescription for narcotic analgesics, the resident will decide the type of drug, dosage, formulation, and duration. The order will be inputted into the EMR. If the prescription is for a schedule III substance, the resident is able to sign the order. However if it is a schedule II narcotic, they will not be able to sign the order on their own. The attending physician will be notified of the prescription order in the EMR. The attending verifies that the order contains the correct drug, dosage, formulation, and duration and then

co-signs the order. The resident is now allowed to place the order.

Ethical Considerations

The main ethical considerations were concerns regarding patient privacy when accessing sensitive patient health information and demographic data. However, all data was anonymized with an alternate medical record number (MRN). The names of physicians prescribing these controlled substances was also available however, physician specific analysis was not performed. The data was only available and accessed by the supervising faculty and essential team members.

CHAPTER 3: Results

One year prior to the rescheduling of hydrocodone, the vast majority of prescriptions were schedule II narcotics at 98.92%. T3 was very rarely prescribed at 1.08% (Table 1). One year following this change, there was a decrease in total prescriptions. In period 1, there was a total of 17,122 prescriptions between T3 and schedule II narcotics. In the year following, period 2, the total number of prescriptions decreased to 12,189 prescriptions. While this could be the result of a decrease in the number of patients that presented, a decrease to this degree is highly unlikely. The drop in prescriptions one year following the intervention suggests that physicians were prescribing less opioids by utilizing nonnarcotic analgesics or possibly undertreating pain. In addition to the significant decrease in opioid prescriptions, the proportion of T3 prescriptions rose to about 49.94%.

In period 3, the total number of prescriptions increased near the amount prescribed in period 1 at 17,297 prescriptions. The proportion of T3 prescriptions also decreased to between 37.12%. Lastly in period 4, the total number of prescriptions decreased to 15,395 and the proportion of T3 prescriptions also decreased to 33.89%. The drop in the total number of prescriptions in 2020 is likely attributed to the COVID-19 pandemic. With a decrease in elective procedures, patients were less likely to present with acute pain requiring prescription narcotics.

The data was also stratified by various demographic factors to assess for differences in prescribing habits. This included patient age divided into ranges of 10 years. There was no significant difference in the prescribing habits for different age groups compared to the overall annual trends for all time periods. There was also no significant difference in the

prescribing habits when filtering for provider type and by department compared to the annual trends for all time periods. When stratified for race, the proportion of T3 prescriptions compared to schedule II narcotics followed the annual trends for all time periods. However, the trends in the total number of prescriptions for different races varies significantly (Tables 2-5). For instance, the total number of prescriptions for Hispanic or Latino patients decreased from 815 prescription prior to the intervention to 458 prescriptions the following year, approximately a 44% decrease. While the total number of prescriptions for Asian patients decreased from 455 prescription prior to the intervention to 372 prescriptions the following year - an 18% decrease.

CHAPTER 4: Discussion

Findings

Following the data analysis and mapping of the opioid prescription process, we utilized a Driver Diagram to determine the primary and secondary drivers in deciding to prescribe T3 or a schedule II narcotic (Figure 5). The first primary driver was a general lack of knowledge surrounding T3. When interviewing residents, there were many misconceptions regarding its addictive potential in comparison to schedule II drugs. Because many of UTSW and Parkland patients present with complex medical histories and are already taking several medications, residents were often intimidated by prescribing schedule II narcotics due to potential drug interactions. There is also a general lack of knowledge about which drugs are more effective for managing certain types of pain. Many residents are not aware that T3 is not the superior option for managing acute pain. The second driver for prescribing T3 over schedule II narcotics was inefficiencies the process itself. The step that requires a co-sign for the medication order not only takes additional time but requires the involvement of an attending physician. Especially on a high-volume, resident-run, service or clinic, residents may not be able to take the time required to fulfil this step. An attending physician also may not be readily available on a predominately resident-run service.

Interpretation

A multitude of change ideas can be implemented to address the primary and secondary drivers discovered. Residents and other providers need increased education to address many of the misconceptions and to fill in the knowledge deficits around which drugs provide optimal pain control. The step requiring an attending physician to co-sign orders for

schedule II narcotics is most certainly the bottleneck in the process. While the simple solution may be to remove this step in the process, doing so may create situations where junior, less experienced, residents have the ability to prescribe highly addictive controlled substances without oversight. Potential solutions include removing restrictions for senior residents to allow them to co-sign orders. Since many of the high volume, resident-run services are at Parkland, it is likely that the residents operating within this safety net hospital resort to prescribing T3 over schedule II drugs. Unfortunately, this has a greater impact on the underserved population, which has a disproportionately higher number of African Americans, Hispanics, and other minorities. Therefore, providing implicit bias training to decrease the variance in opioid prescribing habits between UTSW and Parkland may prove to be beneficial.

Conclusion

Based on current literature, T3 is not the most effective medication for pain control in comparison to schedule II narcotics and over-the counter analgesics^{14,23}. Much of the information regarding addictive potential, rates of abuse, and adverse effects for T3 remains unknown. This calls for the need for more scientific data and research for T3. Many laws, regulatory changes, and institutional guidelines have been implemented around prescribing opioids. However, there is a general lack of data and research around the effectiveness of specific drug policies. Rates of abuse, addiction, and overdose since implementation of these policies remains unknown. Patient satisfaction and quality of pain management also remains unknown. These topics must be explored to determine whether physicians are doing what is best for their patients when following laws, regulations, and guidelines on the institutional

level. There are knowledge deficits regarding T3 and schedule II narcotics and lack of training amongst providers in how to prescribe opioids safely. This contributes to inappropriate prescriptions and increases fear around prescribing opioids, thereby negatively impacting patients. In addition, the current state opioid prescribing process contains a bottleneck that resulted in increased T3 prescriptions following the rescheduling of HCPs. The current process must be altered in a way that does not give residents too much autonomy to prescribe dangerously. A potential solution could be to provide senior, more experienced residents the ability to co-sign schedule II narcotic orders to help alleviate some of the strain on attending physicians, minimize time, and increase efficiency while maintaining adequate oversight.

While data from Parkland was not acquired to assess to differences in prescribing habits between different socioeconomic classes, it is evident from current literature that race and socioeconomic status does affect patient care either intentionally or unintentionally^{10,19}. For example, the “War on Drugs” initiated decades ago reinforces racial hierarchies and unfairly criminalizes people of color and lower socioeconomic status, while advocating for treatment and less punitive consequences for white Americans^{1,16}. Racial bias when it comes to pain assessment and management has also been studied. A study revealed that approximately 40% of first- and second-year medical trainees hold one or more false beliefs regarding pain felt by African Americans compared to Caucasians¹¹. Although widely debunked, some of these misconceptions included statements akin to black people have thicker skin than white people and their nerve endings are less sensitive than white peoples’¹¹.

Concerns of noncompliance may also be playing a role if the provider holds the

belief that a patient of color or lower socioeconomic class is more likely to abuse the controlled substance¹⁹. This belief has also been widely refuted as studies show that white people are just as likely to get addicted or misuse drugs as people of color¹⁶. Other reasons that underserved patient's pain can go inadequately treated are the lack of resources. Opioids are more expensive than over the counter analgesics. Many of these patients may not have the ability to pay or have health insurance to pay for these drugs¹⁹. Physicians also need to acknowledge that treatment recommendations may not be followed if a patient is coping with extreme socioeconomic disadvantages and related stressors¹⁹. They must provide these patients with adequate resources such as access to social workers and public welfare agencies to increase treatment adherence and improve outcomes¹⁹.

In conclusion, the abrupt change in the proportion of T3 and schedule II narcotic prescriptions suggests rescheduling of hydrocodone combination products as the primary driver in prescribing practices^{20,21}. T3 was rarely prescribed prior to the rescheduling of hydrocodone at 1.08%. Following rescheduling, T3 prescriptions rose exponentially to 49.94%. While T3 prescriptions have decreased in recent years, 37.12% and 33.89% in 2019 and 2020 respectively, this proportion remains significantly high. Despite prescribing T3 at record numbers, we do not have sufficient data and research regarding its addictive potential, how it is metabolized, and the potential side effects for patients⁷. More research is necessary to assess whether rates of abuse, addiction, and overdose are indeed decreased by this intervention or are physicians simply undertreating or mistreating pain¹⁰. Physicians and other providers need to be educated on the risks, benefits, and appropriate use of schedule II and schedule III opioids. Because the rescheduling of HCPs led to the dramatic shift in T3

prescriptions, it is obvious that regulatory agencies like the DEA and institutional policies are driving prescribing habits, not necessarily physician preference. Policies and guidelines like the ones discussed in this study contribute to the inequalities in healthcare for people of color and lower socioeconomic status. All patients deserve adequate pain management. Time and money need to be spent on policies and guidelines that improve all patients' quality of life.

LIST OF TABLES

Encounter Discharged Period	Medication Orders of T3 or Schedule II			
	Number of Medication Orders of T3	% of Medication Orders of T3	Number of Medication Orders of Schedule II	% of Medication Orders of Schedule II
Period-1 (10/01/2013 - 09/30/2014)	185	1.08%	16,937	98.92%
Period-2 (11/01/2014 - 10/31/2015)	6,087	49.94%	6,102	50.06%
Period-3 (01/01/2019 - 12/31/2019)	6,420	37.12%	10,877	62.88%
Period-4 (01/01/2020 - 12/31/2020)	5,217	33.89%	10,178	66.11%

Table 1: Annual trends in T3 and schedule II narcotic prescriptions

Medication Orders of T3 and Schedule II Narcotics for Period-1 (10/01/2013 - 09/30/2014)					
Race	Number of Medication Orders of T3		Number of Medication Orders of Schedule II		Total
American Indian or Alaska Native	0	0%	68	100%	68
Asian	7	2%	448	98%	455
African American	26	1%	2715	99%	2741
Hispanic or Latino	12	1%	803	99%	815
Native Hawaiian or Other Pacific Islander	0	0%	14	100%	14
White	118	1%	10553	99%	10671

Table 2: Proportion of T3 compared to schedule II narcotics when stratified by race for Period 1 (10/01/2013 – 09/30/2014)

Medication Orders of T3 and Schedule II Narcotics for Period-2 (11/01/2014 - 10/31/2015)					
Race	Number of Medication Orders of T3		Number of Medication Orders of Schedule II		Total
American Indian or Alaska Native	15	38%	24	62%	39
Asian	186	50%	186	50%	372
African American	950	43%	1235	57%	2185
Hispanic or Latino	248	54%	210	46%	458
Native Hawaiian or Other Pacific Islander	7	37%	12	63%	19
White	3574	51%	3406	49%	6980

Table 3: Proportion of T3 compared to schedule II narcotics when stratified by race for Period 2 (11/01/2014 – 10/31/2015)

Medication Orders of T3 and Schedule II Narcotics for Period-3 (01/01/2019 - 12/31/2019)					
Race	Number of Medication Orders of T3		Number of Medication Orders of Schedule II		Total
American Indian or Alaska Native	23	41%	33	59%	56
Asian	167	32%	347	68%	514
African American	899	33%	1848	67%	2747
Hispanic or Latino	233	37%	398	63%	631
Native Hawaiian or Other Pacific Islander	4	31%	9	69%	13
White	3928	38%	6328	62%	10256

Table 4: Proportion of T3 compared to schedule II narcotics when stratified by race for Period 3 (01/01/2019 – 12/31/2019)

Medication Orders of T3 and Schedule II Narcotics for Period-4 (01/01/2020 - 12/31/2020)					
Race	Number of Medication Orders of T3		Number of Medication Orders of Schedule II		Total
American Indian or Alaska Native	34	51%	33	49%	67
Asian	133	27%	356	73%	489
African American	755	30%	1800	70%	2555
Hispanic or Latino	164	36%	288	64%	452
Native Hawaiian or Other Pacific Islander	7	35%	13	65%	20
White	3059	35%	5671	65%	8730

Table 5: Proportion of T3 compared to schedule II narcotics when stratified by race for Period 4 (01/01/2020 – 12/31/2020)

LIST OF FIGURES

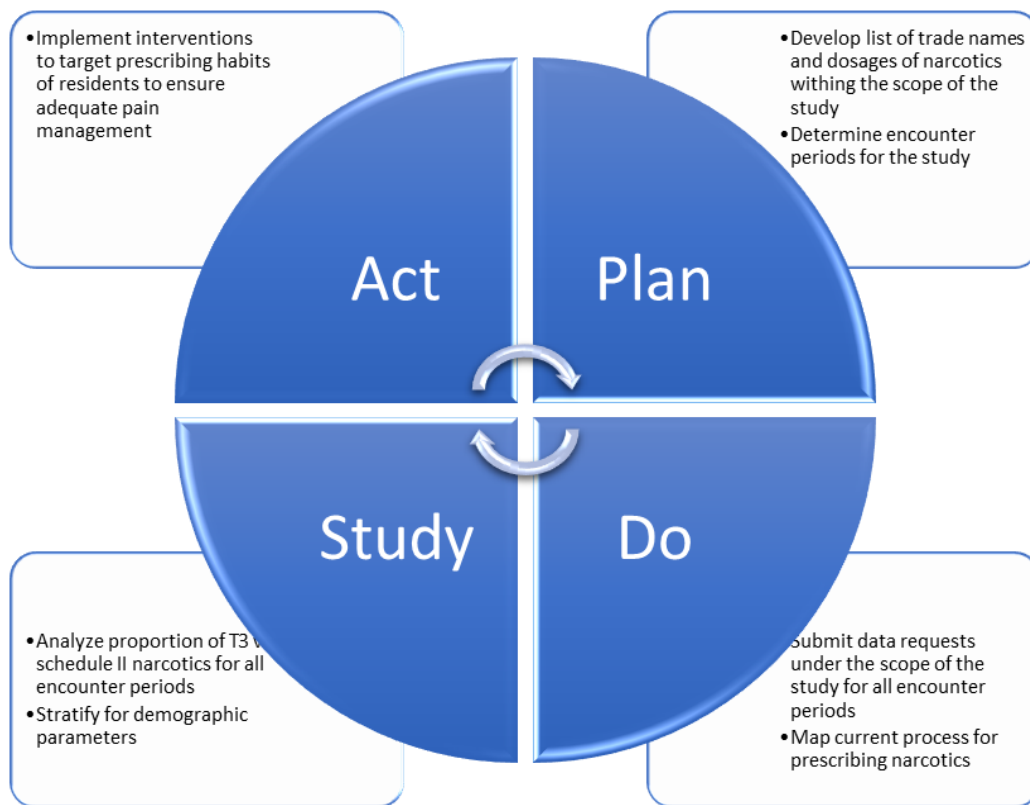


Figure 1: PDSA Cycle

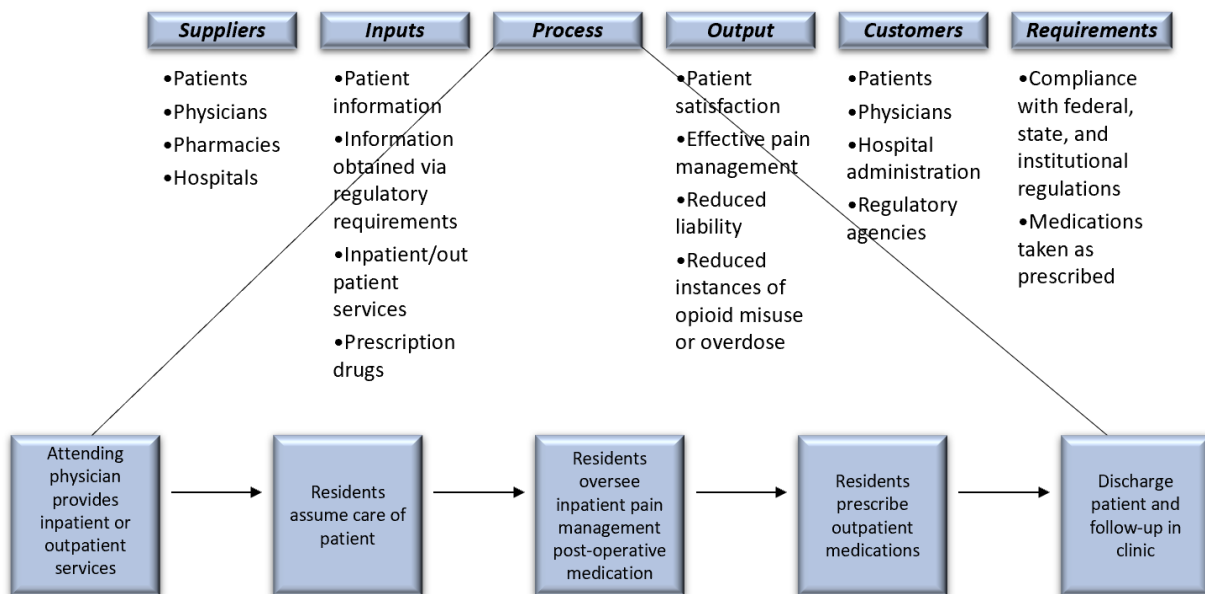


Figure 2: SIPOC Diagram

Opioid Prescription Process - Current State

Ari Machchhar | March 3, 2022

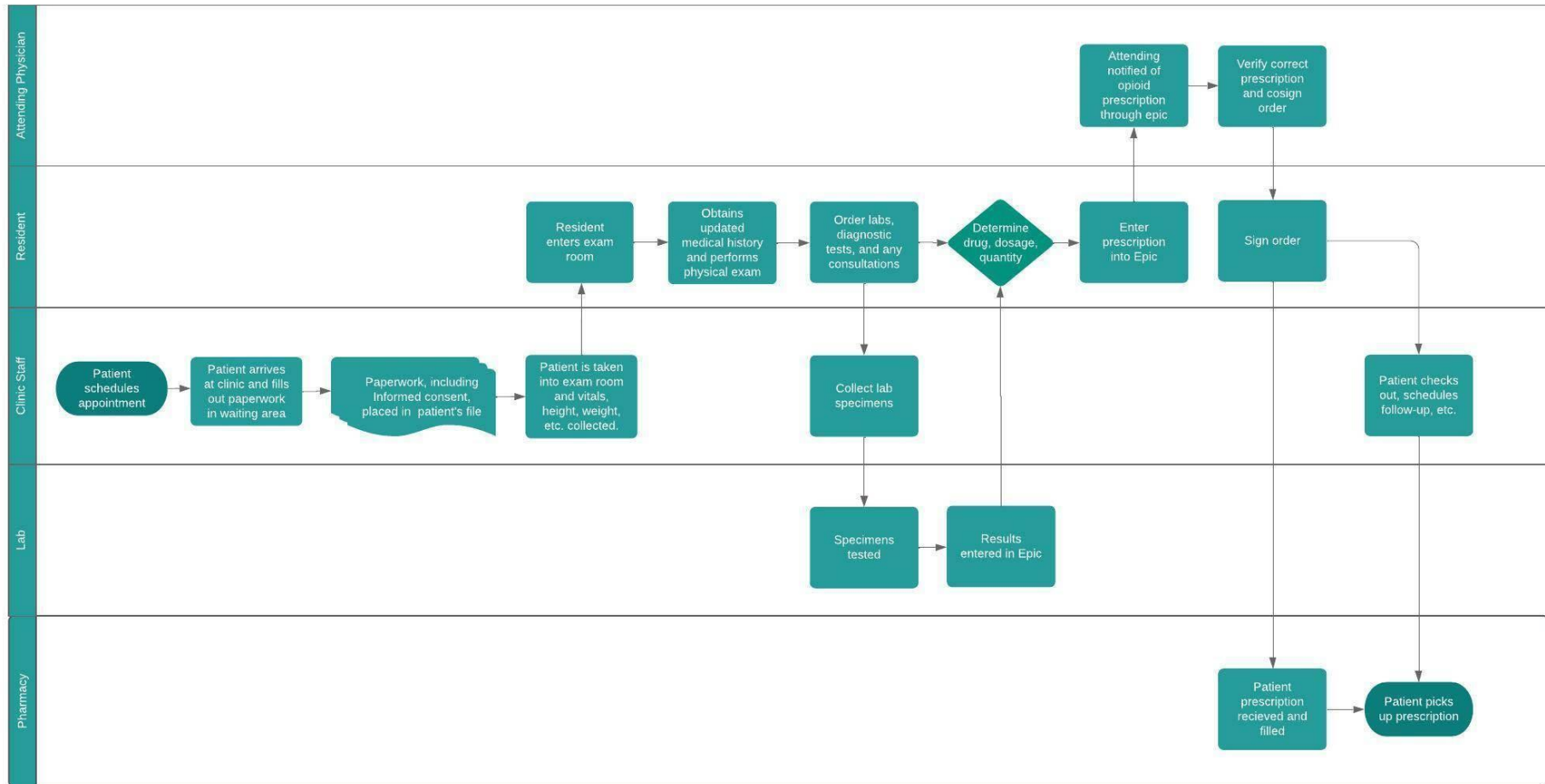


Figure 3: Current State Opioid Prescribing Process

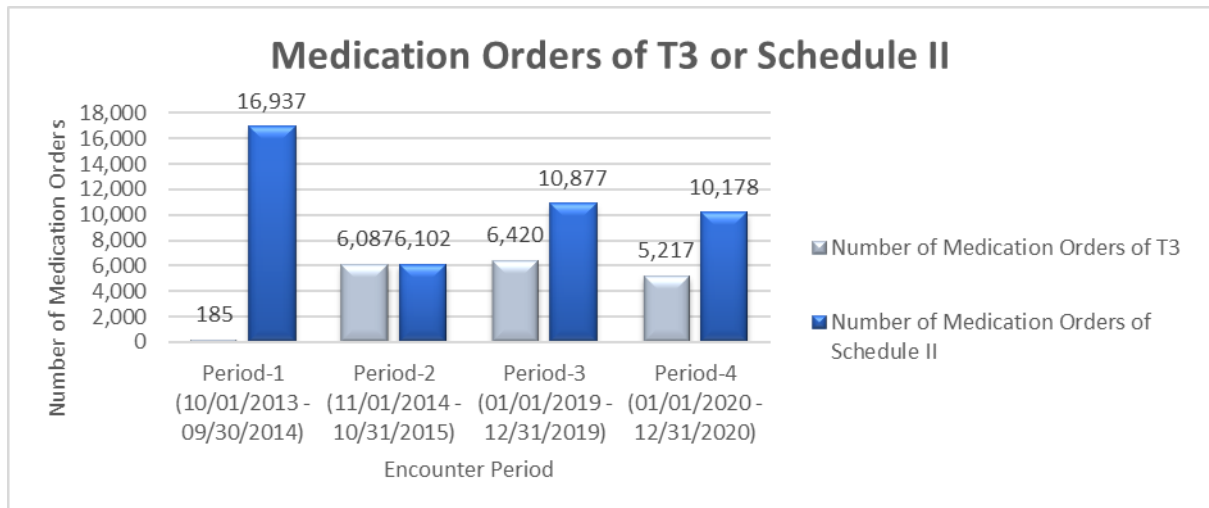


Figure 4: Bar graph depicting the quantity of T3 and schedule II narcotic orders for one year prior to rescheduling of HCPs, one year following, and for the 2019 and 2020 calendar years.

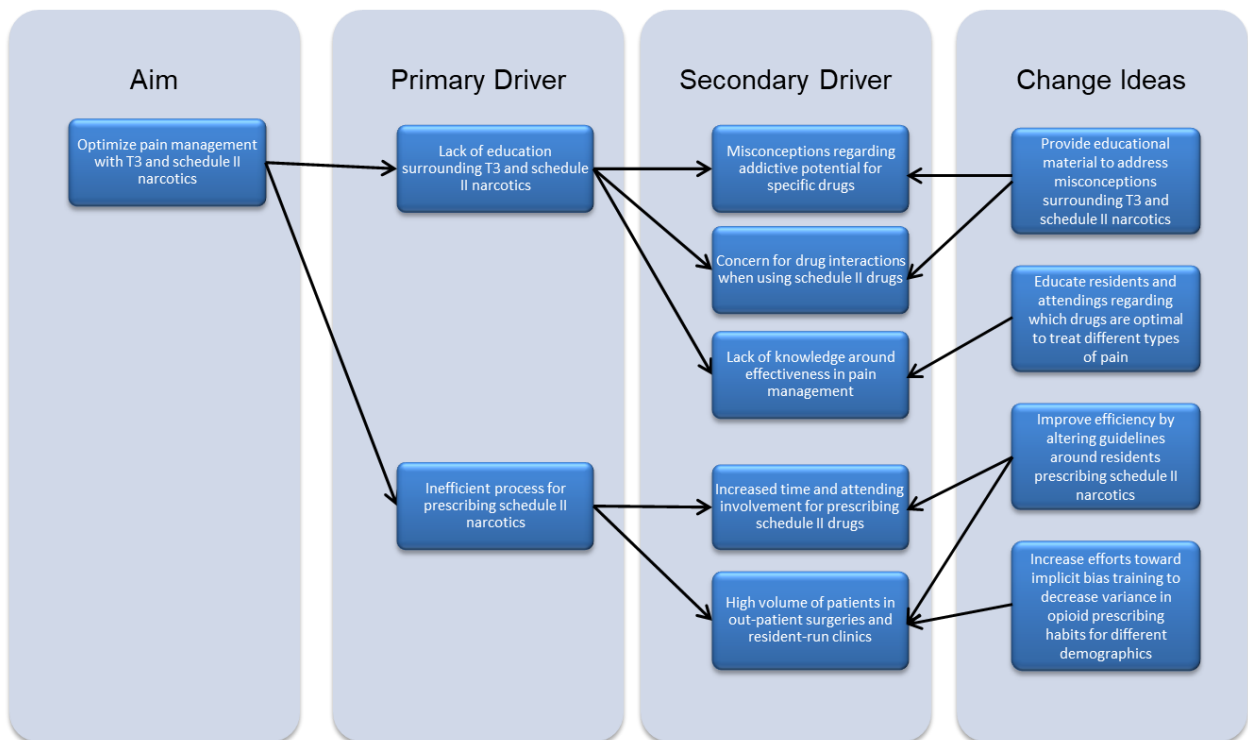


Figure 5: Driver Diagram

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VITAE

Arti Machchhar (September 8, 1994 – present) is a 4th year medical student at University of Texas at Southwestern who will be starting her general surgery residency in July 2022. She obtained her undergraduate degree in Finance from the University of Texas at Austin. Prior to starting medical school, Arti worked as a management consultant doing quality improvement work in the financial sector. When she learned about the Quality Improvement and Patient Safety distinction during her first semester in medical school, she decided to leverage her past experience to help make a greater impact for patients. She served as a Co-President of the IHI Open School chapter at UT Southwestern and represented her medical school at the IHI National Leadership Academy in 2019.

Permanent Address: 14560 Pensham Drive

Frisco, TX, 75035