**Understanding Patient History and access to healthcare by analyzing medical cases**

Question 1

**Patient 254** a 75 years and older female patient was treated at Mount Ascutney Hospital and Health Center following a transfer from another hospital, with a unique number of 254 her admission was elective, and she falls within the age category of 75 and over. After a hospital stay of 46 days, she was discharged to her home with home health care. The total charges for her care amounted to $67,375.25, with Medicare being the principal payer. Her first diagnosis was an encounter for other specified aftercare, followed by diagnoses of sepsis due to Methicillin-susceptible Staphylococcus aureus, acute and subacute infective endocarditis, acute kidney failure with tubular necrosis, and staphylococcal arthritis in the right shoulder. The procedures performed included the transfusion of non-autologous red blood cells into the central vein, insertion of an infusion device into the superior vena cava, and an inspection of the nose through an external approach.

**Patient 3692**, a male aged between 18 and 24 years, was admitted urgently to the University of Vermont Medical Center, originating from a non-health care facility. His principal payment method is Blue Cross, and he was charged a total of $117,895.29. His primary diagnoses include bipolar disorder and suicidal ideation, alongside a personal history of traumatic brain injury (TBI). Additionally, he has uncomplicated cannabis dependence and nicotine dependence from cigarettes. During his 58-day hospital stay, he underwent pharmacotherapy for substance abuse treatment with other replacement medication and detoxification services. Upon discharge, he returned home, either to his own or family care.

**Patient 89286**, a male between the ages of 70 and 74, was admitted to the University of Vermont Medical Center in 2014 through the emergency department, originating from a non-health care facility point. He was diagnosed with several conditions, including a fracture of the head and neck of the left femur, pneumonia caused by an unspecified organism, chronic respiratory failure with hypoxia, unspecified protein-calorie malnutrition, and cachexia, which causes weight loss and muscle wasting. During his 37-day hospital stay, he underwent a procedure to replace his left hip joint using a metal-on-polyethylene synthetic substitute, cemented using an open approach. Upon discharge, he returned to his home with home health care support. His medical expenses totaled $203,603.84, covered by commercial insurance.

**Patient number 200760**, a female aged between 18 and 24, was admitted to the University of Vermont Medical Center in 2014 under emergency conditions, originating from a non-health care facility point of origin. Her discharge status was recorded as HOME with home health support. The primary source of payment for her treatment was through commercial insurance, and the total charges amounted to $49,533.15. She was diagnosed with multiple conditions, including a displaced fracture of the medial malleolus of the left tibia and an unspecified fracture of the shaft of the left fibula, both requiring initial encounters for closed fractures. Additionally, she was diagnosed with gastroesophageal reflux disease (GERD) without esophagitis and a single episode of major depressive disorder, unspecified. Her injuries were related to an unspecified motor vehicle accident. The procedures performed included repositioning of the left tibia with an internal fixation device and repositioning of the left fibula with intramedullary fixation, both through an open approach. She remained in the hospital for a total of four days.

**Patient 507033**, a female aged between 25 and 29, was admitted to Northwestern Medical Center for an elective procedure. The admission was sourced from a non-health care facility point of origin. She was diagnosed with an encounter for full-term uncomplicated delivery, 40 weeks gestation of pregnancy, and a single live birth. During her hospital stay, she underwent two procedures: drainage of amniotic fluid, therapeutic from products of conception, via natural or artificial opening. She stayed in the hospital for one day and was discharged to home, under her own or family care. The principal payment was covered by Blue Cross, and she was charged $3,233.29.

**Patient 690326**, a female aged between 40 to 44 years, was admitted electively to the University of Vermont Medical Center, with admission originating from a non-health care facility point as of 2014. She stayed in the hospital for three days and was discharged to her home or family care. The principal payment method was self-pay, totaling a charge of $43,425.53. The primary diagnosis was an encounter for cosmetic surgery, with additional diagnoses including unspecified pruritus (itchiness), unspecified tachycardia, other muscle spasms, and bariatric surgery status. The procedures performed included the alteration of bilateral breast and abdominal wall, both through open approaches.

On July 1, 2010, a woman, **UNIQ code 1585831**, who was between the ages of 40 and 44, encountered a serious circumstance in the emergency room of Rutland Regional Medical Center that required her immediate admission. Her zip code was 05700-05799 (not including 05701), and the hospital staff realized she needed help right away.   
The urgency of the situation was highlighted by the admittance source, a Non-Health Care Facility Point of Origin. The medical staff worked very hard, but the woman's discharge status was listed as "died." The fact that Medicaid was the Principal Payment Source suggests that this healthcare assistance program provided help. $17,093.79 was the total cost of the medical services rendered during the one-day stay. Her primary diagnosis included a complex medical history that included heroin poisoning, acute respiratory failure with hypoxia, acute pulmonary edema, acute and subacute infective endocarditis, acidosis, opioid dependence, cellulitis of the right lower limb, benzodiazepine poisoning, cardiac arrest, neurogenic shock, other psychoactive substance abuse, unidentified viral hepatitis C without hepatic coma, hypokalemia, diabetes mellitus, hyperglycemia, unidentified diarrhea, bradycardia, and a puncture wound in the right foot without a foreign body. Her medical condition's severity and complexity were further highlighted by the Unadjusted Total Charges and the Diagnosis Related category (DRG) code 917, which placed it in a particular category requiring inpatient care.

On July 1, 2010, a male in the 30-34 age group, **UNIQ code 859382**, who lived in the zip code area of 05700-05799 (not including 05701), encountered a serious issue at the emergency room of Rutland Regional Medical Center that required immediate surgery. The surgery was essential despite the financial burden of self-paid bills. Addressing serious illnesses such as heroin poisoning, acute respiratory failure with hypercapnia, brain herniation, opioid dependence, anoxic brain injury, ventricular fibrillation, and cardiac arrest presented a difficult challenge for the medical team. Unfortunately, he had to pay the full $13,128.19 for a single day of admission out of pocket because he lacked insurance. Unfortunately, he died a day after being admitted.

Through the Non-Health Care Facility Point of Origin, a woman between the ages of 70 and 74 who was identified by **UNIQ code 40436** was admitted right away to Copley Hospital. Her complex health conditions included myocardial infarction, acute posthemorrhagic anemia, type 2 diabetes mellitus with diabetic neuropathy, significant depression, hyperlipidemia, simple unexplained asthma, and many more, her history of coronary angioplasty implant and graft, long-term insulin and aspirin use, and family history of ischemic heart disease made her noteworthy. The Principal Diagnosis also included a personal history of atherosclerotic heart disease of the native coronary artery without angina pectoris, cerebral infarction without lasting sequelae, and transient ischemic episodes (TIAs).

Despite the difficulty of her medical situation, she only spent a short time in Copley Hospital. She returned to family care or home ownership with Medicare as the primary source of funding. The total cost of the significant medical care she received during her brief hospital stay was $70,275.41, according to the Unadjusted Total Charges ($70275.41). The Diagnosis Related Group (DRG) code 247 classified her case under a specific inpatient care category due to the intricacy of her medical condition.

**Comparison of Healthcare Spending Distribution Across Commercial Payers, Medicaid, and Medicare**

Introduction

This report compares the distribution of healthcare spending among Commercial Payers, Medicaid, and Medicare, using three pie charts that categorize expenses by medical condition. Each payer type has distinct priorities based on the populations they serve.

Key Findings & Comparisons

1. Neonatal Care

* Largest category across all three payer types, indicating significant healthcare costs related to newborn care.
* Medicaid has the highest neonatal spending, as it covers a large proportion of low-income mothers and infants.
* Medicare also shows notable neonatal spending, though Medicare primarily covers seniors. This may include coverage of neonatal care under specific circumstances, such as family-related policies.

2. Musculoskeletal Conditions

* A major expense for both Medicare and Commercial Payers due to the prevalence of orthopedic issues, injuries, and chronic conditions.
* Medicare has a higher proportion of musculoskeletal spending than Medicaid, likely due to age-related conditions such as arthritis and osteoporosis.
* Medicaid has lower musculoskeletal spending, reflecting its focus on maternal and child healthcare.

3. Pregnancy, Childbirth, and the Puerperium

* Medicaid allocates a significant portion to this category, as it covers many low-income pregnant women.
* Commercial payers also have notable spending on this category, likely covering employer-sponsored insurance plans for working mothers.
* Medicare has minimal spending here, since it primarily serves older adults.

4. Respiratory Conditions

* Spending is consistent across all three payers, reflecting common respiratory illnesses such as asthma, COPD, and pneumonia.
* Medicare spending on respiratory conditions is slightly higher, as older adults are more vulnerable to respiratory diseases.

5. Heart & Circulatory Diseases

* A major cost in Medicare, due to the prevalence of cardiovascular diseases in elderly populations.
* Commercial payers also allocate a large portion, covering middle-aged and working populations who may develop hypertension and heart disease.
* Medicaid spends comparatively less on circulatory diseases, as its population includes more young individuals.

6. Mental Illness & Substance Abuse

* Medicaid has the highest proportion of spending in these categories, as it provides coverage for vulnerable populations, including low-income individuals with mental health disorders.
* Medicare and Commercial Payers have a smaller allocation, though still significant.

7. Infection, Trauma, and Other Conditions

* Medicaid allocates a notable share to infections, given its role in covering vulnerable populations, including children and individuals with chronic conditions.
* Trauma-related costs are distributed across all three payers, likely linked to accidents and emergency care.

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| **Category** | **Highest Spending Payer** | **Notes** |
| Neonatal Care | Medicaid | High due to coverage of low-income mothers and infants. |
| Musculoskeletal | Medicare & Commercial | Common in elderly and working populations |
| Pregnancy & Childbirth | Medicaid | Medicaid covers many low-income pregnant women. |
| Respiratory Diseases | Medicare | Higher in elderly populations |
| Heart & Circulatory | Medicare | Aging population increases cardiovascular issues. |
| Mental Illness & Substance Abuse | Medicaid | Covers vulnerable individuals needing mental health support. |
| Infections & Trauma | Medicaid | Includes childhood illnesses and chronic infections. |

**Primary Insight**:  
Medicaid prioritizes services related to maternal, neonatal, and mental health.  
Medicare emphasizes musculoskeletal, cardiovascular, and respiratory conditions.  
Commercial payers allocate expenditures more uniformly across various conditions, with significant costs associated with neonatal and musculoskeletal care.  
This analysis emphasizes the variation in healthcare financing priorities according to the populations served by various payers.

Question 3

**Taking a closer look at the problems caused by the opioid epidemic**

What is the exact number of visits to the emergency department when a person who uses or abuses drugs has been diagnosed?

Among the patients that are taken to the emergency room, we are interested in learning the frequency with which they use drugs. During the process of filtering emergency department claims for drug abuse-related diagnoses (ICD-10 codes that begin with T40, T41, T42, and T43), we found that there were 2,151 admissions to the emergency department that were connected to drug misuse.

A common misunderstanding is that drug addiction and usage have traditionally been an issue that has been experienced by men. It is also a common misperception that women have significantly better protections against drug abuse and use, let alone overdoses that are severe enough to necessitate hospitalization. Would you be able to check whether or not this preconceived notion about gender bias is supported by your data?

The popular belief that drug abuse is primarily a problem that affects men is something that we would want to investigate. In the event that this is the case, male patients must make up the bulk of these admissions to the emergency department. Out of the total number of patients admitted for drug use, our data shows that there were 1,141 female patients and 1,009 male patients. There are almost the same number of female patients admitted for drug usage as there are male patients, if not more. This study dispels the myth that there are more female patients than male patients. The fact that this is the case adds support to the idea that drug use is a problem that affects people of all genders.

According to reports, tens of millions of dollars were spent that year on cases involving drug use.

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| **UNIQ ID** | **CHARGES** |
| 254 | $67,375.25 |
| 3692 | $117,895.29 |
| 40436 | $70,275.41 |
| 89286 | $203,603.84 |
| 200760 | $49,533.15 |
| 507033 | $3,233.29 |
| 690326 | $43,425.53 |
| 859382 | $13,128.19 |
| 1585831 | $17,093.79 |

Substance abuse accounted for 0.4% ($2,666,693) of Medicare charges, 1.7% ($4,022,391) of Medicaid charges, and 0.4% ($1,444,209) of Commercial Payer charges.

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| **PPAY Code** | **Company Name** | **Percentage Share** |
| 1 | MEDICARE | 56.074784 |
| 2 | MEDICAID | 21.839533 |
| 6 | BLUE CROSS | 10.873305 |
| 7 | COMMERCIAL INSURANCE | 7.920620 |
| 12 | HMO | 0.927970 |
| 8 | SELF PAY | 0.858803 |
| 0 | MISSING OR INVALID | 0.714933 |
| 5 | WORKER’S COMPENSATION | 0.447222 |
| 10 | NO CHARGE | 0.215372 |
| 11 | CHAMPUS | 0.079986 |
| 4 | OTHER GOVERNMENT | 0.047472 |

Recent advancements in the more obscure aspects of chemistry related to drug development have resulted in detrimental consequences for humanity. The increasing prevalence of synthetic narcotics is concerning, partially attributable to the aggressive marketing strategies employed for these medications. Conversely, the general populace remains inadequately informed about the perils associated with the latest generation of laboratory-engineered pharmaceuticals that are claimed to enhance cognitive function. Utilize the ICD-10 codes T404xxx and T4362xx to pinpoint a limited cohort of patients exhibiting these characteristics. What is the number of patients who have been admitted to the emergency department for diagnoses associated with synthetic narcotics  
In a similar vein, we filtered for diagnoses associated with synthetic narcotics and amphetamines, revealing that 156 patients were admitted to the emergency department with these pertinent diagnoses.   
Identify the three zip code areas exhibiting the highest prevalence of drug use and abuse cases.   
The three regions exhibiting the highest incidence of drug use cases are those associated with zip codes commencing with 054, 057, and specifically the zip code 05701. Zip codes commencing with 054 recorded 326 instances, while those beginning with 057 accounted for 214 instances, and

181 instances were reported in the specific postal code 05701.

What are the ten most common diagnoses that are linked to substance use and abuse?

The following is a list of the most common diagnoses associated with substance use, along with the corresponding number of cases:

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| **ICD-10 Code** | **Diagnosis Description** | **Number of Cases** |
| T401X1A | Poisoning by heroin, accidental (unintentional), initial encounter | 258 |
| T402X5A | Adverse effect of other opioids, initial encounter | 256 |
| T424X2A | Poisoning by benzodiazepines, intentional self-harm, initial encounter | 123 |
| T424X5A | Adverse effect of benzodiazepines, initial encounter | 114 |
| T40605A | Adverse effect of unspecified narcotics, initial encounter | 112 |
| T43222A | Poisoning by selective serotonin reuptake inhibitors, intentional self-harm, initial encounter | 82 |
| T402X1A | Poisoning by other opioids, accidental (unintentional), initial encounter | 81 |
| T424X1A | Poisoning by benzodiazepines, accidental (unintentional), initial encounter | 80 |
| T426X5A | Adverse effect of other antiepileptic and sedative-hypnotic drugs, initial encounter | 75 |
| T426X2A | Poisoning by other antiepileptic and sedative-hypnotic drugs, intentional self-harm, initial encounter | 74 |