MTFC Project Proposal 2025-26

Team Name	JASPA the Ghost
Team ID #	23921
Short Title for Proposal	The Real Cost of Addiction
Topic Category	Drugs/Addictions/Mental Health

Part 1: Project Definition *(Team's Topic)*

These prompts can be found on page 3 of the MTFC Project Proposal Prompts 2025-26. Additional information on Project Definition can be found in ***Step 1: Project Definition*** in the Actuarial Process Guide.

Team Responses:

#1: Identify the topic (3-5 sentences)

- Response: Our topic is about addiction in patients after being prescribed opioids after surgery. According to the NIH, over 13,000 people die every year from addiction to prescription opioids. Opioid addiction is extremely prevalent today, as we are in an 'opioid epidemic.' These drugs can affect anyone, but we are focusing on patients who are prescribed these drugs after surgery and then become addicted. Addiction impacts people, families, and communities, as well as mental health. Those who suffer from addiction may need rehabilitation services, which can be covered by insurance. We will be looking at how much opioid addiction really ends up costing the community, hospitals, rehabilitation centers, and insurance companies.

#2: Identify potential risks (3-5 sentences)

- Response: Some potential risks of patients developing addiction to prescribed opioid drugs post-surgery would be loss of life of the patient due to opioid overdose, as well as a loss of money for the patient due to fees for rehab. Additionally, insured patients with addiction would create a loss of money for their insurance, as the insurance would have an increased financial burden to pay for medication and rehab. There is also the risk of overburdened healthcare systems due to an increase in patients and not enough healthcare professionals to cover the increase. The government will also experience a financial risk, due to increasing materials, resources, and worker wages. Finally, there is a risk to research companies as they have to spend more resources on finding new solutions.

#3: Identify a behavior change risk mitigation strategy (1-2 sentences)

- Response: Some ways to change behavior could be to limit opioid usage to small dosages, by only using them for 5 days or less. If medical professionals need to rely on drugs post-operations for extreme pain long-term, they can find an alternative. An example of this could be lidocaine. Furthermore, attention to the composition of the opioids could mitigate risks. Opioids are either fully synthetic, semi-synthetic, or natural (from the plant)-- and studies have shown that the natural alternative is much less potent and poses less addictive risks. Another option could be to prescribe opioids to people over the age of 25. After this age, the brain and prefrontal cortex will be better developed, decreasing the risk of addiction.

#4: Identify a modifying outcomes risk mitigation strategy

One way to modify outcomes as a risk mitigation strategy is to change the medical standard of care to use other drugs that do not have the side effects of addiction. Additionally, prescribing naloxone (before full-fledged addiction) to patients who have a history of drug abuse can be a helpful way to prevent addiction.

#5: Identify an insurance risk mitigation strategy

Insurances should cover rehab stays for patients with past history of drugs/high chance of developing addiction after opioid use in surgery.

#6: Identify driving research questions for your topic

Some driving research questions are: What are alternatives to opioids for pain relief post-surgery? How are people sourcing their opioids? How can this be better regulated? How likely are people to develop addiction to opioids after surgery?

Part 2: Data Identification & Assessment *(Team's Topic)*

These prompts can be found on page 4 of the MTFC Project Proposal Prompts 2025-26. Additional information on Data Identification and Assessment can be found in ***Step 2: Data Identification & Assessment*** in the Actuarial Process Guide.

Team Responses:

#7: Identifying the type of data you hope to find (2-3 sentences)

- Response:
    - The ideal dataset for us to use would be patient cases who may or may not have gotten addicted to opioids after surgery, with their costs of rehab, medication, etc., categorized. The percentage of opioid users post opioid use in surgery can be compared to the rate of addiction in regular people.
    - We would also like to see the type of opioid prescribed during surgery and the percentage of people who became addicted.

#8: Identify potential data sources for your topic (1-2 sentences for each + 1-2 sentences about data visualization)

- Response:

https://www.psychiatry.org/patients-families/opioid-use-disorder

This website has information and an overview of opioids. They also have data on opioid use throughout the years and by gender. The graphs show rises in opioid use and differences between genders, which can be used in our data visualization as well.

https://www.cdc.gov/overdose-prevention/about/understanding-the-opioid-overdose-epidemic.html

This website explains the three waves of increases in opioid use since 1999. These waves are connected to the increase of opioid use in medication. The increase is graphed using a line chart to show how medical use of opioids correlates to addiction.

https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm

This website has a series of graphs that show how the number of opioid deaths has changed over the years in the US (from 2015 to 2025). There is also information from each state, such as predicted cases from 2024 and 2025 (and their percent change). This collection of information is important as it could provide insight into how historical events have shaped the data presented, and also how the different circumstances in particular states affect the data. This could be presented in a bar chart and a scatter plot.

https://datavisualization.dph.mass.gov/views/BSAS_Dashboard_Phase_3_BSAS_Enrollments/Comparisons_Dash

This is a customizable chart from the Massachusetts gov that you can sort by type of opioid, year, race, etc. to find comparisons of opioid addiction between demographics. This website is extremely helpful for collecting data to create our own graphs with.

https://opioid.amfar.org/MA

This website gives Massachusetts-specific data on opioid deaths by county. Different information is available, such as county risks, drug-related deaths, age-dependent deaths, and the amount of opioid prescriptions per 100 people (including for 30-day supplies). These can all be visualized using a line chart.

https://www.sciencedirect.com/science/article/pii/S0039606022000137

This is a journal article written about predicting the risk of opioid use after surgery using patient data. This is similar to our analysis, which examines the cost and risk of opioid addiction after surgery. The information and statistics from this paper will be very beneficial and can be graphed as our data.

https://www.cdc.gov/overdose-prevention/data-research/facts-stats/opioid-dispensing-rate-maps.html

This data looks at how many opioids are being prescribed per 100 people in each state. This information is beneficial in creating our recommendations and relating dispensing rates to usage rates.
https://drugabusestatistics.org/cost-of-rehab/
Thai data is for the average cost of rehab based on treatment type. This helps us characterize the cost a patient must pay for drug rehab and weigh the risks vs. costs.

Part 3: Mathematical Modeling *(Team's Topic)*

These prompts can be found on page 5 of the MTFC Project Proposal Prompts 2025-26. Additional information on Mathematical Modeling can be found in ***Step 3: Mathematical Modeling*** in the Actuarial Process Guide.

Team Responses:

#9: Modeling research on your topic (3-5 sentences)

- Response:
- https://www.sciencedirect.com/science/article/pii/S0376871614007716
- https://www.sciencedirect.com/science/article/pii/S1525861023002918
- https://substanceabusepolicy.biomedcentral.com/articles/10.1186/s13011-021-00349-y
- Looking up opioids and math modeling results in papers that analyze the factors of opioid addiction, opioid use after surgery, and the impact of opioid-restrictive laws. Most of these papers pull data from medical databases to mathematically analyze them for trends. This is helpful because we can borrow this same data. Some also use a machine learning model to analyze large sets of data for information.

#10: Goals of a mathematical model in the project phase (3-5 sentences)

- Response:
- We hope our mathematical model would be able to demonstrate which types of surgery, demographics, genders, and ages are most associated with postoperative opioid abuse. This would help us identify risk based on each factor mentioned. Moreover, this will help create better recommendations and guidelines for prescribing opioids. This makes our model likely to be a stochastic, dynamic, statistical model.

#11: Assumption development (1-2 sentences each)

- Response:
- Our recommendations and mitigation may be brought into the 3 to 5 years. This is due to the biennial ballot questions, which are likely where our ideas would take effect.
- Within these 3 to 5 years, we believe that our data will be pretty similar with the exception of certain new restrictions and treatments being discovered. Due to the rise of research and technology, our risks may be modified by new treatments found.

Part 4: Risk Analysis *(Team's Topic)*

These prompts can be found on page 6 of the MTFC Project Proposal Prompts 2025-26. Additional information on conducting a Risk Analysis can be found in ***Step 4: Risk Analysis*** in the Actuarial Process Guide.

Team Responses:

#12: Goals for mitigation strategy (2-3 sentences)

- Response:

The current trajectory of the risks for our topic leads to addiction to opioids and the health issues associated with it, including death (if no interventions are made). Another potential outcome is varying periods of rehabilitation (which can either be short or long-term).

The goal of the risk mitigation strategy would be to minimize the risk of addiction to opioids from originally starting and helping people make medically-safe choices for themselves and their families.

Part 5: Recommendations *(Team's Topic)*

These prompts can be found on page 7 of the MTFC Project Proposal Prompts 2025-26. Additional information on making Recommendations can be found in ***Step 5: Recommendations*** in the Actuarial Process Guide.

Team Responses:

#13: Recommendation differences between mitigation strategies (2-3 sentences)

- Response:
  I think effectiveness, cost, and complexity will be the most important criteria for choosing a risk mitigation strategy. This is because the biggest struggle in overcoming addiction to opioids and choosing alternatives to opioids is cost and effectiveness. Opioids are the most effective pain-killer which is why it is used in surgery, despite the risk for addiction. Implementing new alternatives to opioids can also be complex, which is why choosing a risk mitigation strategy will depend on these factors.

#14: Audience for recommendations (1-2 sentences)

The audience for our solution and problem would be those who undergo surgeries that would result in them relying on opioids, as well as those who have an underlying addiction to the drug. Or, those who prescribe the pain medications/decide the standard of care.

#15: Goals for situation improvement (3-5 sentences)

The best-case scenario would reduce opioid addiction rates as a result of health procedures to a minimum. In other words, surgeries would not be the catalyst for major life-altering additions that could lead to higher insurance costs or death. This would happen in hopes of safer and more predictable alternatives to opioids for pain management.