

Opioid-Related Emergency Department Visits and Their Relationship to Age and Gender

by

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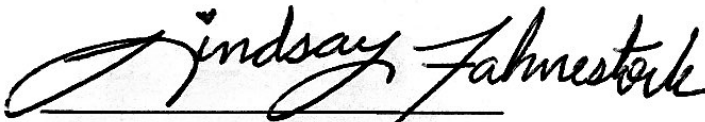
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Abstract

This study examines opioid-related emergency department visits and their relationship on age and gender. Opioid abuse has increased steadily in the United States, and current research shows a drastic increase in opioid-related emergency department visits.

However, a gap in literature remains when looking at the relationship of opioid-related emergency department visits with age and gender. Using a cross-sectional design, trends in age and gender were examined among opioid-related emergency department visits in Riverside County, California using secondary data from the California Office of Statewide Planning and Development (OSHPD). The OSHPD Emergency Department Encounters data file was utilized, which included data collected by the State of California from 2015 and 2016. The sample included 138 participants (85 male and 53 female) of ages 18 and older. The criteria for selection included if the individual had a principal diagnosis for an opioid-related emergency department visit in Riverside County between 2015 and 2016. A one-way analysis of variance (ANOVA) and Pearson's Chi-Square test were used to test the hypothesized differences. Individuals who had opium, other opiates, prescription drugs, and unspecified narcotics use emergency department visits had a higher average age than individuals who had a heroin use emergency department visit. No relationship was found between gender and opioid-related emergency department visits. The public health implications and limitations from the study are discussed.

Key Words: Opioids, Age, Gender, Emergency department, Epidemic

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Review of Literature

Introduction

Approximately 21-29% of patients in the United States who are prescribed opioids for chronic pain misuse them (National Institute on Drug Abuse [NIDA], 2019). Opioid abuse and overdose have increased steadily in the United States, and current research shows a drastic increase in opioid-related emergency department visits (Tadros, Layman, Davis, Davidov & Cimino, 2015). Opioids are a class of drugs which act on the nervous system to produce feelings of pleasure and pain relief (U.S. National Library of Medicine [NLM], 2019). Some opioids are legally prescribed by healthcare providers in order to manage severe and chronic pain (NLM, 2019). Some commonly prescribed opioids include oxycodone, fentanyl, methadone, hydrocodone, codeine, and morphine (NLM, 2019). All opioids chemically react with opioid receptors on nerve cells in the body and brain (NIDA, n.d.). When taken for a short period of time and as prescribed by a doctor, opioid pain relievers are generally safe (NIDA, n.d.). However, since opioids produce euphoria along with pain relief, they can be misused, often by being taken in a larger quantity than prescribed or by being taken without a doctor's prescription (NIDA, n.d.).

In 2010, approximately 12.2 million individuals reported non-medical use of pain relievers for the first time within the past twelve months (Meyer, Patel, Rattana, Quock & Mody, 2014). The misuse of opioids, including prescription pain relievers and synthetic opioids such as fentanyl, is a serious national crisis that affects the public's health as well as social and economic welfare (NIDA, 2019).

Data from emergency departments provide an early warning system for health departments to identify increases in opioid overdoses more quickly and coordinate response

efforts (CDC, 2018b). Data from emergency departments can help with meeting the Healthy People 2020 objective of reducing fatal and nonfatal poisonings (Hasegawa, Espinola, Brown, & Camargo, 2014). Emergency departments can also provide naloxone, link patients to treatment and referral services, and provide health departments with critical data on overdoses (CDC, 2018b).

Economic Burden

The economic burden of opioid abuse is substantial. The total economic burden of prescription opioid misuse in the United States is estimated to be \$78.5 billion per year (Florence, Zhou, Luo, & Xu, 2016). Around one-third of that amount, \$28.9 billion, is due to increased healthcare and substance abuse treatment costs (Florence et al., 2016). Approximately one-quarter of the cost is carried by the public sector in areas such as healthcare, substance abuse treatment, and criminal justice records (Florence, Zhou, Luo, & Xu, 2016). Lower-income individuals are more likely to misuse opioids than the general population, including those on Medicaid and the uninsured (Ghertner & Groves, 2018). Weiss and colleagues (2016) found that per capita opioid-related emergency department visits are higher, and have increased at higher rates, in low-income communities when compared to higher income communities. Nationally, from 2010 to 2015, the share of opioid-related emergency department visits shifted away from private payers and toward public payers such as individuals on Medicaid and Medicare (Weiss & Heslin, 2018). In 2015, the distribution of opioid-related emergency department visits by payer varied across 23 states. The range for each payer across states was 10.9-31.7% for Medicare, 10.1-59.9% for Medicaid, 12.2-48.8% for private insurance, and 5.7-44.5% for the uninsured (Weiss & Heslin, 2018). This data demonstrates that opioid use is an economic, country-wide burden that significantly affects the insured and uninsured.

US Opioid Trends

Data from emergency departments show that the U.S. opioid overdose epidemic continues to worsen. The U.S. national opioid-related emergency department visits have increased from a rate of 429 per 100,000 in 2009 to 974 per 100,000 in 2016 (Healthcare Cost and Utilization Project [HCUP], 2019). Data from the Center for Disease Control and Prevention's ([CDC] 2018a) Enhanced State Opioid Overdose Surveillance (ESOOS) Program and the National Syndromic Surveillance Program (NSSP) BioSense platform, using ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemic) software were analyzed, showing quarterly trends by state and rural/urban differences from July 2016 through September 2017. Overall, emergency department visits for suspected opioid overdoses increased 35% in the 16 states hit hardest by the epidemic (CDC, 2018a). All five U.S. regions experienced rate increases; the largest was in the Midwest (70%), followed by the West (40%), Northeast (21%), Southwest (20%), and Southeast (14%) (CDC, 2018a). Large central metropolitan areas which have a population of one million or more and covering a principal city saw a rate increase of 54% (CDC, 2018a). Substantial rate increases were also seen among men by 30% and women by 24%. Those age 25 and older experienced an increase of more than 30% (CDC, 2018a).

Opioid Trends in California

California is a large and diverse state, and many counties within the state have opioid prescribing rates and overdose fatalities that are higher than both state and national averages (Hope Canyon, 2019). The California Opioid Overdose Surveillance Dashboard ([CDPH] n.d. a) reported that there were over 20 million opioid prescriptions dispensed to California residents in 2017 and over 4,000 visits to California emergency departments for an opioid overdose. From

2009 to 2016, the rate of opioid-related emergency department visits per 100,000 increased from 349 to 734 per 100,000 (HCUP, 2019). Opioid-related emergency department visits in California nearly doubled from 2,219 in 2006 to 4,281 in 2017 (California Health Care Foundation, 2018). Many rural counties are underserved, and the lack of treatment resources contributes to the opioid crisis (Hope Canyon, 2019). The northern coast of California is largely rural and has a large population of homeless residents who often face extreme barriers to treatment and financial hardship (Del Real & Kang, 2018). In 2016, the California counties with the highest opioid overdose rates included Inyo County, Humboldt County, Lassen County, Mendocino County, and Siskiyou Counties (Davis, 2017).

Opioid Trends in Riverside County

Riverside County's opioid rates mirror national and state trends with emergency department visits increasing 56% from 2010-2016 (Riverside University Health System [RUHS], 2018). In 2016, there were 3,387 opioid-related emergency department visits in Riverside County (RUHS, 2018). Approximately 61% of opioid-related emergency department visits occurred among white residents (RUHS, 2018). Palm Springs, Desert Hot Springs, Wildomar, Indio, Hemet, and Calimesa were among the top ten cities with the highest opioid-related emergency department visit rates in 2016 (RUHS, 2018). Eighty percent of the top ten cities with the highest rates for opioid-related ED visits are located in the east and mid regions of the county (RUHS, 2018). In 2014, 38% of opioid-related emergency department visits in Riverside County occurred among individuals of ages 20-29 (CDPH, n.d.b), while 64% of the opioid-related emergency department visits in Riverside County were among males (CDPH, n.d.b).

Age

The relationship between age and opioid-related emergency visits has not been well established. From July 2016 through September 2017, opioid overdoses increased 31% for people ages 25-35, 36% for people ages 35-54, and 32% for people age 55 and over (CDC, 2018b). Recent literature suggests that opioid misuse in older adults is an underappreciated and growing problem (Weiss, Heslin, Barrett, Izar, & Bierman, 2018). Opioid-related emergency department visits for patients aged 65 years and older increased from 43.2% in 2010 to 84.5% in 2015 (Abbasi, 2018).

Increasing age tends to come with painful chronic conditions including degeneration of bones, joints, and muscles (Molton & Terrill, 2014). Approximately 40% of older adults report pain compared to around 30% of the general population (LeRoux, Tang, & Drexler, 2016). Eighty percent of U.S. adults aged 65 years and older have multiple chronic conditions, such as heart disease, diabetes, and arthritis, compared with less than 20% of adults aged 18-44 years, making older adults more likely to receive an opioid prescription (Weiss et al., 2018).

With age come experiences involving trauma that can result in depression or anxiety, including the loss of loved ones. Among adults age 50 or older who visited the emergency department for drug toxicity, pain relievers were most commonly involved (43.5%), and opioid pain relievers were the most frequent type (Chang, 2017). According to the National Health and Nutrition Examination Survey (NHANES), adults of age 65 and older represent 25.4% of long-term (90 days or longer) users of opioids from 1999 to 2014 (Mojtabai, 2017). In 2016, one-third of the more than 40 million Americans enrolled in Medicare Part D received prescription opioids, and a large number received higher doses than recommended for prolonged periods of time, putting them at an increased risk of misuse (Weiss et al., 2018). Further, more than one-

third of older Americans are living with a disability, making this population more likely than younger adults to receive an opioid prescription (Weiss et al., 2018).

Gender

The relationship between gender and opioid-related emergency department visits has yet to be clarified (Choo, Douriez, & Green, 2014). From 2009 to 2016, opioid-related emergency department visits for men and women have increased. The largest increase was among men with a rate of 475 emergency department visits per 100,000 increasing to 1,113 per 100,000 (HCUP, 2019). The rate among women increased from 385 emergency department visits per 100,000 to 839 per 100,000 population (HCUP, 2019). From 2006 to 2010, 52.37% of opioid-related emergency department visits were made by females (Tadros et al., 2015). From July 2016 through September 2017, opioid overdoses increased 30% for men and 24% for women (CDC, 2018b).

Compared to men, women are more likely to be prescribed painkillers, especially in higher doses, and are more likely to become dependent on them more quickly (Weiss, McDermott, & Heslin, 2019). From 1993 to 2009, opioid overdoses have steadily increased at higher rates among women compared to men (Unick, Rosenblum, Mars, & Ciccarone, 2013). Men have been described as using opioids more often for pleasurable aspects or to enhance amusement, while women may engage in nonmedical use of opioids more often to deal with negative emotions and address interpersonal problems (Choo et al., 2014). A review by Hemsing, Greaves, Poole, and Schmidt (2016) found that women who had experienced violence or trauma, identified as aboriginal, were pregnant, or women who were sexual minorities such as lesbian, bisexual, or transgender women were at a heightened risk for misuse of opioids. A study done by Serdarevic and associates (2017) found that women were more likely to report recent

and non-recent prescription opioid use (54.9% women vs. 42.2% men). A multisite effectiveness trial suggested that women who use opioids not only progress to dependence more quickly than men but also experience more cravings than men (Back, Lawson, Singleton, & Brady, 2011). Psychological and emotional distress have been identified as risk factors for dangerous opioid use among women but not among men (Back et al., 2011). Women are significantly more likely to be motivated to use opioids in order to cope with interpersonal stress and to use them first thing in the morning compared to men (Back et al., 2011).

Purpose of Study

The purpose of this study was to examine the trends among age and gender with types of opioid-related emergency department visits in Riverside County, California.

Research Questions

The following research questions are associated with this study:

1. Is there a significant difference between age and the type of opioid-related emergency department visits?
2. Are women more likely to have opioid-related emergency department visits than men?

Hypotheses

It is hypothesized that there is a significant difference between age and type of opioid-related emergency department visits. It is further hypothesized that women are more likely to have opioid-related emergency department visits than men.

Methods

Design

This study used a cross-sectional design in which trends in age and gender were examined among opioid-related emergency department visits in Riverside County, California. Secondary data from the California Office of Statewide Health Planning and Development (OSHPD) was used. This study was approved by the California Baptist University Institutional Review Board (IRB) (Appendix B).

Procedures

In this research, the OSHPD Emergency Department Encounters data file was utilized. The file included data collected by the State of California from 2015 and 2016. Emergency department data include encounters from hospitals that are licensed to provide emergency medical services (OSHPD, 2015). Reportable emergency department encounters only include patients who had face-to-face contact with a provider (OSHPD, 2015).

The de-identified data file was obtained from the Riverside University Health System (RUHS) - Public Health's Epidemiology and Program Evaluation branch for this study. The file included the age, gender, year, and principal diagnosis for all patient encounters. Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 24.0. The initial data file included 2,075 patient encounters, using ICD-9 and ICD-10 codes to identify opioid-related principal diagnoses. The file was cleaned to only include visits for specific types of opioids, consisting of heroin, methadone, opium, prescription drugs, other opiates, and unspecified narcotics, leaving 934 patient encounters.

Participants

The data used for this study was from the California Office of Statewide Health Planning and Development's (OSHPD) Emergency Department Encounters data file. Using G*Power, and selecting an alpha of 0.05, statistical power of 0.80, a medium effect size of 0.25, and two groups, a minimum sample size of 128 was estimated. The sample included 138 patient encounters (85 male and 53 female) of ages 18 and older. An adjusted sample size of 138 patient encounters was applied to account for missing data and repeated encounters. According to Suresh and Chandrashekara (2012), a 5-10% margin of error is acceptable in a sample size. A random sample of 138 participants from among the 934 patient encounters was produced three times with the third sample of 138 participants kept to answer the two research questions.

Independent and Dependent Variables

The independent variable for the first research question was type of opioid-related emergency department visit and the dependent variable was age. The type of opioid-related emergency department visit was a categorical variable consisting of "1 = heroin," "2 = methadone," "3 = opium," "4 = prescription drugs 4," "5 = other opiates," and "6 = unspecified narcotics." Age was a continuous variable.

The independent variable for the second research question was gender and the dependent variable was type of opioid-related emergency department visit. These diagnoses were based on emergency department visits. Gender was a categorical variable being either "1 = male" or "2 = female." Type of opioid-related emergency department visit was a categorical variable consisting of "1 = opioid" or "2 = opiate." The opioid category consisted of prescription drugs, methadone, and unspecified narcotics. The opiate category consisted of heroin, opium, and other opiates. Recategorization was done for the Chi-Square test to have higher expected counts.

Data Analysis

To test the first hypothesis that there is a significant difference between age and type of opioid-related emergency department visits, a one-way analysis of variance (ANOVA) was performed. A one-way ANOVA was chosen to see whether there were any statistically significant differences between the means of the six categorical variables of types of opioid-related emergency department visits when compared to age.

To test the second hypothesis that women are more likely to have opioid-related emergency department visits compared to men, a Chi-Square test was performed. A Chi-Square Test of Independence was chosen to explore the relationship between gender and a principal diagnosis of opioid use-related emergency department visits.

Results

The sample consisted of a total of 138 participants who had a principal diagnosis of opioid use-related emergency department visit in Riverside County between 2015 and 2016. The sample included 85 males (61.6%) and 53 females (38.4%) (see Table 1). The participants' average age was 43 years with a minimum age of 18 and a maximum age of 85 (see Table 2). Most (42%) opioid-related emergency department visits were for heroin use followed by prescription drugs (16.7%), other opiates (15.2%) unspecified narcotics (13%), opium (8.7%), and methadone (4.3%) (see Table 3).

To answer the first research question, "*Is there a significant difference between age and the type of opioid-related emergency department visits?*," a one-way ANOVA was conducted. The results of the ANOVA showed a significant difference between age and opioid-related emergency department visits ($F(5, 132) = 9.43, p = 0.000$) (see Table 4). A Games-Howell post hoc test was conducted and showed that individuals who visited the emergency department for issues related to their use of opium, other opiates, prescription drugs, and unspecified narcotics had a significant difference in age than individuals who visited the emergency department for issues related to their use of heroin (see Table 5). The mean age of heroin related visits was 32.38, the mean age of methadone related visits was 58.50, the mean age of opium related visits was 53.42, the mean age of other opiates related visits was 48.29, the mean age of prescription drug related visits was 52.52, and the mean age of unspecified narcotic related visits was 48.78 (see Table 4).

To answer the second research question, "*Are women more likely to have opioid-related emergency department visits than men?*," a Chi-Square Test of Independence was performed. The results of the Chi-Square test comparing the frequency of a primary diagnosis of opioid use

emergency department visits among male and females showed no significant association ($\chi^2(1) = 1.93, p = 0.165$).

Discussion

The purpose of this study was to examine the trends among age and gender with types of opioid-related emergency department visits in Riverside County. Significant results were found when looking at age and opioid-related emergency department visits. Individuals who had opium, other opiates, prescription drugs, and unspecified narcotics who use emergency department visits had a higher average age than individuals who had a heroin use emergency department visit. No significant results were found when looking at gender and opioid-related emergency department visits.

Age Findings

There was a significant association between age and opioid-related emergency department visits. Individuals who visited the emergency department for issues associated with opium, other opiates, prescription drugs, and unspecified narcotics use were on average, older than individuals who had a heroin use-related emergency department visit. These findings are consistent with an analysis done by the Healthcare Cost and Utilization Project (HCUP) which found that older patients had the largest increase in opioid-related emergency department visits from 2006 to 2015 (Sun, Karaca & Wong, 2018). The HCUP study was inconsistent with the heroin-related emergency department visit findings in this study. However, this study's heroin-related emergency department visit findings were consistent with a study done by the National Hospital Care Survey ([NHCS] n.d.) which found that heroin-related emergency department visits were more commonly made by young adults around the age of 21-24 years and the rates decreased as the age increased.

A possible explanation for the increased age among those who were seen for opium, other opiates, prescription drugs, and unspecified narcotics is that 80% of adults ages 65 or older

living in the United States have multiple chronic conditions including heart disease, diabetes, arthritis, and depression, compared to less than 20% of younger adults (Weiss et al., 2018). Polypharmacy can be common in older adults who have more than one underlying medical conditions, and one-third of prescription drug use is by older adults in the United States (Kalapatapu & Sullivan, 2010). Older adults are also more likely to take prescription medication than younger adults, which increases their chances of drug interactions and opioid related adverse effects (Weiss et al., 2018).

These findings emphasize the need for physicians to reevaluate prescribing painkillers and other opioids to older adults. These findings emphasize the need to educate older adults on opioids because all of the Baby Boomers will be 50 and older by 2020 and 65 and older by 2030 (Kalapatapu & Sullivan, 2010). The 65 and older age group is projected to increase to 88.5 million people by 2050 (Kalapatapu & Sullivan, 2010). There will be a significant impact on the healthcare workforce and the U.S. economy with such projected numbers of older adults (Kalapatapu & Sullivan, 2010).

Gender Findings

There was no significant association between gender and opioid-related emergency department visits. The results from this study were not consistent with findings from a study done by Tadros and colleagues (2015) looking at prescription opioid emergency department visits. Tadros and colleagues (2015) found that females had significantly more prescription opioid emergency department visits.

A possible explanation for the inconsistency could be due to geographic variances. Both of the studies that contradicted this study's findings used national data while this study used data from one California county. Another possible explanation for the lack of consistency could be

from the narrow time period researched. The study done by Ryoo and Choo (2016), which found males more likely to have illicit drug related emergency department visits, used data collected from 2004 to 2011. A study conducted by Tadros and colleagues, which found females more likely to have prescription drug related emergency department visits, used data from 2006 to 2011 (Tadros et al., 2015). Since this study used more recent data from 2015 and 2016, it may imply that the relationship between gender and opioid-related emergency department visits has changed over the years.

Limitations

This study has a few limitations. First, OSHPD emergency department data consists of data submitted by emergency departments based solely on the accuracy of patient records. Physicians may inaccurately report diagnosis data resulting in an overrepresentation of drug misuse among certain genders and age groups. Second, the data was limited to individuals of ages 18 years and older, so the findings cannot generalize to younger populations who have opioid-related emergency department visits. A study done by Crane (2017) found the number of emergency department visits involving ingestion of opioid pain relievers among children of age one to five to have almost tripled. Lastly, we do not know if the same individuals are being documented for multiple opioid-related emergency department visits. There is a lack of guarantee of unduplicated cases or even having the same patient coded for more than one opioid-related emergency department visit at the same hospital or a different hospital.

Public Health Implications

Screening, evaluation, and management of opioid abuse is crucial among older adults (Kalapatapu & Sullivan, 2010). Older adults should receive more education about the medications they are taking. The risks and benefits of opioids should be discussed along with

suggesting alternative pain management options. Physicians should also avoid prescribing opioids to older adults whenever possible and suggest alternative ways to cope with pain that are healthier. Since older adults see primary care physicians more frequently for medical conditions, those visits would be a good time to screen for opioid use problems and refer patients to counseling or treatment if needed (Wu & Blazer, 2010). Although no significant association between gender and opioid-related emergency department visits was found, more research should be done to better understand how gender plays a role in the opioid crisis.

Every patient being prescribed medication should be educated on proper disposal of unused medications as well as making sure that all medications in the home are secure so that children and other household members do not have access to them. A recent article published by Gandhi and Best (2015) stressed how unused, expired, and “extra” medications are a significant risk for abuse and accidental overdose for others in the household. Patients need to be reminded that medications are prescribed solely for them and are not to be shared with friends and other family members (Gandhi & Best, 2015). Also, medications should only be used at the prescribed dose and frequency for the suggested duration (Gandhi & Best, 2015). Patients need to be reminded that medications should not be flushed down the toilet; instead they should be discarded properly in the trash or be returned to a take-back program sponsored by the U.S. Drug Enforcement Administration (Gandhi & Best, 2015).

Conclusion

The results of this study found a significant difference between age and type of opioid-related emergency department visits. Individuals who visited the emergency department for issues related to their use of opium, other opiates, prescription drugs, and unspecified narcotics had a significant difference in age than individuals who visited the emergency department for

issues related to their use of heroin. No significant results were found when looking at gender and opioid-related emergency department visits. The findings on gender were inconsistent with other studies which have found a significant relationship between gender and opioid-related emergency department visits (Tadros et al., 2015). Due to inconsistent findings with regard to gender, further research needs to be done to explore possible relationships. Older adults need to receive more education on the risk factors of opioids, and prescribers need to be more careful when giving opioid prescriptions to older adults.

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Appendix A: Tables

Table 1

Gender Demographics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	53	38.4	38.4	38.4
	M	85	61.6	61.6	100.0
	Total	138	100.0	100.0	

Table 2

Age Demographics

N	Valid	138
	Missing	0
Mean		43.26
Median		40.00
Std. Deviation		18.659
Range		67
Minimum		18
Maximum		85

Table 3

Type of Opioid-Related Emergency Department Visit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Heroin	58	42.0	42.0	42.0
	Methadone	6	4.3	4.3	46.4
	Opium	12	8.7	8.7	55.1
	Other Opiates	21	15.2	15.2	70.3
	Prescription	23	16.7	16.7	87.0
	Unspecified Narcotics	18	13.0	13.0	100.0
	Total	138	100.0	100.0	

Table 4

One-way ANOVA and Descriptives of Age by Opioid ED Visits

	N	Mean	Standard Deviation	F	Sig.
Type of Opioid- Related ED Visit				9.426	.000
Heroin	58	32.38	11.104		
Methadone	6	58.50	19.736		
Opium	12	53.42	20.070		
Other Opiates	21	48.29	19.978		
Prescription	23	52.52	17.784		
Unspecified Narcotics	18	48.78	20.005		

Note. N = 138.

Table 5

Games-Howell Post-Hoc Test

(I) NewDX	(J) NewDX	Mean	Std. Error	Sig.	95% Confidence Interval	
		Difference (I-J)			Lower Bound	Upper Bound
Heroin	Methadone	-26.121	8.188	.131	-60.15	7.91
	Opium	-21.037*	5.974	.037	-40.99	-1.08
	Other	-15.906*	4.597	.022	-30.09	-1.72
	Opiates					
	Prescription	-20.142*	3.984	.000	-32.29	-8.00
	Unspecified	-16.398*	4.935	.034	-31.89	-.91
Narcotics						
Methadone	Heroin	26.121	8.188	.131	-7.91	60.15
	Opium	5.083	9.924	.994	-29.21	39.38
	Other	10.214	9.161	.863	-23.07	43.50
	Opiates					
	Prescription	5.978	8.869	.980	-27.27	39.23
	Unspecified	9.722	9.335	.892	-23.69	43.13
Narcotics						
Opium	Heroin	21.037*	5.974	.037	1.08	40.99
	Methadone	-5.083	9.924	.994	-39.38	29.21
	Other	5.131	7.251	.979	-17.37	27.64
	Opiates					
	Prescription	.895	6.879	1.000	-20.71	22.50
	Unspecified	4.639	7.470	.988	-18.48	27.76
Narcotics						
Other	Heroin	15.906*	4.597	.022	1.72	30.09
Opiates	Methadone	-10.214	9.161	.863	-43.50	23.07
	Opium	-5.131	7.251	.979	-27.64	17.37
	Prescription	-4.236	5.723	.976	-21.36	12.88
	Unspecified	-.492	6.422	1.000	-19.81	18.83
	Narcotics					
Prescription	Heroin	20.142*	3.984	.000	8.00	32.29
	Methadone	-5.978	8.869	.980	-39.23	27.27
	Opium	-.895	6.879	1.000	-22.50	20.71
	Other	4.236	5.723	.976	-12.88	21.36
	Opiates					

Table 5 Continued

	Unspecified	3.744	5.999	.988	-14.35	21.84
	Narcotics					
Unspecified	Heroin	16.398*	4.935	.034	.91	31.89
Narcotics	Methadone	-9.722	9.335	.892	-43.13	23.69
	Opium	-4.639	7.470	.988	-27.76	18.48
	Other	.492	6.422	1.000	-18.83	19.81
	Opiates					
	Prescription	-3.744	5.999	.988	-21.84	14.35

*. The mean difference is significant at the 0.05 level.

Table 6

Results of Chi-Squared Test for Gender by Type of Opioid-Related ED Visit

Gender	Type of Opioid-Related Emergency Department Visit	
	Opioid	Opiate
Female	21 (47%)	32 (34%)
Male	24 (53%)	61 (66%)

Note. $\chi^2 = 1.93$, $df = 1$. Numbers in parentheses indicate column percentages.

* $p > .05$

Appendix B: IRB Approval

RE: IRB Review
IRB No.: 099-1819-EXM

Project: Opioid-Related Emergency Department Visits and Its Relationship to Age and Gender

Date Complete Application Received: 4/26

Principle Investigator: Shreya Shah
Faculty Advisor: Lindsay Fahnestock

College/Department: CHS

IRB Determination: Exempt Application Approved – Student research using de-identified, privately maintained secondary data set with permission of data set supervisor (Lindsay Fahnestock). Data analysis may begin, in accordance with the final submitted documents and approved protocol.

Future Correspondence: All future correspondence about this project must include all PIs, Co-PIs, and Faculty Advisors (as relevant) and reference the assigned IRB number.

Approval Information: In the case of an unforeseen risk/adverse experience, please report this to the IRB immediately using the appropriate forms. Requests for a change to protocol must be submitted for IRB review and approved prior to implementation. At the completion of the project, you are to submit a Research Closure Form.

Researcher Responsibilities: The researcher is responsible for ensuring that the research is conducted in the manner outlined in the IRB application and that all reporting requirements are met. Please refer to this approval and to the IRB handbook for more information.

Date: April 26, 2019