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**Problem Statement**

The Center for Health Systems Innovation (CHSI) in conjunction with the Riata Center for Entrepreneurship and the Center for Wellness & Recovery are proud to present the 2019 OSU Health Data Shootout. The goal of the health data shootout is to draw the attention of OSU students to interesting and important topics in the health care field, and to encourage them to develop innovative solutions to solve the most pressing problems in health care.

The focus of this year’s competition will be on opioids. Over two million Americans are currently dependent on either prescription opioid pain pills or street drugs, and more than 130 people in the US die every day die from accidental misuse of these drugs. Although specific populations – such as **teens** and **veterans** – are disproportionately impacted, the opioid addiction affects everydemographic in the US.

**Some Basic Facts**

* In 2016, [more than 42,249 people died of opioid overdoses](https://opioids.thetruth.com/o/the-facts/fact-1016) in America – [more than 115 people every day](https://opioids.thetruth.com/o/the-facts/fact-1004)1
* Adult hospital stays involving opioid overuse increased more than 150% between 1993 and 2012 to 709,500 per year, according to a report from the Agency for Healthcare Research and Quality
* Roughly 21 to 29% of the patients prescribed opioids for chronic pain misuse them, and between 8 to 12% develop an opioid use disorder2
* The likelihood of becoming dependent on opioids long-term spikes after just five days of use14
* Risk factors for opioid misuse include sociodemographic factors, pain and drug-related factors, genetics and environment, psychosocial and family history, psychopathology, and alcohol and substance use disorders3
* Although primarily used for pain relief, researchers evaluating health record (EHR) data have found that up to 28.5% of all visits in which opioids are prescribed did not involve a pain diagnosis, and up to 30% of all visits in which an opioid prescription was renewed or continued did not include a pain diagnosis4
* Researchers have also found that over 60% of individuals who died of an opioid-related cause had received a diagnosis for a chronic pain condition the preceding year5
* Psychotropic medications and benzodiazepines can increase the risk of death when combined with opioids5
* Patients older than 85 suffering from opioid use disorders are more likely to die from chronic illnesses, such as HIV and liver-related illnesses, compared to older adults without opioid use disorder6

**Background and Context**

The opioid epidemic began in the 1990’s. At that time, there was a large focus on improving pain management, which led to the increased usage of opioids to treat pain. This phenomenon coincided with the introduction of OxyContin (oxycodone) by Purdue Pharma in 1996. Due to aggressive marketing, from 1996 to 2012, sales of OxyContin increased from $48 million to over $2.4 billion worldwide.10 The spread of the opioid epidemic was not restricted to the US, however; many other countries around the world also saw a corresponding increase in opioid usage during this time, although the US experienced the brunt of the impact. In 2009, the US accounted for 99% of the hydrocodone, 60% of the hydromorphone, and 81% of the oxycodone being consumed around the world.7

In Oklahoma, the problem is even direr. In 2015, providers in Oklahoma wrote an average of 101.7 opioid prescriptions for every 100 persons, or a total of 3.97 million prescriptions. During the same year, providers across the US were prescribing an average of 70 opioid prescriptions for every 100 persons.8 This 30% increase in opioid prescriptions is reflected in the rate of opioid-related overdose deaths in Oklahoma. Between 2000 and 2015, the rate of opioid-related overdose deaths in Oklahoma consistently exceeded the national rate (*Figure 1*). Furthermore, prescription opioids account for over 80% of these deaths.9



Figure 1: Year-by-Year Breakdown of Opioid-Related Overdose Death Rates10

There are many factors that have contributed to the spread of the opioid epidemic. Some of these factors include, but are not limited to, a lack of consensus on appropriate use and dosage for these medications, strong patient demand for the drugs, a fragmented health tracking system, as well as the rise of for-profit clinics. Given the many different factors and participants involved, addressing the opioid epidemic is no easy task. However, many communities and organizations have acknowledge the severity of the problem, and are actively pursuing efforts to address the opioid epidemic and its consequences in a myriad of different ways. The US Food and Drug Administration (FDA), for instance, has required stronger warnings on drug labels for opioids, sponsored educational campaigns for both patient and prescriber alike, “upscheduled” hydrocodone so that patients need a new prescription each time they want to refill the drug, and set up guidance for the pharmaceutical companies on developing abuse-deterrent formulations of opioids. Insurance companies, on the other hand, have responded by using analytics to obtain real-time assessments of a patient’s risk for abusing prescription opioids, and passing this information onto case managers so that they can intervene and prevent a dangerous situation from developing. Providers and patient groups have also contributed the effort by demanding improved labeling on drugs as well as a recall of opioids that have a high-abuse potential.7

However, in spite of all the attention placed on the opioid epidemic, results have been mixed. For instance, even though pharmaceutical companies developed an abuse-deterrent version of OxyContin in 2010 that saw a 36% decrease in the use of oxycodone, at the same time, the use of heroin—an illegal opioid—increased by 42%. Consequently, although some interventions have had the immediate desired effect of reducing abuse of prescription opioids, research suggests that there may be other unintended consequences that arise.7

**The Competition**

For this competition, CHSI has prepared a set of data that has been extracted from Cerner Health Facts®, one of the largest electronic health record (EHR) systems in the US. The dataset contains information on 53,541 patients who have had at least one encounter in 2013 that had an associated diagnosis for either dependency, abuse, or poisoning by opioids and related drugs. These patients are associated with 84,221 encounters (visits). The dataset includes basic patient demographics, hospital/clinic attributes, encounter metadata, vital signs, lab tests, common comorbidities and chronic disease information, historic diagnosis and visit information, along with indicators for medication prescriptions.

Using this data, we challenge your team to draw on the diverse skills and backgrounds of all members to derive an insight that can be used to tackle the opioid epidemic. Some possible ideas are included on the next page, although we encourage your team to explore any topic and solution related to opioids. Integrating data from other sources with the Cerner dataset to support the investigation is also highly encouraged.

Possible solution ideas

* Factors most likely to contribute to opioid overdose/abuse (inpatient group vs. outpatient group vs ER group)
  + Develop risk score
  + Develop tool to identify patients who have not been identified
  + Identify correlations and/or statistically-significant variables in groups that are likely to experience opioid overdose/abuse
  + Create decision-support and predictive medicine tools? (e.g., maybe to suggest a patient who is at risk may not be a good candidate for drugs?)
* Characteristics—e.g., demographics, comorbidities, locations, etc.—of users who are suffering opioid overdose/abuse
  + Develop stats that can be incorporated into an informative infographic, poster, presentation, or some kind of awareness campaign
  + Use characteristics to identify most effective channels for outreach to these groups; how to get help to them?
  + Are there different unique trends/patterns between different groups of patients that could be used to identify appropriate treatment strategies for each group? (e.g., overdose users vs. non-overdose users, inpatients vs. outpatients, individuals suffering from cancer vs. chronic pain, individuals who end up in ER, young vs. old, etc.)
* Validation
  + There are some nationally-known trends/patterns in opioid patients; does the data in Health Facts corroborate those trends?
  + There are some publications that have identified certain trends; are these corroborated by Health Facts?
* Measuring accuracy and quality of care
  + Develop quality outcome measures
  + Identify clinical adherence (are patients being appropriately prescribed opioids when they need it?)
  + What % of cases is diagnosis code missing for opioid overdose/abuse? What would be some ways to address this situation?
  + Are patients still being prescribed opioids even after being diagnosed with an opioid dependence?
  + Are outcomes different between different hospitals? What could be possible causes?

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**References**

1. What are opioids? truth. https://opioids.thetruth.com/o/articles/what-are-opioids. Published May 30, 2018. Accessed January 29, 2019.

2. Opioid Overdose Crisis | National Institute on Drug Abuse (NIDA). https://www.drugabuse.gov/drugs-abuse/opioids/opioid-overdose-crisis. Accessed January 29, 2019.

3. Strain E. Opioid use disorder: Epidemiology, pharmacology, clinical manifestations, course, screening, assessment, and diagnosis. UpToDate. https://www.uptodate.com/contents/opioid-use-disorder-epidemiology-pharmacology-clinical-manifestations-course-screening-assessment-and-diagnosis. Published September 13, 2018.

4. Sherry TB, Sabety A, Maestas N. Documented Pain Diagnoses in Adults Prescribed Opioids: Results From the National Ambulatory Medical Care Survey, 2006–2015. *Ann Intern Med*. 2018;169(12):892. doi:10.7326/M18-0644

5. Olfson M, Wall M, Wang S, Crystal S, Blanco C. Service Use Preceding Opioid-Related Fatality. *Am J Psychiatry*. 2018;175(6):538-544. doi:10.1176/appi.ajp.2017.17070808

6. Larney S, Bohnert ASB, Ganoczy D, et al. Mortality among older adults with opioid use disorders in the Veteran’s Health Administration, 2000–2011. *Drug Alcohol Depend*. 2015;147:32-37. doi:10.1016/j.drugalcdep.2014.12.019

7. Lyapustina T, Caleb AG. The prescription opioid addiction and abuse epidemic: how it happened and what we can do about it. Pharmaceutical Journal. https://www.pharmaceutical-journal.com/opinion/comment/the-prescription-opioid-addiction-and-abuse-epidemic-how-it-happened-and-what-we-can-do-about-it/20068579.article. Accessed January 29, 2019.

8. Opioid Resources Master List. 11. https://www.unmc.edu/cce/handouts/opioid/OpioidMasterList-CompleteDoc.pdf.

9. Drug Overdose - Oklahoma State Department of Health. https://www.ok.gov/health/Protective\_Health/Injury\_Prevention\_Service/Drug\_Overdose/. Accessed January 29, 2019.

10. National Institute on Drug Abuse. Oklahoma Opioid Summary. https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state/oklahoma-opioid-summary. Published February 28, 2018. Accessed January 29, 2019.