Answering Questions with Databases

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By using informatics and evaluating databases we can answer questions about problems that are identified in patient management or patient outcomes. Once a problem is identified, a specific question can be formed. The answer to a question will be dependent on the parameters of the question as well as the quality and relevance of the data source used (Coiera, 2003). In this paper we will evaluate the use of a dataset to explore the risks and implications of opioid related deaths.

**Formulation and Scope of Informatics Problem**

We used a deductive approach for testing our hypotheses. As Doctor of Nursing Practice students, utilizing this approach enabled us to analyze information with the use of technology and available informatics tools, thereby allowing us to be efficient and effective at solving problems while using nursing informatics (McGonigle & Mastrian, 2012). The increasing use of informatics systems to process prescriptions is a great platform to have a risk screening alert prior to printing the prescription. The rise in opioid poisoning deaths has been linked to the rise in the number of providers prescribing opioids for pain (Substance Abuse and Mental Health Service Administration, 2010). The establishment of an alert prompt for both prescribers and opioid dispensers could prevent unintentional drug poisoning as well as educate patients using opioids of these risks.

**Dataset and Source**

Our chosen dataset is publicly available from the Center of Disease Control (CDC) website (2009). This dataset is downloadable as an excel document which allows for easier analysis (Appendix). The data is not linked to specific incidences of opioid analgesic deaths; rather, it is clustered by state. There is the ability to further divide the data into subsets of death by age and total deaths (CDC, 2009).

**Structure of Data**

To obtain the data on opioid analgesic deaths, the CDC applied National Vital Statistics Mortality Data (Morbidity and Mortality Weekly Report, 2010), which employs dozens of ICD-10 diagnostic codes to compile their data on Poisoning Deaths involving Opioid Analgesics and Other Drugs or Substances (ICD10data.com, 2011). The data is presented in a table format with gender as columns and states as rows, and contains nominal and interval data (Appendix).

**Question Posed**

Unintentional opioid deaths have historically been higher in men than in women (Paulozzi, 2007). Our question posed is: which gender is more at risk of death due to opioid poisonings? By relying on informatics we hope to either confirm previous research or shed new light on risk factors associated with opioid deaths.

**Results**

According to the data electronically available under the CDC website, the number of fatal poisoning deaths involving opioids analgesics in 2006 was 14,458 (CDC, 2009). The chart in the Appendix shows an increase in mortality (20%) from 1996 to 2006, where the gender-adjusted death rate in 1996 for males was 2.0 deaths per 100,000 and 0.9 deaths per 100,000 for females. In 2006, the gender-adjusted death rate was 5.8 deaths per 100,000 for males and 3.3 deaths per 100,000 for females (CDC, 2009). The data set shows that males in 2006 were 62% more likely to die due to opioids poisoning than female for the same year (CDC, 2009).

**Evaluation**

The dataset chosen is not sufficient to fully address an informatics solution to the posed clinical question. The data in the Appendix indicates that men are more likely to suffer from opioid related deaths than females, but does not address plausible risk factors. The data is unable to give explanations for the significant increases in opioid related deaths for both sexes from 1996 to 2006 (CDC, 2009), which is necessary to fully assess which sex is at greatest risk for death from opioid poisoning.

The dataset also has limitations due to taxonomy. Because of multiple ICD 10 diagnostic codes, the summative data is nonspecific to opioid analgesic deaths, and includes poisoning deaths from all manners including suicide, homicide, unintentional and undetermined (MMWR, 2010). In order to fully answer the question posed, the above data needs to be separated into more specific diagnostic groupings that pertain strictly to opioid involvement.

Additional data is necessary to address root causes of opioid use and abuse contributing to opioid related deaths by gender. The fact that death rates in women are increasing faster than men and are up by more than 300 percent has not been addressed (National Safety Council, Greater Omaha Chapter, 2007). Useful data would include demographics, psycho-social factors, comorbidities (including substance abuse, chronic pain, and mental illness), type of opioids, polysubstance use in those who died, intentional versus unintentional overdose, and legal versus illegal means of obtaining opioids. These data are considered nominal or ordinal data, so chi-square analyses of any of the above would reveal relationships between the data that could be useful in developing a solution to the question of assessing risk by gender.

References

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**Appendix**

**Opioid Deaths per State by Gender- 2007**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **State** | **Number of Deaths (Female)** | **Female Death Rate (Age Adjusted)** | **Number of Deaths (Male)** | **Male Death Rate (Age Adjusted)** |
| National | 5649 | 3.7 | 8809 | 5.8 |
| Alabama | 62 | 2.7 | 95 | 4.2 |
| Alaska | 4 | N/A | 10 | N/A |
| Arizona | 129 | 4.2 | 183 | 5.8 |
| Arkansas | 64 | 4.6 | 79 | 5.8 |
| California | 499 | 2.7 | 780 | 4.2 |
| Colorado | 135 | 5.3 | 138 | 5.4 |
| Connecticut | 32 | 1.7 | 73 | 4.2 |
| Delaware | 16 | N/A | 17 | N/A |
| District of Columbia | 6 | N/A | 5 | N/A |
| Florida | 478 | 5.3 | 857 | 9.7 |
| Georgia | 131 | 2.6 | 217 | 4.5 |
| Hawaii | 20 | 3.1 | 47 | 7 |
| Idaho | 22 | 3 | 33 | 4.5 |
| Illinois | 127 | 2 | 192 | 3 |
| Indiana | 64 | 2 | 133 | 4.3 |
| Iowa | 39 | 2.6 | 58 | 3.9 |
| Kansas | 41 | 3 | 72 | 5.2 |
| Kentucky | 107 | 4.9 | 225 | 10.6 |
| Louisiana | 63 | 2.9 | 127 | 6.2 |
| Maine | 30 | 4.5 | 62 | 10 |
| Maryland | 110 | 3.7 | 222 | 7.9 |
| Massachusetts | 150 | 4.3 | 184 | 5.6 |
| Michigan | 136 | 2.6 | 237 | 4.7 |
| Minnesota | 60 | 2.3 | 95 | 3.5 |
| Mississippi | 29 | 2 | 60 | 4.4 |
| Missouri | 122 | 4 | 180 | 6.3 |
| Montana | 23 | 4.7 | 36 | 7.3 |
| Nebraska | 21 | 2.5 | 16 | N/A |
| Nevada | 139 | 11 | 168 | 12.6 |
| New Hampshire | 45 | 6.2 | 72 | 10.8 |
| New Jersey | 75 | 1.7 | 139 | 3.2 |
| New Mexico | 71 | 7.2 | 160 | 16.4 |
| New York | 244 | 2.4 | 467 | 4.8 |
| North Carolina | 287 | 6.1 | 410 | 9.2 |
| North Dakota | 5 | N/A | 7 | N/A |
| Ohio | 202 | 3.4 | 334 | 5.9 |
| Oklahoma | 212 | 11.9 | 271 | 15.4 |
| Oregon | 114 | 5.8 | 122 | 6.2 |
| Pennsylvania | 109 | 1.7 | 273 | 4.5 |
| Rhode Island | 14 | N/A | 35 | 6.6 |
| South Carolina | 91 | 3.9 | 91 | 4.2 |
| South Dakota | 11 | N/A | 7 | N/A |
| Tennessee | 185 | 5.8 | 257 | 8.4 |
| Texas | 318 | 2.7 | 430 | 3.6 |
| Utah | 128 | 10.8 | 196 | 15 |
| Vermont | 19 | N/A | 30 | 9.9 |
| Virginia | 186 | 4.7 | 193 | 5 |
| Washington | 228 | 6.7 | 288 | 8.5 |
| West Virginia | 111 | 12.6 | 206 | 23.7 |
| Wisconsin | 126 | 4.5 | 209 | 7.4 |
| Wyoming | 9 | N/A | 11 | N/A |

Note. Retrieved from http://wwwn.cdc.gov/sortablestats/