Effects of Adjuncts on Opioids

Introduction

Opioids are commonly used as pain relievers but can be very harmful to the people taking them. Studies have shown that opioids cause more deaths than car wrecks or other drug overdoses combined as displayed in figure 1. Certain non-opioid drugs (Adjuncts) can be used to lower the amounts of opioids taken, and to limit addiction while maintaining effectiveness. To study which adjuncts lower the severity and which ones don’t, we have analyzed over 135 million records from the FDA’s Adverse Event Reporting System (FAERS) dataset. The outcomes varied, but some of the cases were extreme. An adjunct could make the effects of one opioid less severe and make another opioid’s effects more severe. For example, the addition of Acetaminophen to Fentanyl lowered the reported death percentage by 28.38%, while the addition of Acetaminophen to Hydrocodone made the death rate 35.79% higher.

Research Questions

- Does the addition of adjuncts to opioid prescriptions significantly impact adverse drug events?
- Which adjunct and opioid combinations are most dangerous?

System Design

We used data from the FDA’s Adverse Event Reporting System (FAERS) database to populate our dataset. The outcomes contained 20 opioids, and the final model contained both opioids and adjuncts as shown in figure 6. Each model was a matrix of Drug Names, Patient Deaths, ADR’s, and Demographics. The first model contained 75 adjuncts, the second contained 200, and the third contained 20 opioids and 75 adjuncts as shown in figure 6.

Experimental Design

Our FAERS data was from 2004 Quarter 1 to 2018 Quarter 2 as displayed in Figure 5. We build thee models to analyze our data. Each model was a matrix of Drug Names, Patient Deaths, ADR’s, and Demographics. The first model contained 75 adjuncts, the second model contained 200, and the third model contained both opioids and adjuncts as shown in figure 6.

Figure 5: 135,276,263 FAERS Records

- Demographics
- Drugs
- Indications
- Outcomes
- Reactions
- Report Sources
- Therapies

Figure 6: Models

Opioids O+A Adjuncts

Experimental Results and Discussion

We found that on average that the addition of a random adjunct to a random opioid showed no benefit. However, after looking at specific drug combinations, some of them showed a major increase in severity, and others showed a major decrease in severity. We made a list of the most dangerous combinations in figure 7. Figure 8 shows the combinations that showed the greatest impact at lowering severity.

Conclusions

Certain adjuncts significantly lower the severity of the opioids they are taken with, while other combinations could be deadly.

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References