The Opioid Epidemic: Challenge to Military Medicine and National Security

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ABSTRACT

Introduction

We examine the current status of the military relevance of opioids, their use and misuse in military and veteran populations, the national security consequences of opioid use in our military age population, public health implications, and military, veteran, and government solutions for opioid addiction.

Materials and Methods

A literature search of recent published research, federal government, and related open source materials was conducted using PubMed, Google, and Google Scholar, and all materials retrieved were manually identified, screened, and evaluated for inclusion. A modified Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach was used for the selection of relevant articles. Heath policy literature and relevant demographic information published within the last 5 years was also included to provide current information and search for solutions to address the escalating national opioid crisis.

Results

Synthetic opioids are used for pain and trauma management, not readily substituted, and have exceptionally high addiction potential. Combat wounded veterans have greater potential for opioid misuse than civilian populations. Assessment, management, and treatment of opioid use in this population are essential. Veterans receiving synthetic opioids have been noted to have multiple overdose risk factors. Opioids are readily available nationally as "street drugs" and also in the form of fentanyl-contaminated heroin. The opioid crisis affects the military age population and the top states for military enlistments. Younger age males with lower education and income are at significant risk for opioid use disorder. Recently increased drug overdose deaths contribute to an increased U.S. mortality rate with a commensurate decline in life expectancy at birth. Opioid abuse contributes to increased incidence of infectious disease. Behavioral health programs directed at military and veterans to identify risk factors for opioid misuse have been introduced. Prescription drug monitoring initiatives continue for these populations with increased information exchanged between military and civilian healthcare. Lifesaving interventions for opioid addiction include methadone maintenance and fentanyl test strip accessibility. Newly implemented federal funding healthcare initiatives to the states are now directed at opioid use prevention and enhanced surveillance.

Conclusions

Given increasing rates of opioid addiction and death, viable solutions are universally needed. Successful intervention measures should be widely shared between military, veteran, and civilian healthcare and public health communities. Increased collaboration between these groups could inculcate successful programs to prevent and decrease opioid use. Results received from recent military and veterans' programs for prescription and electronic medical record (EMR) monitoring and data sharing may also prove useful for civilian healthcare providers and hospital systems. Future evaluations from ongoing federally funded programs to the states for addiction surveillance and intervention may help create measures to address the proliferation of opioid addiction with increased death rates. Anticipated results from these federal efforts should help inform opioid programs in military and veterans' health systems.

INTRODUCTION

The opioid epidemic increasingly affects the capacities of military medicine and preparedness,[1] veteran's health,[2] and national security,[3] along with public health, law enforcement, healthcare, and social welfare.[4] The economic and social costs of the national opioid crisis were estimated at $504 billion for 2015.[5] About 11.8 million U.S. citizens have misused opioids, with 948,000 heroin users, and 228,000 Fentanyl users.[6] Viable solutions are urgently needed to stem further addictions and subsequently strengthen national security.

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The views expressed in this article are those of the authors and do not reflect the official policy or position of the Defense Threat Reduction Agency, Department of Defense, or the U.S. Government.

doi:10.1093/milmed/usz487

METHODS

A literature search of published research, federal government, and related open source materials was conducted using PubMed, Google, and Google Scholar. A modified Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was used to identify relevant articles. Search terms included "fentanyl," "opioid," "military," "veteran," "army," "navy," "air force," "last 5 years," "humans," and "English." An internet search of related national security issues, public health implications, and state and federal intervention programs was also conducted. All materials retrieved were manually identified, screened, and evaluated for inclusion. Literature within the recent 5 years was preferentially used to determine current status of the opioid crisis. Beginning with 751 articles, and subsequent screening to omit duplicates and evaluate titles, abstract, and entire articles, 241 were identified for possible inclusion. All were manually screened and evaluated for inclusion. Of these, 40 articles were included in the final analysis. Inclusion criteria included peer-review, focus on defining the problem and/or providing viable solutions for military, veteran and civilian fentanyl and opioid addictions, with prioritization for publication within the last 5 years. Other recent relevant health policy and demographic literature was included as necessary.

RESULTS

Military Relevance of Opioids

Battlefield Pain Management

Synthetic opioids are used for pain management in military medicine. Fentanyl is used for prehospital pain control and has replaced morphine use.[7] Oral transmucosal fentanyl citrate (OTFC) delivers rapid noninvasive pain management through safe effective analgesia in the battlefield setting.[8] Nevertheless, OTFC use for the treatment of acute pain in combat casualty care is an off-label indication.[7] Dsuvia (sufentanyl),[9] a new battlefield analgesic, is a fentanyl analog and 5–10 times more potent than fentanyl.[10] New opioids with fewer side effects are currently under investigation.[11] Nonopioid drug substitutes under exploration as battlefield analgesics include ketamine[12] and tetrodotoxin.[13]

Opioid Dependency in Military Population

Synthetic opioids also have great potential for misuse. Fentanyl is highly addictive and is 50–100 times more potent than morphine.[14] Unsurprisingly, the greatest predictors of opioid receipt in the military are acute pain or physical trauma.[15] A 2011 confidential survey collected from 2,567 soldiers deployed to Afghanistan or Iraq found that ~44% of soldiers with opioid use reported no or mild past-month pain, including ~6% without pain.[16] This is concerning as opioids have high abuse and overdose potential and are optimally prescribed for moderate to severe pain. These findings instigated a call for the transformation of pain management in the military.[17] Younger soldiers may be at greatest risk for opioid misuse.[18] Military prescription practices for opioids should use best practice standards of care and clinical practice guidelines, with nonopioid alternatives used as appropriate.[16] Risk factor awareness by prescribers is key; one example is the severity of overdoses caused by benzodiazepines combined with other substances.[19] Since 2011, opioid prescription use has significantly decreased in both military and civilian populations.[20] Much has been recently accomplished. One study conducted in 2010 demonstrated that nearly one-third of active duty service members received at least one prescription for opioids,[21] while current estimates are that less than 1% of active duty military personnel abuse or are addicted to opioids.[1]

Opioid Use and Dependency in Veterans

One study demonstrated that nearly all veterans receiving synthetic opioids for pain management or opioid use disorder (OUD) had multiple overdose risk factors.[22] Combat wounded veterans have demonstrated high rates of prescription opioid misuse (46.2%) and sedative misuse (21.7%), nearly an order of magnitude higher than for civilian populations.[2] Benzodiazepine receipt among veterans prescribed opioid analgesics was associated with an increased risk of death from drug overdose in a dose-response manner.[23] Substance abuse history is strongly associated with opioid-linked death. Nonmedical use of prescription opioids is associated with heroin initiation among veterans receiving medical care in the Veterans Health Administration (VHA). Even receipt of a short-term opioid prescription was associated with increased risk of heroin initiation.[24] Prior receipt of high-dose opioid was associated with past year heroin use among veterans.[25] While opioid prescriptions declined among veterans receiving VHA care who died between 2010 and 2016, their synthetic opioid and heroin overdose rates increased substantially.[26]

National Security Implications of the Opioid Crisis

Illegal Drug Importation

Illicit manufacture and trafficking of carfentanil has been recognized as a worldwide health problem by the World Health Organization.[27] The primary source of illegally imported fentanyl and fentanyl analogues (primarily carfentanil) is international mail from China and smuggling from Mexico.[3] Synthetic opioid importation and marketing is a lucrative enterprise for transnational criminal organizations. One kilogram of fentanyl purchased in China for $3,000–$5,000 can realize $1.5 million on the illicit market.[28] The result of this criminal enterprise is that synthetic opioids and fentanyl-contaminated heroin (FCH) are available nationwide as "street drugs."[29]

Opioid Use in Military Age Population

The national security implications of the opioid crisis are severe, will likely impact all aspects of U.S. government

security and continue to worsen. Individuals with drug use history and crimes cannot attain a security clearance or enlist in the military services. About 2.5 million of those ages 18–25 (7.3% of the total age group) are current illicit drug users.[30] Illicit opioid users are significantly younger than pharmaceutical opioid users.[31] From 2014 to 2017, the age-adjusted rate of drug overdose deaths has increased by 16% annually with rates significantly higher for males than females. Over 60% of illicit opioid fatalities occur under age 44.[29] Among ages 15 and older, the highest rates of drug overdose deaths in 2017 were for those ages 15–24 and 35–54.[32] Notably, similar concerns existed in 1918, with urban youths using heroin. It was discovered during military conscription at that time that large numbers of young men were medically unqualified for military service due to drug abuse.[33]

From 2006 to 2017, the top 10 states for fentanyl abuse (microgram per person) were (in order): OR, UT, NY, TN, SC, ID, VA, AR, MI, and GA.[34] The top 10 states for military enlistment rates in 2018 were (in order): GA, FL, SC, VA, NV, AZ, CO, HI, AK, and AL.[35] States appearing on both lists include GA, SC, and VA, indicating the potential for fentanyl abuse to impact military recruiting. Given that recent military recruiting goals have not been met, opioid use could be a contributing factor.[36] Of the states listed above, AR, FL, GA, MI, SC, and TN are among the 10 states producing recruits significantly less fit and more likely to become injured than recruits from other states.[37] Other states particularly hard hit by the opioid crisis include those with the highest observed age-adjusted death rates for drug overdose deaths in 2017: WV (57.8 per 100,000), OH (46.3), PA (44.3), and the District of Columbia (44).[32]

Public Health Implications of the Opioid Crisis

OUD and Death

OUD is the continuing use of opioids regardless of harmful effects and is associated with many comorbid conditions and increased mortality. Younger age, being male, and lower education and income are strongly associated with OUD, as are some psychiatric disorders, including substance use and mood disorders.[38] Nonmedical use of prescription opioids is a significant risk factor for heroin use. While ≥2.1 million U.S. citizens have OUD, only 20% have received treatment.[6] Between 2005 and 2014, opioid-related hospitalizations increased for both men and women, while rate increases were more for women than for men (75 vs. 55%).[39]

Nationally, opioid-related deaths accounted for ∼68% of all drug overdose deaths.[40] Classes of opioids that cause overdose deaths include prescription opioid pills (natural and semisynthetic opioids), heroin, and methadone and synthetic opioids.[41] From 1999 to 2016, heroin user death rates increased seven-fold, while synthetic opioid death rates increased twenty-fold. Men have higher overall rates of OUD and overdose deaths than women.[39] The rate of drug deaths involving synthetic opioids (including fentanyl and fentanyl analogues) increased 45% from 2016 to 2017, while deaths attributed to heroin, natural and semisynthetic opioids, and methadone remained the same.[32] In 2017, 59% of all opioid-related deaths were due to fentanyl, versus 14.3% in 2010.[42] Drug overdose deaths have increased the U.S. mortality rate from 2014 to 2017, while life expectancy at birth has declined. It has been a century since this last occurred in the USA.[43] Drug overdose annual deaths exceed those from motor vehicle deaths, gun violence, and HIV during the HIV epidemic.[44]

Heroin Containing Fentanyl

Fentanyl is increasingly found in "street heroin" (FCH), contributing to opioid overdose deaths.[45] Heroin users in the USA are primarily younger non-Hispanic whites,[46] and this population demographic historically leads all groups in drug overdose deaths.[47] This demographic group (non-Hispanic whites) comprises ∼31% of all active duty military personnel (≤25 years of age).[48] Fentanyl-related deaths are associated with illicit fentanyl use and other injected drugs.[49] There has been a 140% increase in heroin users with a 670% increase in heroin deaths from 2002 to 2016.[6] One study found that 59% of FCH users were unaware of fentanyl contamination, and 59% reported that FCH provides a better high, while all knew that fentanyl increases overdose risk.[50]

Opioid Use and Infectious Diseases

The opioid epidemic directly contributes to the increased incidence of infectious disease. Increases in HIV/AIDS, viral hepatitis, infective endocarditis, and skin and soft tissue infections occur in areas with high rates of injection drug use of opioids.[51] Infectious disease practitioners have become directly involved in combatting opioid abuse and work closely with healthcare providers who treat substance use disorder.

Implemented Solutions

Military Health Care

Sleep disorder identification and alcohol use assessment may help recognize those at greatest risk for opioid and sedative misuse.[2] The Army, Navy, and the Department of Veterans Affairs (VA) offer a Chronic Pain and Opioid Management TeleECHO Clinic program offering pain and addiction instruction, case-based education, and evidence-based recommendations.[52] Regular patient attendance at weekly extension for community healthcare outcomes (ECHO) pain clinics resulted in decreased prescriptions of opioid analgesics and co-prescribed opioids and benzodiazepines.[53]

Veterans Health Administration

The VHA Opioid Safety Initiative and Naloxone Distribution program is designed to decrease opioid prescribing practices associated with adverse outcomes. This includes a dashboard tool that collects EMR data to enable real-time audits of opioid prescribing and identifies a clinical leader at each

facility responsible for safe prescribing.[54] The stratification tool for opioid risk mitigation prioritizes patients for review and intervention according to their modeled risk for overdose/suicide-related events and displays risk factors and risk mitigation interventions obtained from VHA EMR data extracts.[55] However, despite electronic chart review notes communicated between pharmacists and clinicians, they were frequently disregarded by providers and likely insufficient as a primary intervention tool for reducing long-term combination benzodiazepine and opioid therapy.[56]

Prescription Drug Monitoring

Twenty-five states have implemented opioid prescription amount limit laws.[57] Increased state implementation, oversight, and information sharing between each state's Prescription Drug Monitoring Program (PDMP) have been recommended. A comprehensive program includes reduction, opioid substitution, increased availability of naloxone, and improved surveillance to address opioid addiction.[58]

Initiated in 2018, the Defense Health Agency PDMP electronic database collects prescription data on controlled medications dispensed to TRICARE beneficiaries within the military healthcare system (MHS).[59] The MHS now shares prescription drug monitoring information from military hospitals, clinics, and pharmacies with civilian health care providers. This program has recently begun in nine states.[60]

Methadone Maintenance

Methadone maintenance treatment provides set methadone doses for each patient by gradual adjustment of dose until use cravings are reduced and illicit use ceases. Those remaining in this treatment program for 6 months had the highest rates of continued abstinence.[61] A model treatment program of opioid agonist therapy combining methadone and buprenorphine for OUD among veterans is underway at eight Veteran's Administration sites nationwide.[62]

Fentanyl Test Strips

Fentanyl test strips may offer an effective method for overdose prevention among injecting drug users. Recent pilot programs demonstrated that when fentanyl test strips were provided to self-reported drug users, their use was associated with altered drug use behaviors. These protective behaviors specifically included discarding a drug supply, using drugs with another person, keeping naloxone nearby, using less drugs than usual, administering a tester injection, and drug inhalation in lieu of injection.[63,64]

CDC Funding to States

The CDC has directly funded ($28.6 million in 2017) opioid abuse prevention in 45 states and the District of Columbia through the Overdose Prevention in States program.[65] Other CDC-funded programs include Prevention for States ($24.1 million in 2017), the Data-Driven Prevention Initiative ($50 million in 2016), and the Enhanced Morbidity-Mortality Surveillance ($7.5 million in 2017) programs.[66]

DISCUSSION

Potential Solutions

Given the conflicting need for effective battlefield and trauma anesthesia, requirements for effective opioid use monitoring, and ever-increasing demand for illicit opioids and FCH, it behooves military, veteran, and civilian healthcare agencies to collaborate and learn from each other's successful initiatives. Successful techniques from Military and VHA TeleECHO and ECHO pain clinics are known to decrease opioid use and could be shared with civilian healthcare providers. Similar successes with EMR data abstraction tools used by the VHA could also be promoted, but with prompts that oblige healthcare provider intervention with the discovery of adverse opioid use patterns. Impediments to data sharing for secure prescription drug monitoring between the states and the MHS could be prioritized. Successful addiction rehabilitation programs may prove useful to the VHA. When available, evaluation from current CDC funded opioid abuse prevention programs may also provide useful guidance to military and VHA healthcare providers. Prioritization for sharing successful opioid cessation interventions between these communities may help provide consistent national guidelines immediately useful to military, veteran, and civilian health authorities.

SUMMARY

Opioids and especially synthetic opioids provide essential palliative care to those with severe pain. They are an essential component of battlefield medicine. However, opioid overdose morbidity and mortality continues to increase nationwide,[67] and every state and major U.S. city is affected.[68] The increased availability and low cost of illegal synthetic opioids impact national security by affecting the population eligible for military and government service. Past opioid prescription practices in military populations were suboptimal. Opioid death increases are largely attributable to fentanyl and other synthetic opioid use and heroin containing fentanyl. Drug overdose deaths have increased over 100% in the last decade. Heroin overdose deaths have been greatest among young white non-Hispanic urban males. While disparate control measures have been implemented to slow this epidemic, creative and more integrated measures are warranted through cooperation between military medicine and veteran's healthcare, and national security, public health, law enforcement and civilian healthcare, and social welfare communities. Rapid identification, treatment, and management of risk behaviors and OUD, coupled with EMR and prescription drug monitoring, comprise current Department of Defense (DoD) and VHA efforts to combat opioid addiction. The DoD and civilian healthcare providers and public health authorities can benefit

from increased communication and promotion of mutual successes to combat opioid addiction.

FUNDING

This work was funded by Defense Threat Reduction Agency contract: HDTRA1-09-D-0009.

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