Educational Interventions to Address the Opioid Epidemic
W201 Fall 2020 Research Proposal

Hannah Choi, Swetha Pola, Daphne Yang
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Overview

- **Goal**: Assess the impact that educational and case workshop interventions may have on the dosage of opioids prescribed.The goal is to standardize opioid prescription training across all practicing physicians as a primary intervention of opioid addiction substance misuse. Our research project takes a proactive upstream approach to addressing the opioid epidemic
- **Intended audience**: Physician certification board for the states of Louisiana, Missouri, and Alabama. We are targeting these particular states because these states are the most heavily affected by the opioid epidemic. (source)
- **So what?**
    - Prescription rates are extremely high in many states, causing the opioid addiction crisis to consistently be an issue. (source)
    - Further, opioids are the most commonly over-prescribed drug in the U.S. primarily because tolerance to the pain reduction effects of opioids develops within weeks of use. (source)
    - We hypothesize that an intervention that can reduce likelihood to over prescribe opioid medication does the following:
        - equips physicians to be aware of all factors that typically cause physicians to overprescribe opioids
        - introduces strategies that help combat the pressures physicians may fall subject to when prescribing opioids

Research Question

- **Main Research Questions:**
    - Does a one-time educational intervention (in the form of an interactive workshop) on the current opioid epidemic produce a measurable effect on a physician's attitudes towards pain management medication prescription?
    - Further, does the intervention shift in attitudes cause a behavioral change in a physician's prescription practices? (Hypothesis/Goal: the intervention should decrease the overall prescribed volume and/or strength of medication)
    - Additionally, we are curious to see whether or any changes to prescription practices persist over a longitudinal one month period.
    - We acknowledge that attitudes toward pain management and behaviors regarding

actual prescription may either be closely related or divergent in nature due to many
factors such as environmental pressures, cognitive dissonance, and so on. As such, we first seek to construct empirical evidence that the intervention is causally associated with a shift in attitudes. We then seek to explore the causal link, if any, between attitude shift and prescription volume behavior.

- **Motivation**:
  - There are continuing debates around current best practices for prescribing pain management medication (source). Many physicians may have adopted different practices and/or attitudes to pain management approaches. We believe that an intervention that strategically combats misinformation, outdated practices, and environmental pressures can support a physician in making the safest possible treatment plans for their patients.
- **Key Terms:**
  - **Pain Management Medication**: Pain management medications consist of any drug therapeutic that can be purchased over the counter or prescribed by a physician to counteract a patient's experience of pain.
  - **Opioids**: Opioids are narcotic pain medications that contain natural, synthetic or semi-synthetic opiates. Some examples of opioids include: (source)
    - Codeine
    - Fentanyl
    - Hydrocodone-acetaminophen (Vicodin)
    - Morphine
    - Oxycodone
    - Oxycodone-acetaminophen (Percocet)
  - **Environmental Factors:** Environmental factors in the context of this research include any pressure (social, financial, or legal) that may impact a prescribing physician's behavioral practices in prescription, and subsequently overprescription, of opioid medication.
    - **Social Pressures**:
      - Physicians in similar communities tend to recommend similar treatment plans based on the practices of other physicians in their immediate vicinity. This indicates that physician behavior can be influenced by social signals and not always governed by evidence, best practice, or guidelines. (source)
      - Doctor's make decisions based on the patient's subjective experience of pain. A cultural practice to assess and completely eliminate any kind of significant pain has risen in the past few decades amongst the medical community. Experts cite this cultural change as a key player in physicians tending to err on the side of prescribing pills (opioids)

to treat even mild discomfort. (source)

- **Financial Pressures**:
  - In a fee for service model, physicians are paid based on the volume of patients that they see and are incentivized to see more patients, prioritizing quantity over quality of care. This places additional financial pressures for doctors to prescribe opioids to patients in order to satisfy their patients' needs.
    - According to one doctor, "You have to use your clinical acumen. You feel if I don't give antibiotics and the patient goes to another physician or to a chemist who prescribes antibiotics and he gets cured. You lose a patient …" (source)

Data

- **Collection of new data:** We plan to collect new data for our 7 month research study. We intend to recruit a sample of volunteer board certified physicians under one provider network that are in each state's board contact list. In order to gain insight on both the quantified outcomes of and the general attitudes toward prescription practices, we will collect quantitative and qualitative data. By using a mixed methods approach to data collection, we hope to achieve a more extensive understanding of our variables. Specifically, through our experiment design, we'll collect the following data:
  - **Type, volume, dosage of prescribed opioids (Quantitative)**
    - Continuous measure of prescription volumes throughout the course of study
    - Specific points of interest will be explored in order to determine causality
  - **Physician Survey Data (Qualitative)**
    - 4 total rounds of data collection
      - Phase 1 Initial Baseline Measurement: preceding intervention
        - How physicians currently prescribe opioids
      - Phase 2 Measurement: immediately after intervention
        - How physicians would prescribe opioids after going through the workshop (initial reactions, change in attitude)
      - Phase 3 Measurement: 3 months after intervention
        - Did the workshop have a long term effect on the physician's prescribing behaviors?
        - Typical prescription for opioids are 3-7 days in length according to the CDC Guidelines for Prescribing Opioids, and patients are monitored for 1-4 weeks after starting opioid therapy
    - Short survey at each Phase of Measurement

- Questions about physician's general approach to determining how to prescribe (i.e. common brands/types of opioids, specific diseases/conditions commonly seen in patients that require specific dosages)
- Questions about whether doctors believe they are prescribing the right amounts of opioids for patients:
    - If yes, why are they confident in their decisions?
    - If no, what do they think they could change? And why is that not currently taking place?
- Questions about whether a doctor believes their prescription practices could have contributed to the opioid crisis in different ways

- **Demographic Information**
    - We will also collect the following self-reported scores to utilize as controls in the regression analysis:
        - Please rate how impactful any personal stressors in your life may be currently having on your prescription practices.
        - Please rate how impactful any financial stressors in your life may be currently having on your prescription practices.

- **Open Source Data:** We'll also utilize open source data to conduct a deeper literature review and inform our intervention design.
    - Opioid prescription rates by state (the most recent being 2018) and by practice (source)
    - Training physicians receive on how to prescribe opioids before becoming certified
    - Educational materials from top public health officials on the opioid crisis

Study Design

- Experimental Design piloted in hospitals under one provider network to have physician and patient data controlled and recorded.
    - Collecting data from one provider network within our states of interest, such as BlueCross, will eliminate the issue of duplicate data in the case that physicians work at multiple locations
- Measures will be taken at the following points in time:
    - We'll collect anonymized patient prescription data for any prescriptions participating physicians write during the phases of interest in our study. Specifically, we'll sample 1 week of data at each phase of interest
    - Survey results from physicians will be collected at these points in time:
        - Phase 1 Initial Baseline measures: preceding intervention
        - Phase 2 Measurement: immediate follow-up (right after physicians go

through workshop)
        - Phase 3 Measurement: 3 month follow-up after intervention
- Budget**:**
    - Outline of anticipated costs:
        - Compensation for 2-5 experts to help develop intervention training
        - Compensation for 2-5 experts to conduct in-person and/or virtual intervention
        - Transportation for patient-actors and intervention facilitators to clinics (especially to more rural areas)
    - To keep costs on the lower end, we aim to produce a pilot study that is centralized to a specific location radius of 10-15 miles, in a populous area of the state.

Sample

- We will randomly sample currently practicing physicians from Louisiana, Missouri, Alabama because these are the states hardest hit by the opioid epidemic
- **Sample Size:** We will sample a total of 168 total physicians across 3 states. The number of physicians in our sample from each state will be proportionate to the number of practicing physicians in each state according to a 2016 census count of practicing physicians. ○ According to the 2016 census:
    - **Alabama**: 15,947 active physicians
    - **Louisiana**: 16,894 active physicians
    - **Missouri**: 25,763 active physicians
- **Randomization:** Physicians will be randomly selected from the list of medical provider networks within each state's Blues network (BCBS AL, BCBS LA, BCBS MO). The medical facilities will be randomly selected from the network and placed into the experimental and control groups.
    - This level of randomization would ensure internal validity and we assume that all medical facilities within each of the Blues network have comparable levels of quality. Additionally, we will make sure to sample medical facilities for both experimental and control groups with similar patient demographics (i.e similar average patient income level, average educational level, racial/ethic demographics) to ensure that our two samples are comparable for our study.
- **Exclusion Criteria:**
    - Doctors who are under investigation or have had lawsuits filed for medical malpractice
    - Doctors who will retire within 1 year
- **Inclusion Criteria:**
    - Equitable gender diversity of physicians reflective of the U.S. population inclusive of those who identify as women*, men*, or gender non-conforming. Note: women*

and men* refer to broadly inclusive categories of cis/trans individuals who identify as women and cis/trans individuals who identify as men. Further, we also seek to include physicians who identify as non-binary or gender non-conforming.
        - We acknowledge the binary sex breakdown (% Male : % Female) of actively practicing physicians in the states we are sampling in is the following: (source)
            - Alabama: 70% : 30%
            - Louisiana: 68%: 32%
            - Missouri: 66% : 34%
        - However, we choose to sample in a more equitable manner in regards to gender to remain inclusive of practicing professionals across all states and for our research to encourage and support gender diversity in healthcare.
    - Equitable professional experience diversity of participants:
        - Have 33% of doctors within the first 5 years of practice
        - Have 33% of doctors within the first 10 years of practice
        - Have 33% of doctors within the first 15 years of practice
- **One control group:** receives 2 assessments and then a workshop
    - Will have n = 75 (to be able to apply CLT in statistical tests)
- **One experimental group:** receives 1 assessment, 1 workshop, then 1 assessment
    - Will have n = 75 (to be able to apply CLT in statistical tests)
- **Sample Breakdown:** Our study sample will look like the below:

Group	**Gender**	**Years of Experience**	**States**		
			Alabama	**Louisiana**	**Missouri**
Experimental	Women*	≤ 5 Years	4	4	6
		≤ 10 Years	4	4	6
		≥ 15 Years	4	4	6
	Men*	≤ 5 Years	4	4	6
		≤ 10 Years	4	4	6
		≥ 15 Years	4	4	6
	Subtotal		**24 physicians**	**24 physicians**	**36 physicians**
Control	Women*	≤ 5 Years	4	4	6
		≤ 10 Years	4	4	6

		≥ 15 Years	4	4	6
	Men*	≤ 5 Years	4	4	6
		≤ 10 Years	4	4	6

		≥ 15 Years	4	4	6
	Subtotal		**24 physicians**	**24 physicians**	**36 physicians**
Total Sample Size			48 physicians	48 physicians	72 physicians

Variables and Intervention

- **Intervention**: Educational workshop/training on current opioid epidemic ○ **Consulting Professionals** - We will confer and work closely with physicians who specialize in addiction, experts at Narcotics Anonymous, and public health professionals to build out a proper intervention tool that will consist of the following:
    - **Educational Video:**
        - Information about the prescription rates in the respective state by state's public health department
        - Overview of current tools/aids on assessing patient risk of opioid addiction
    - **Case Studies & Interactive Activities:**
        - Role play scenarios that are similar to the patients they have seen
        - Will focus on answering questions that doctors may have and come to group consensus on "best practices"
        - Will include a group discussion on what kinds of interventions seem to work well for their patients and which interventions don't work well
- **Variables of Interest**
    - We are measuring the changes in both the quantitative changes in prescription volume as well as any qualitative shift in physician attitudes towards opioid prescriptions.
    - **Quantitative Variables of Interest - Prescription volume**

        - # of pills prescribed
        - Dosage
        - Name of Opioid
        - # of Refills (if applicable)
    - **Qualitative Variables of Interest - Attitudes**: Physician's attitude/approach to prescribing opioids before and after workshop
        - Pre-Intervention survey of the following of all doctors to assess if they are currently using a risk assessment tool as well as what works/doesn't work about the current tool
        - Post-Intervention measure to assess the use of a Risk Assessment Tool after the intervention
            - Short 5 question survey prior to the workshop
                - Questions about physician's general approach to determining how to prescribe (i.e. common brands/types of opioids, specific diseases/conditions commonly seen in patients)
                - Questions about whether doctors believe they are prescribing the right amounts of opioids for patients:
                    - If yes, why are they confident in their decisions?
                    - If no, what do they think they could change? And why is that not currently taking place?
                - Questions about whether physicians are currently using a risk assessment tool (including what does/doesn't work currently)
            - Same short 5 question survey immediately after the workshop
        - **Environmental Factors**: We will also collect the following self-reported scores to utilize as controls in the regression analysis: environmental factors, race, age, and gender of physician, location

Statistical Methods

- **Introduction:** To test for efficacy of the intervention, we will conduct multiple kinds of statistical tests to understand any significant causal relationships between. Before conducting any tests, we'll normalize the data collected to ensure all data are comparable.
    - **Weighted Variables:** Since different opioids have different levels of medicating strength, we will compute new weighted variables through the following methods:
        - Compute a weight for each kind of opioid in our dataset through expert-led recommendations.
            - Holistically score each metric variable by weighting the variables by corresponding weight computed in Step 1.
- **Paired T-test analysis** for metric variables (prescription volumes):

- **T-Test Reasoning:** A T-test allows us to determine if the means of two sets of data are significantly different from each other. As such, we will compare the mean differences for variables such as weighted dosage amounts, weighted # of refills, and so on.
- **Paired Test Reasoning:** Since prescription practices vary from individual to individual, we will utilize a paired test to understand the differences in prescription volumes pre and post treatment within each individual (instead of at the group level, which is less informative of any changes from baseline).
- **Control Comparison:** We'll compare the results of paired differences between the control group and experimental group through the t-test.

● **Wilcoxon signed-rank test** for ordinal variables (attitudes):

- **Rank Reasoning**: All attitudinal measures will be self-reported measures on a 5 point Likert scale. As such, we care about measuring any differences in ranked values on these scales.
- **Paired Test Reasoning:** Similar to above. Since attitudes vary from individual to individual, we will utilize a paired test to understand the differences pre and post intervention in attitudinal changes within each individual.
- **Control Comparison**: We'll compare the results of paired differences between the control group and experimental group through the Wilcoxon signed-rank test. ● **Regression Analysis:**
  - **Reasoning**: Understanding causality requires a regression analysis. We'll compute 2 regression analyses on our two outcome variables of interest (attitudes and prescription volume).
  - **Control:** We'll control for outlier variables that could have caused a systematic change in the outcome variables beyond the intervention. For example:
    - Self-reported changes in environmental impacts compared to baseline metrics
    - Race of the patient, if accessible to us underneath HIPAA compliance

Potential Risks

● **Voluntary Participation:** Participation in the study is entirely voluntary. As such, we must ask: what kinds of voluntary participation would we get? Participation may be biased to include physicians who are already semi-aware of the external and implicit factors that influence pain management medication prescription. We may see larger attitudinal shifts among those who are already willing to learn. Our results may not generalize to: physicians outside of the experiment, especially those who disagree with the efforts. This bias will be questioned by our audience. To overcome this, we seek to attain as representative of a sample as we can in our initial voluntary recruitment process. Secondly, we will specifically address this as a source of bias that wouldn't allow full generalizability to the population of

physicians in the state.

- **Reach:** There exist hard to reach rural areas (where providers may not be connected to provider networks) where there is high incidence of opioid overprescription and subsequently, high rates of abuse. We acknowledge that there will be potential for bias since our pilot study will not sample from these populations. We will not be able to quantify or fully understand/account for in our study design.
- **Bias towards patients of color:** Is there a systematic difference between the volume of prescriptions for different race/ethnicities (there is a lot of evidence that points towards decreased prescription volume for non-white individuals). We acknowledge that there will be potential for bias that we will not be able to quantify or fully understand/account for in our study design.

Deliverables

- **Total Anticipated Duration of Study:** 7 months
- **Phase 1 (2 Months): Initial Physician Recruitment and Baseline Measurements:** After reaching out to the provider networks, we will begin to collect prescription information by physician for 1 month.
- **Phase 2 (1 Month) Intervention Given to Physicians:** Physicians sign up for the workshop over the span of a week, and will be able to attend the same workshop at the timeslot of their choice.
    - **Immediate Re-assessment of Physicians:** We will collect prescription information by physician immediately following the intervention for the experimental group and simultaneously for the control group.
- **Phase 3 (3 Months) Re-assessment of Physicians:** We will collect prescription information by physician following a 3 month break in data collection for both the experimental group and control group to assess long-term changes to both prescription volume and physician attitudes.
- **Phase 4 (1 Month) Analyze Results + Reach Conclusion:** We will take the data collected from the re-assessment of our sample group of physicians and conduct statistical analysis to determine if there was an effect on our target variable. More specifically, we will compare each physician's difference in prescription volume and attitudes between phase 2 and phase 1 measurements to determine if there is a pattern in prescription behaviors immediately after the intervention. We will then also compare each physician's difference in prescription volume and attitudes between phase 3 and phase 1 measurements to determine if there is a pattern in prescription behaviors months after the intervention.
- **Pitch Project to the Board:** Based on our results, we will pitch our workshop intervention method to the Physician Certification Board to be part of the required training for physicians who can prescribe opioids.