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Risk Factors Associated with Opioid Misuse Among Military Personnel

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Health Management and Policy

Risk Factors of Military Personnel Becoming Opioid Dependent

Brittany Sullivan and Semra Aytur

Abstract:

Drug overdosing has become one of the leading causes of injury death in the United States and continues to grow. Opioid related deaths have increased which may be due to the increase use of prescription opioids to treat chronic pain. Opioids are one of the most prescribed medications among military personal for pain management. The objective of this study is to determine risk factors of military personnel becoming opioid dependent. We utilized data provided by Chris Armijo, an Informatics Administrative Officer in the United States military, called the Opioid Registry and Behavior Risk Factor Surveillance System, BRFSS, 2011. The Opioid Registry data source contains information about opioid data management and reporting platform developed through Carepoint Military Health System Population Health Portal. The Behavior Risk Factor Surveillance System 2011 provides additional information about risk factors associated with opioid dependence and military personnel. Data from the Opioid Registry and BRFSS 2011 were analyzed. Odds ratios and chi-square models were developed to estimate the relationship between opioid use and risk factors, such as alcohol use, mental disorders, and suicide, in JMP Pro 13.

Introduction:

Opioid overdoses are increasing continuously among military personnel as well as civilians. Opioids are a class of drugs that include heroin, synthetic opioids, and pain relievers. When these drugs are misused, it can lead to overdose incidents and deaths (NIDA, 2017). Prescription opioids are the most misused drug class in the United States (Potter et al., 2014). The misuse of a drug can vary from taking the drug more frequently than prescribed to trying to get high from the drug (Potter et al., 2014). Almost half of all veterans returning from deployment in Afghanistan and Iraq have chronic pain, one in six veterans turn to opioids for pain relief (Pain Doctor, 2015). Substance abuse is higher in the military population compared to the civilian population. Veterans between the ages of eighteen and fifty-three are five times as likely to have Substance Use Disorder and two times as likely to have Post-Traumatic Stress Disorder in contrast to the general public (Back et al., 2014).

Opioids are one of the most common drugs prescribed by primary care to treat chronic pain (Back et al., 2014). Often times, patients prescribed opioids are also prescribed other psychoactive drugs to treat mental disorders. The interaction with the opioid increases the probability of an overdose. Overdoses also increase with the increase in dosage due to patients becoming tolerant to original dosage (Pouget et al., 2017). Many veterans after returning from Iraq and Afghanistan were prescribed opioids at very high rate with little guidance about the risks of the drug (Pouget et al., 2017). Lack of guidance with opioids, rises the chance of opioid misuse.

Due to the problem of opioids increasing greatly among civilians and the military population, guidelines have been put in place to reduce the probability of misuse. Some of the guidelines are an opioid pain care agreement and urine drug tests. However, these guidelines have not stopped the growing rate of opioid misuse. Often times, it appears that the clinicians do not follow the guidelines as only thirty-one percent of patient had to undergo a urine drug test while on opioid therapy (Sekhon et al., 2013).

There are certain risk factors that are believed to increase the probability of misusing opioid prescriptions. Those risk factors are prior history of substance abuse, alcohol use, mental disorders, and demographics. The demographic factors that increases the likelihood of misusing opioids are younger age and male gender (Sekhon et al., 2013). However, these risk factors are

not always consistent. Therefore, it is difficult to determine predictor variables of opioid prescription misuse.

Military personnel are a target population for this problem because they have very high rates of opioid prescription misuse and high rate of opioid overdose. Evidence shows that formerly deployed military personnel often try to self-medicate for mental disorders, such as anxiety, depression, and posttraumatic stress disorder (Pouget et al., 2017). With self-medicating, it increases the possibility of overdose due to not knowing how much medication to take and knowing the correct medication to take.

Large number of veterans are returning from war with physical and mental injuries that would have been fatal in prior wars due to the improved battlefield medicine (Seal et al., 2012). Many of these injuries is what results in veterans misusing opioids which in return can cause overdoses. The purpose behind this study is to examine military personnel who misuse opioids and determine the risk factors associated with the misuse. With identifying the risk factors of opioid misuse, it will help reduce the misuse of opioids because patients with high risk factors should not be prescribed opioids. Even though, some military personnel do try to self-medicate, especially when mental disorders are involved due to the stigma behind these disorders. However, most misuse the opioids that were prescribed by their primary care doctor.

There has been little research done behind the associations of opioid misuse and risk factors. One reason there has been little research is due to the confidentiality of the military data and many military personnel do not want to admit to having a mental disorder because they are scared it might ruin their military career. The research that has been done on the military personnel and opioids is not conclusive. Most of the studies have shown there is a small relationship between opioids and a certain risk factor; however, there is not enough complete data to prove the results or there are some cases where a certain factor is a risk factor for opioids then there are other cases where the same factor is not a risk factor. The goal of this study is to develop a strong relationship between opioid misuse and risk factors.

This study will use data from two different data scores. The Opioid Registry provided by Christopher Armijo, an Informatics Officer in the United States Military, and the Behavior Risk Factor Surveillance System, BRFSS, 2011. The Opioid Registry is produced from the Carepoint Military Health System Population Health Portal. This data contains basic demographic information, urine drug test results, and opioid prescription information about military personnel.

The BRFSS 2011 data contains information about healthy behaviors, chronic conditions, and preventive service. This data will be used in this study to examine the risky health behaviors and additional demographic information not available in the opioid registry to identify risk factors associated with military personnel and opioid misuse. The study will look at all the possible risk factors that may be associated with opioid misuse. Those risk factors are demographic information, post-traumatic stress disorder, substance use disorder, sleep apnea, depression, suicide attempt, serious mental illness, type of opioid prescription, military branch, and behavior information.

With the growth of opioid misuse being more prevalent in the military population, more research needs to be done to determine how to stop this growth. Through determining risk factors of opioid misuse, it should reduce high risk patients receiving prescription to opioids. This may also result in examining the strengths and lengths of opioids prescribed as well as looking at alternative treatment methods for military personnel. Especially, when a person is on opioids, it can affect their abilities to operate machines. This can be very dangerous especially since the duties of the military require them to operate very dangerous machinery.

Literature Review:

The United States is facing a public health concern of the rapid growth of the misuse of prescription opioids. Opioids are a group of drugs that relieve pan. These can be prescription or from the “streets”. Some of the more common opioids are heroin, hydrocodone, oxycodone, and morphine (Ahrnsbrak et al., 2016). Opioid misuse can vary from taking the drug more frequent than prescribed to taking an opioid prescription prescribed to someone else. It is believed that the most frequent misuse of opioids is taking opioids prescribed to a relative. Also, prescribed opioids can interact with other prescribed drugs which increases the possibility of overdose risk (Pouget et al., 2017). The results of opioid misuse are emergency department visits, poisoning deaths, addiction treatment, and suicide (Potter et al., 2014). The risk of opioid misuse increases with the length of the opioid therapy. Most patient prescribed an opioid for short-term acute pain do not abuse opioids; however, there has been increasing numbers in long-term opioid therapy.

This is a problem for not just the military, but also the civilian population. However, the problem is growing much faster among the military population. Many believe that the problem is growing more rapid for this population due to the increase number of prescriptions for chronic pain associated with injuries from war (Committee on Prevention, 2013). Opioid prescriptions are important tool in medicine; however, due to the great increase in prescriptions, it is believed that more training is needed for clinicians providing these prescriptions to reduce the misuse of opioids. Since opioids are more available now than before, it means that there is an increase chance of abuse (Committee on Prevention, 2013). Even though, researchers know that there is a problem with misuse of opioids little is known about what is causing the growth.

It is believed that the opioid epidemic originated in rural Appalachia. This area had a large amount of poverty, chronic pain, and depression, which resulted in this community turning to drugs for relieve (Clarke et al., 2016). “It is estimated that 2.1 million Americans suffered from disorders related to opioid pain relivers in 2012…” (Clarke et al., 2016, p. S-2). Even though the media makes it seem that heroin and cocaine are the problem, the reality is opioid analgesic poisoning are causing more deaths. The reason opioids became the drug of choice for most clinicians treating patients with pain is due to this drugs ability to a potent analgesic and ability to be titrated within a wide range (Clarke et al., 2016). This public health concern is an epidemic that needs policies to be put in place to reduce the adverse effects that are happening.

The National Survey on Drug Use and Health defines substance use disorders as "…clinically significant impairment caused by the recurrent use of alcohol or other drugs…" (Ahrnsbrak et al., 2016, para. 99). These disorders can result in people not meeting their responsibilities personally and professionally. When a person has a history of substance use disorders, they are more likely to abuse a substance again if prescribed a drug with possible addiction, such as an opioid. The prevalence of substance use disorder among veterans aged eighteen to fifty-three is five times the prevalence among the civilian population (Back et al., 2014). Studies shows that there is a relationship between post-traumatic stress disorder and increased substance use (Back et al., 2014).

To date, there has been more studies about the opioid epidemic in the civilian population compared to this epidemic in the military population. This is primarily because a person in the military that is identified as having a substance use problem, it results in them having to leave the military. The people that have a problem in the military try to keep it quiet because if not they will have to leave. Another reason behind limited studies on this population is due to the confidentiality of military data, especially military health data.

Just because much of the data about military personnel in relation to opioid misuse is kept confidentially that does not mean that this population is not effected by the opioid epidemic. This population's opioid problem is growing faster than the general public. A survey results showed that active military personnel tripled misuse of opioids from the year 2005 to the year 2008 (Potter et al., 2014). Within the military population, Army personnel were more likely than Navy, Air Force, or Marine Corps to misuse opioids. More than one in five active service members reported opioid misuse in the past year. Since this survey was self-reported, it is likely that these results are underestimating the misuse population (Potter et al., 2014). Therefore, the misuse of opioids is most likely much higher than what was reported in the survey.

The most common reason behind being prescribed opioids is due to pain. Pain causes the most short-term and long-term disability among military personnel. More than twenty-five percent of military personnel suffered from at least one form of pain injury during basic training (Potter et al., 2014). These pain injuries can last long after their time in the military. Little is known about the initiation and the determined length of opioid prescriptions. The studies that have been done on this information is mainly about the civilian population. However, the study

shows that the initiation and length is determined by comorbid psychiatric disorders, drug abuse, and nicotine use (Dobscha et al., 2014).

With the war in Afghanistan and Iraq, the number of opioid prescriptions prescribed has increased greatly. In 2009, 3.8 million opioid prescriptions were prescribed by military clinicians which is four times higher than in 2001(Potter et al., 2014). Two of the most frequent prescribed opioids also have high potential for abuse. Those two prescriptions are oxycodone and hydrocodone (Potter et al., 2014). Also, the place of deployment can affect the possibility of being diagnosed with a mental health disorder. A study on mental health problems among military personnel show that 19.1% of military personnel returning from Iraq, 11.3% of military personnel returning from Afghanistan, and 8.5% of military personnel returning from other locations reported having a mental health disorder (Hoge et al., 2006). Often, mental health problems are treated by opioids; therefore, the location of deployment can affect opioid use.

Studies have shown relationships between different possible risk factors associated with military personnel misusing opioids. A study on mental health disorders and opioid use in veterans shows that there is evidence of veterans with a mental disorder, such as alcohol use disorder, depression, or drug use disorder, to receive an opioid prescription. However, there is also evidence that patients with prior substance abuse are more likely to misuse opioids (Seal et al., 2012). It is also believed the number of deployment and injuries can increase the possibility of opioid abuse. Due to the current emphasis on post-traumatic stress disorder, it has resulted in many substance abuse disorders going undetected (Committee on Prevention, 2013).

There are current programs in place to attempt to reduce opioid abuse among the military personnel. One of the programs is called the Sole Provider Program. This program identifies individuals who are high risk of opioid misuse. Once a person is part of this program they are monitored for potential risky behaviors, such as unscheduled medication request (Potter et al., 2014). However, there are limited resources available to identify potential high-risk individuals. Another program is the Controlled Drug Management Analysis and Reporting Tool. This program provides pharmacy dispensing reports that contain information about the prescriptions, providers, and quantities. The limitation of this tool is that they are only available if requested (Potter et al., 2014). Often, when patients are prescribed an opioid they have to sign an opioid pain care agreement which can be considered a consent form. Also, patients may undergo

random urine drug screenings to check for any illicit drugs (Sekhon et al., 2013). Evidence shows that often clinicians do not keep up with the urine drug screens as suggested. Due to the limitations and lack of commitment of the few programs available for military personnel, the opioid epidemic continues to grow at a rapid rate.

Our study will add to the literature more evidence of the risk factors associated with opioid misuse among military personnel. Much of the studies that have been done to date were not able to produce clear results. The objective of this study is to identify clear risk factors that will show who within the military population are more likely to misuse opioids. This study will also add the use of two different data sources which has not been examined together. Overall, the studies that have been done has looked at either a survey conducted by the military or health data produced by the military. However, our study will look at data provided by the military as well as data provided by a national survey which will provide new ideas into the topic of risk factors associated with military personnel opioid misuse.

Objective and Research Questions:

Objective:

The main objective of this study is to determine risk factors associated with opioid misuse among the military population. The risk factors that will be examined are demographics, opioid prescription type, military branch, behavioral health, and mental health.

Research Questions:

- What are the risk factors associated with opioid misuse?
- What mental health disorders affect opioid misuse?
- Does the branch and level of military affect opioid misuse?
- What demographic factors affect opioid misuse?
- What behavior factors affect opioid misuse?
- Does history of substance use disorder affect opioid misuse?

Methods:

For this study, there are two different types of data sources that are used. One source is the Opioid Registry. The other source is the Behavioral Risk Factor Surveillance System, BRFSS, 2011 (CDC, 2011). The Opioid Registry is a data sources that comes from Christopher Armijo, an Informatics Administrative Officer in the United States military. This data is produced from Carepoint Military Health System Population Health Portal for the current year. It contains demographic information, opioid prescriptions information, and health conditions. The Behavioral Risk Factor Surveillance System is a national telephone survey conducted each year; however, the information that will be used for this study is from the year 2011. This data will provide the study with additional information about risk factors that are not part of the Opioid Registry, such as additional demographic factors and behavioral factors.

There will be two different samples. The first sample is from the individuals in the Opioid Registry. All the individuals in this data source are currently in the military or retired from the military or a family member of a person in the military. The Opioid Registry contains 21,610 people. The demographic information available about these patients vary. The youngest patient is not even a year old and the oldest patient is 105 years old. There are more Army service members compared to Navy and Airforce. There are more females in the sample compared to males. The other sample that will be used is from the Behavioral Risk Factor Surveillance System for the year 2011. From this data, the sample that will be used is all former and current military personnel. The BRFSS sample will provide additional risk factor data that is not available through the Opioid Registry. For this data sample, all personnel are over the age of 18.

To receive the Opioid Registry, a relationship with Christopher Armijo was formed. Professor Mark Bonica, a fellow health management and policy professor, was a former teacher of Christopher Armijo. When Professor Bonica heard about my project, he believed that Chris would be the person to help us get military data. After explaining what was trying to be accomplish with this study to Chris, he provided the Opioid Registry which contain much of the information that was needed to determine risk factors of opioid misuse.

The dependent variable for this study is opioid misuse among military personnel. There are many independent variables that are going to tested against the independent variable. The independent variables that will be tested are branch of service, age, gender, sleep apnea, post-

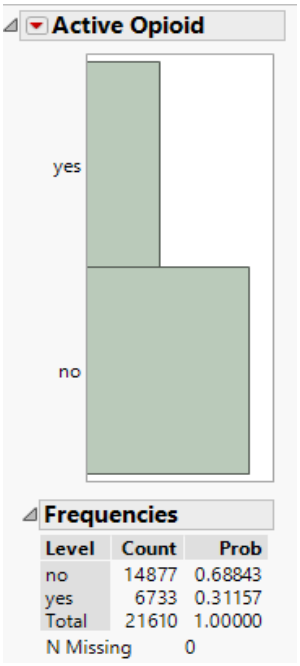
traumatic stress disorder, depression, Benzo, substance use disorder, suicide attempt, serious mental illness, income, type of opioid, and behavior factors, such as smoking and alcohol use. These independent variables will be tested in the Opioid Registry in addition to BRFSS sample. However, some of the risk factors, such as income is only available in the BRFSS data. The objective is to see a relationship with some of these independent variables with the dependent variable of opioid misuse. The only questionnaire that will be used is the Behavioral Risk Factor Surveillance System 2011.

All the analytics for this study will be accomplished in JMP Pro 13. For the most part, all the analytics will be quantitative. The only qualitative data will be classifying the opioid prescriptions within the opioid registry. The statistical tests that will be done are frequencies, odd ratios, and chi-square models. Through all these statistical tests, we will find risk factors of opioid misuse among military personnel.

Results:

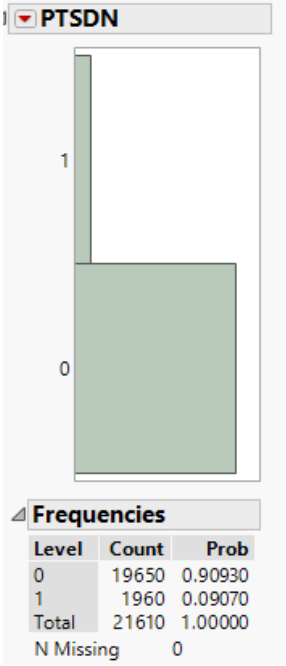
Preliminary Results/ Statistical Output:

To date, there is not must statistical output due to receiving the data late. However, some of the results from the opioid registry data is below.



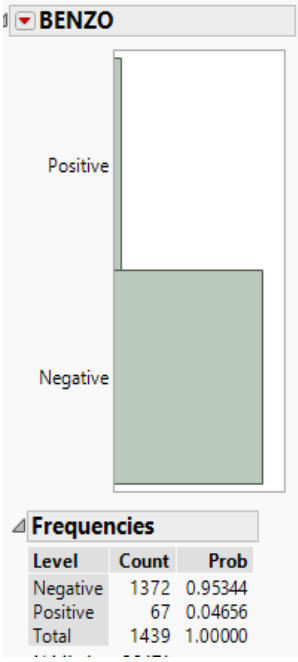
Frequencies

Level	Count	Prob
no	14877	0.68843
yes	6733	0.31157
Total	21610	1.00000
N Missing	0	



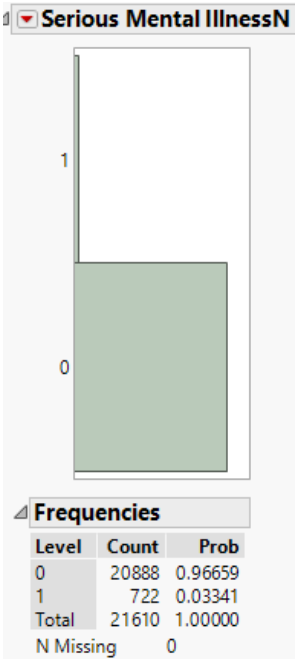
Frequencies

Level	Count	Prob
0	19650	0.90930
1	1960	0.09070
Total	21610	1.00000
N Missing	0	



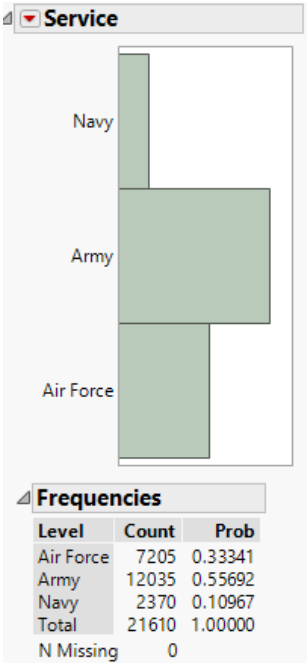
Frequencies

Level	Count	Prob
Negative	1372	0.95344
Positive	67	0.04656
Total	1439	1.00000



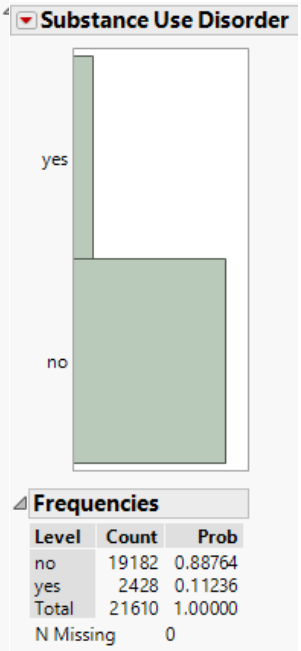
Frequencies

Level	Count	Prob
0	20888	0.96659
1	722	0.03341
Total	21610	1.00000
N Missing	0	



Frequencies

Level	Count	Prob
Air Force	7205	0.33341
Army	12035	0.55692
Navy	2370	0.10967
Total	21610	1.00000
N Missing	0	



Frequencies

Level	Count	Prob
no	19182	0.88764
yes	2428	0.11236
Total	21610	1.00000
N Missing	0	

Contingency Table

BENZO	Count / Total % / Col % / Row %	Active OpioidN 0	Active OpioidN 1	Total
Negative		811	561	1372
		56.36	38.99	95.34
		95.98	94.44	
		59.11	40.89	
Positive		34	33	67
		2.36	2.29	4.66
		4.02	5.56	
		50.75	49.25	
Total		845	594	1439
		58.72	41.28	

Tests

N	DF	-LogLike	RSquare (U)
1439	1	0.90925318	0.0009

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	1.819	0.1775
Pearson	1.844	0.1745

Since the p-value is greater than 0.05, one can conclude that there is not a significant relationship between being an active opioid user and the Benzo test results

Contingency Table

PTSDN	Count / Total % / Col % / Row %	Active OpioidN 0	Active OpioidN 1	Total
0		13763	5887	19650
		63.69	27.24	90.93
		92.51	87.44	
		70.04	29.96	
1		1114	846	1960
		5.16	3.91	9.07
		7.49	12.56	
		56.84	43.16	
Total		14877	6733	21610
		68.84	31.16	

Tests

N	DF	-LogLike	RSquare (U)
21610	1	68.879313	0.0051

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	137.759	<.0001*
Pearson	144.864	<.0001*

Since the p-value is less than 0.0001, one can conclude that there is a significant relationship between being an active opioid user and having PTSD. If you have PTSD, you are more likely to be an active opioid user (12.6%) than not (7.5%).

Contingency Table

Active OpioidN

Serious Mental IllnessN	Count / Total % / Col % / Row %	0	1	Total
0		14480	6408	20888
		67.01	29.65	96.66
		97.33	95.17	
		69.32	30.68	
1		397	325	722
		1.84	1.50	3.34
		2.67	4.83	
		54.99	45.01	
Total		14877	6733	21610
		68.84	31.16	

Tests

N	DF	-LogLike	RSquare (U)
21610	1	31.473831	0.0023

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	62.948	<.0001*
Pearson	66.868	<.0001*

Since the p-value is less than 0.0001, one can conclude that there is a significant relationship between being active opioid user and having a serious mental illness. If you have a serious mental illness you are more likely to be an active opioid user (4.8%) than not (2.7%).

Contingency Table

Active OpioidN

Service	Count / Total % / Col % / Row %	0	1	Total
Air Force		4966	2239	7205
		22.98	10.36	33.34
		33.38	33.25	
		68.92	31.08	
Army		8285	3750	12035
		38.34	17.35	55.69
		55.69	55.70	
		68.84	31.16	
Navy		1626	744	2370
		7.52	3.44	10.97
		10.93	11.05	
		68.61	31.39	
Total		14877	6733	21610
		68.84	31.16	

Tests

N	DF	-LogLike	RSquare (U)
21610	2	0.04170791	0.0000

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	0.083	0.9591
Pearson	0.083	0.9591

Since the p-value is greater than 0.05, one can conclude that there is not a significant relationship between being an active opioid user and military service.

Contingency Table

Substance Use Disorder	Count / Total % / Col % / Row %	Active OpioidN 0	1	Total
no	Count	13680	5502	19182
	Total %	63.30	25.46	88.76
	Col %	91.95	81.72	
	Row %	71.32	28.68	
yes	Count	1197	1231	2428
	Total %	5.54	5.70	11.24
	Col %	8.05	18.28	
	Row %	49.30	50.70	
Total	Count	14877	6733	21610
	Total %	68.84	31.16	

Tests

N	DF	-LogLike	RSquare (U)
21610	1	227.45847	0.0170

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	454.917	<.0001*
Pearson	487.069	<.0001*

Since the p-value is less than 0.001, one can conclude that there is a significant relationship between being an active opioid user and substance user disorder. If one has a substance use disorder, they are more likely to be an active opioid user (18.3%) than not (8%).

- For this research, hospice, palliative, and cancer treatment patients as well as all nonmilitary personnel were removed from the data set. The final analytic sample was N=10,422.

Statistical Models:

- An opioid misuse variable was developed which represented patients using opioids for over 30 days. Multivariate logistic regression models were utilized to estimate associations between opioid misuse and patient-level risk factors.

Results and Final URC Presentation (2018)

Summary of Key Results:

- Depression, PTSD, and serious mental illness increased the risk of opioid misuse among both genders (Figure 1).
- Depression causes the highest risk of opioid misuse among females (Figure 2).
- Serious mental illness and PTSD cause the highest risk of opioid misuse among males (Figure 3).
- The majority of patients are on opioids for 1-14 days.
- The majority of the population is male, as most of the patients are retired from the military.

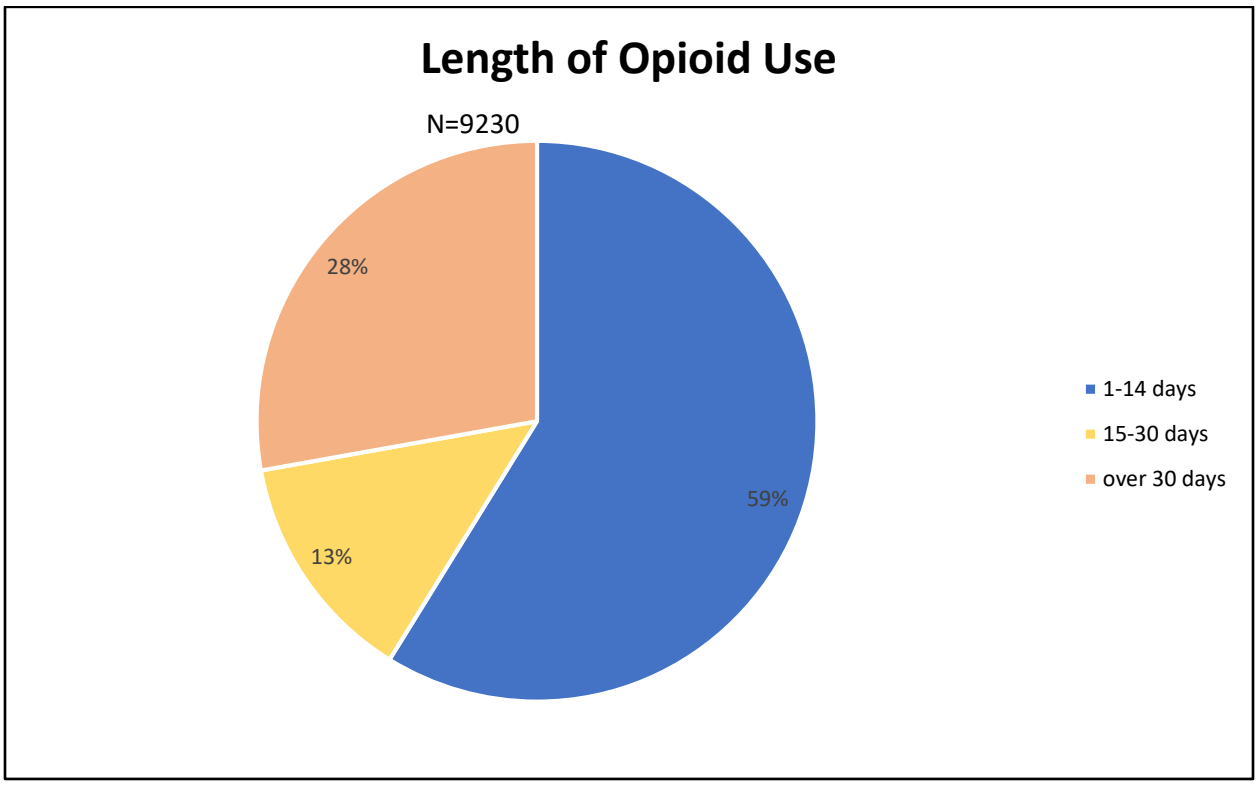
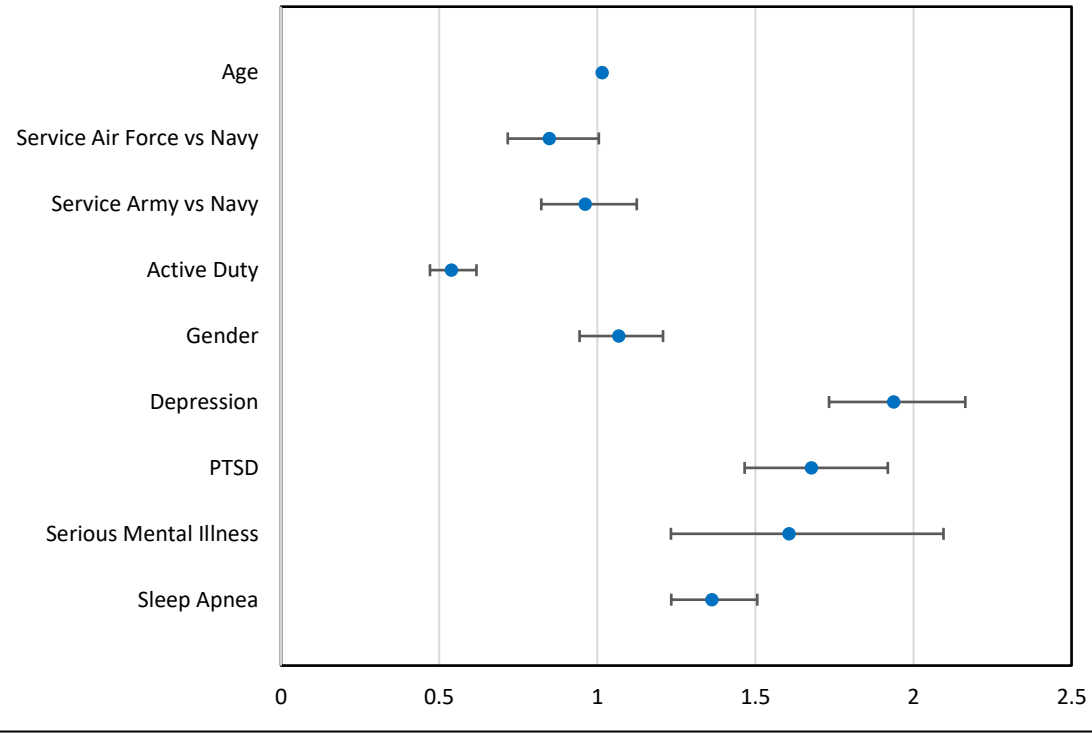


Figure 1: Odds Ratio for all Genders



Risk Factors Associated with Opioid Misuse Among Military Personnel

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Background

Opioid overdoses are increasing among military personnel. Opioids are a class of drugs that include heroin, synthetic opioids, and pain relievers.[1] Almost half of all Veterans returning from deployment in Afghanistan and Iraq have chronic pain; one in six veterans turn to opioids for pain relief.[2]

- Veterans between the ages of eighteen and fifty-three are five times as likely to have a Substance Use Disorder and two times as likely to have Post-Traumatic Stress Disorder in contrast to the general public.[3]
- Risk factors that have been shown to increase the probability of misusing opioids in the literature include prior history of substance abuse, alcohol use, mental illness, age, and male gender.[4] However, these risk factors are not always consistent.

Learning Objectives

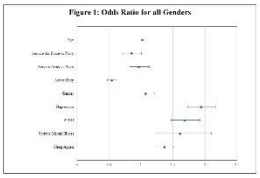
- Derive a variable to indicate opioid misuse from a military database.
- Determine the risk factors associated with opioid misuse among military personnel.
- Compare the odds of opioid misuse by gender, branch, duty status, age, depression, PTSD, serious mental illness, and sleep apnea.

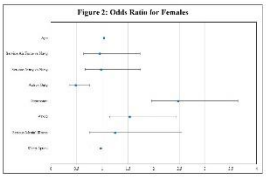
Data Source and Methods

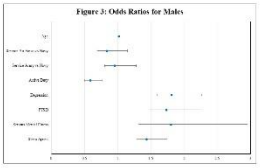
- We obtained data from the Opioid Registry for the military. The opioid registry contains information about opioid data management and reporting platform developed through Carepoint Military Health System Population Health Portal.
- For this research, hospice, palliative, and cancer treatment patients as well as all nonmilitary personnel were removed from the data set. The final analytic sample was N=10,422.
- An opioid misuse variable was developed which represented patients using opioids for over 30 days. Multivariate logistic regression models were utilized to estimate associations between opioid misuse and patient-level risk factors.

Results

- Depression, PTSD, and serious mental illness increased the risk of opioid misuse among both genders **(Figure 1)**.
- Depression causes the highest risk of opioid misuse among females **(Figure 2).**
- Serious mental illness and PTSD cause the highest risk of opioid misuse among males **(Figure 3)**.
- The majority of patients are on opioids for 1-14 days **(Figure 4)**.
- The majority of the population is male, as most of the patients are retired from the military **(Table 1).**







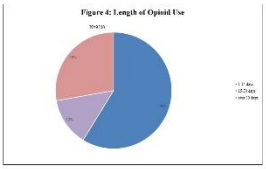


Table 1: Demographics

	Total	Percent
Males	7,998	76.74%
Females	2,424	23.26%
Mean Age	50.03	
Active Duty	3,795	36.41%
Retired	6,627	63.59%
Army	6,169	59.19%
Air Force	3,168	30.40%
Navy	1,085	10.41%
Sleep Apnea	3,598	34.52%
PTSD	1,530	14.68%
Depression	2,697	25.88%
Serious Mental Illness	253	2.43%
Active Opioid User	9,230	88.56%

Conclusions

- Air Force service (compared to Army) and Active Duty decreased the risk of opioid misuse
- Depression, PTSD, and serious mental illness have the highest risk of opioid misuse for both genders, as well in gender-stratified models.
- Age slightly increases the risk of opioid misuse.
- Sleep apnea increases the risk of opioid misuse, particularly for males.

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The LOGISTIC Procedure

Model Information

Data Set	C.BRITTANY_NEW_0307B
Response Variable	Op_30
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	10422
Number of Observations Used	10422

Response Profile

Ordered Value	Op_30	Total Frequency
1	1	2567
2	0	7855

Probability modeled is Op_30=1.

Class Level Information

Class	Value	Design Variables	
Service	**Air Force**	1	0
	Army	0	1
	Navy	-1	-1

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	11637.960	11026.928
SC	11645.211	11077.689
-2 Log L	11635.960	11012.928

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	623.0320	6	<.0001
Score	615.0477	6	<.0001
Wald	574.3013	6	<.0001

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Age	1	266.9886	<.0001
GenderN	1	0.3671	0.5446
Service	2	4.7800	0.0916
PTSDn	1	194.6303	<.0001
sleep_apneaN	1	82.5071	<.0001

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-2.8056	0.0968	840.0976	<.0001
Age		1	0.0273	0.00167	266.9886	<.0001
GenderN		1	-0.0369	0.0610	0.3671	0.5446
Service	**Air Force**	1	-0.0866	0.0396	4.7797	0.0288
Service	**Army**	1	0.00358	0.0350	0.0105	0.9185
PTSDn		1	0.8796	0.0630	194.6303	<.0001
sleep_apneaN		1	0.4499	0.0495	82.5071	<.0001

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Age	1.028	1.024	1.031
GenderN	0.964	0.855	1.086
Service Air Force vs Navy	0.844	0.715	0.997
Service Army vs Navy	0.924	0.792	1.077
PTSDn	2.410	2.130	2.727
sleep_apneaN	1.568	1.423	1.728

Association of Predicted Probabilities and Observed Responses

Percent Concordant	66.0	**Somers' D**	0.323
Percent Discordant	33.8	**Gamma**	0.323
Percent Tied	0.2	**Tau-a**	0.120
Pairs	20163785	**c**	0.661

controlling for suicide attempt

The LOGISTIC Procedure

Model Information

Data Set	C.BRITTANY_NEW_0307B
Response Variable	Op_30
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	10422
Number of Observations Used	10422

Response Profile

Ordered Value	Op_30	Total Frequency
1	1	2567
2	0	7855

Probability modeled is Op_30=1.

Class Level Information

Class	Value	Design Variables	
Service	**Air Force**	1	0
	Army	0	1
	Navy	-1	-1

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	11637.960	11028.053
SC	11645.211	11086.066
-2 Log L	11635.960	11012.053

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	623.9071	7	<.0001

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Score	616.0616	7	<.0001
Wald	575.0323	7	<.0001

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
Age	1	266.9853	<.0001
GenderN	1	0.3510	0.5536
Service	2	4.7152	0.0946
PTSDn	1	192.8636	<.0001
sleep_apneaN	1	82.4122	<.0001
Suicide_AttemptN	1	0.8931	0.3446

Analysis of Maximum Likelihood Estimates

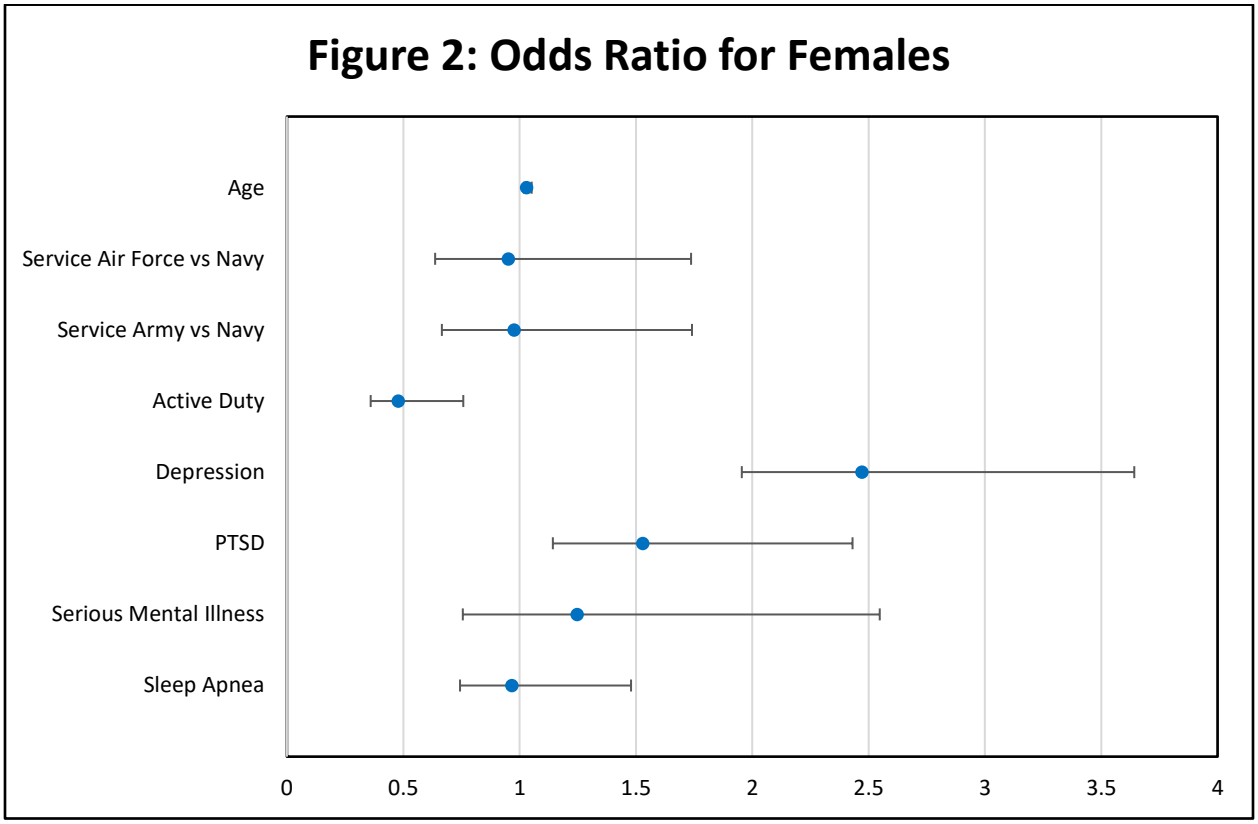
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-2.8068	0.0968	840.5280	<.0001
Age		1	0.0273	0.00167	266.9853	<.0001
GenderN		1	-0.0361	0.0610	0.3510	0.5536
Service	**Air Force**	1	-0.0861	0.0396	4.7151	0.0299
Service	**Army**	1	0.00389	0.0350	0.0124	0.9114
PTSDn		1	0.8767	0.0631	192.8636	<.0001
sleep_apneaN		1	0.4497	0.0495	82.4122	<.0001
Suicide_AttemptN		1	0.5468	0.5786	0.8931	0.3446

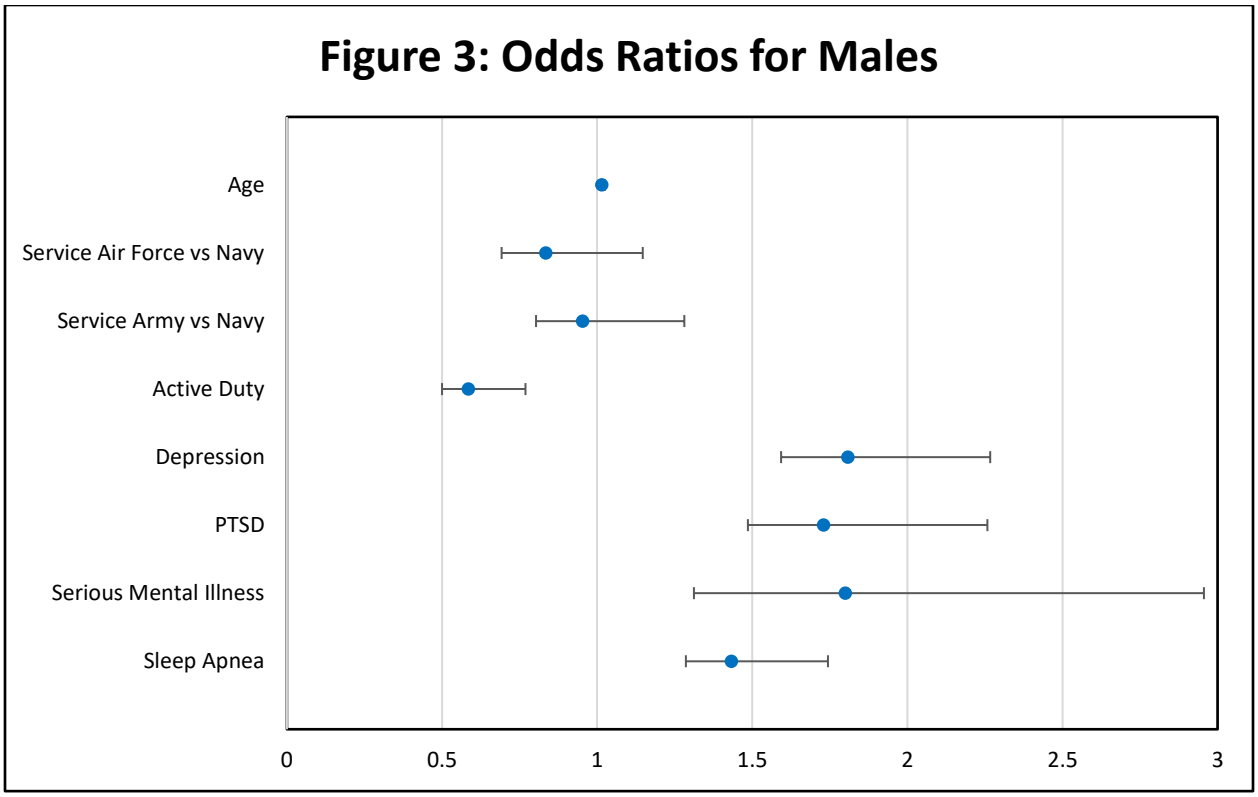
Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Age	1.028	1.024	1.031
GenderN	0.965	0.856	1.087
Service Air Force vs Navy	0.845	0.716	0.998
Service Army vs Navy	0.925	0.793	1.079
PTSDn	2.403	2.123	2.719
sleep_apneaN	1.568	1.423	1.728
Suicide_AttemptN	1.728	0.556	5.370

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	66.0	**Somers' D**	0.323
Percent Discordant	33.8	**Gamma**	0.323
Percent Tied	0.2	**Tau-a**	0.120
Pairs	20163785	**c**	0.661

Gender-Stratified Model Results:





Conclusions:

- Air Force service (compared to Army) and Active Duty decreased the risk of opioid misuse
- Depression, PTSD, and serious mental illness have the highest risk of opioid misuse for both genders, as well in gender-stratified models.
- Age slightly increases the risk of opioid misuse.
- Sleep apnea increases the risk of opioid misuse, particularly for males.

Implications of Research:

Certain risk factors have been identified which could inform guidelines regarding opioids. This is important because physicians will be able to use this information when deciding to prescribe a patient opioids or consider alternative/complementary treatments. This is also important for patients and family members because when a patient knows that they have risk factors for opioid misuse, they can proactively seek support to facilitate safe use of the medication.

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