Opioid epidemic and homeland security: an integrative framework of intricacies and proposed solutions

Olusegun Owotomo, MD, MPH,
University of Texas at Austin; owotomo@utexas.edu

Purpose

This white paper aims to use an integrative framework to describe the intricacies of the opioid epidemic, demonstrate the link between the opioid epidemic and homeland security, and highlight opportunities for intervention. The framework will enhance our understanding of the multiple actors involved in the opioid epidemic; and will be useful in planning, coordinating, and evaluating strategies developed to address the opioid epidemic in the United States.

Scope of the Problem

Indiscriminate use of opioids (medical and non-medical use), driven by opioid addiction, has become a social problem of epidemic proportions in the United States.[1,2] In 2015, among Americans (≥12 years of age) who suffered from substance use disorder, two million people abused prescription opioids and about 591,000 had heroin-related substance use disorder.[3] That same year, there were over 33,000 deaths from opioid overdose (60.7% from prescription pain relievers and 39.3% from heroin overdose).[1] On the average, about 78 people die everyday from opioid overdose in the United States.[4] The economic burden (health and social costs) of prescription opioid abuse is estimated to be $55 billion per year, and about $20billion is also lost annually on emergency and inpatient treatment of opioid abuse.[4]

Burden on Homeland Security

The opioid epidemic exerts a huge burden on homeland security through its overwhelming influence on the healthcare system, public health, and law enforcement.[2, 5-8]

Opioid-related emergencies often require the diversion of limited human and capital resources. Every opioid-related emergency requires the utilization of emergency response personnel, healthcare professionals, and law enforcement.[5-8] With the rising prevalence of opioid overdoses and the increasing need for opioid addiction treatment (emergency room and inpatient), the impact of the opioid epidemic on the healthcare system and society cannot be overemphasized. Also, synthetic opioids such as carfentanil (10,000 times more potent than morphine, and 100 times more potent than fentanyl) are gaining popularity and pose newer threat to law enforcement and emergency first responders.[9, 10] Carfentanil can get gain entry into the body through skin contact and inhalation and can thus potentially be used as an incapacitating chemical weapon.[11] Further, morbidity and mortality arising from opioid addiction also have serious public health implications.[2,9] Immediate public health interventions are needed to address the imminent health and social consequences of opioid addiction. Accordingly, opioid overdose prevention is one of the major public health challenges prioritized by the CDC.[2,12] In addition, combating violence associated with illicit opioid trade, securing the border and preventing drug smuggling, monitoring and investigating international drug trade exert a great burden on law enforcement and also require the diversion of resources away from other equally important national priorities.[5-8] Illicit drug sale is a huge source of funding for criminal and terrorist organizations.[8]

Explaining the Integrative Framework

The integrative framework depicted in Figure 1 provides a comprehensive summary of the multiple actors involved in the pathway from being susceptible to addiction to the devastating outcomes of opioid addiction, including the burden on homeland security. It illustrates (1) how predisposing factors such as chronic pain lead to susceptibility to opioid addiction; (2) how access to opioids results in opioid addiction; (3) how opioid addiction results in devastating outcomes; and (4) how opioid addiction outcomes easily overwhelm the healthcare system, public health, law enforcement, and ultimately homeland security. It also identifies unique opportunities (A, B, C, D, and E) for intervening in the opioid epidemic. Further, the framework is compartmentalized into four components (F, G, H, and I), signifying the roles of different agencies and other stakeholders in combating the epidemic. Finally, an additional micro-framework (Figure 2) expounds on the central component of the integrative framework, illustrating the predisposing factors and demand and supply pathway to opioid addiction.

The components of the integrative framework are defined below:

Predisposing Factors: These are factors that make an individual susceptible to opioid use and addiction. Most common health-related factors include chronic pain; and mental health disorders (e.g. major depression, generalized anxiety, panic disorder).[2,13, 14] Examples of social factors, particularly among adolescents and young adults include poor perceptions of the harm and addictiveness of opioids, and ease of access to opioids at home.[15]

Susceptible Individual: Susceptibility to opioid addiction occurs following exposure to one or more predisposing factors. Individuals currently taking opioids are at risk of becoming addicted and are referred to as "susceptible individuals" in this framework. Individuals already suffering from opioid addiction or relapsing are also considered to be susceptible because of their continuing demand for opioids.

Demand for Opioids: Avenues through which susceptible individuals demand access to opioids. Susceptible individuals demand opioids either from their physicians and/or through other avenues including internet or illicit drug market.[16-19]

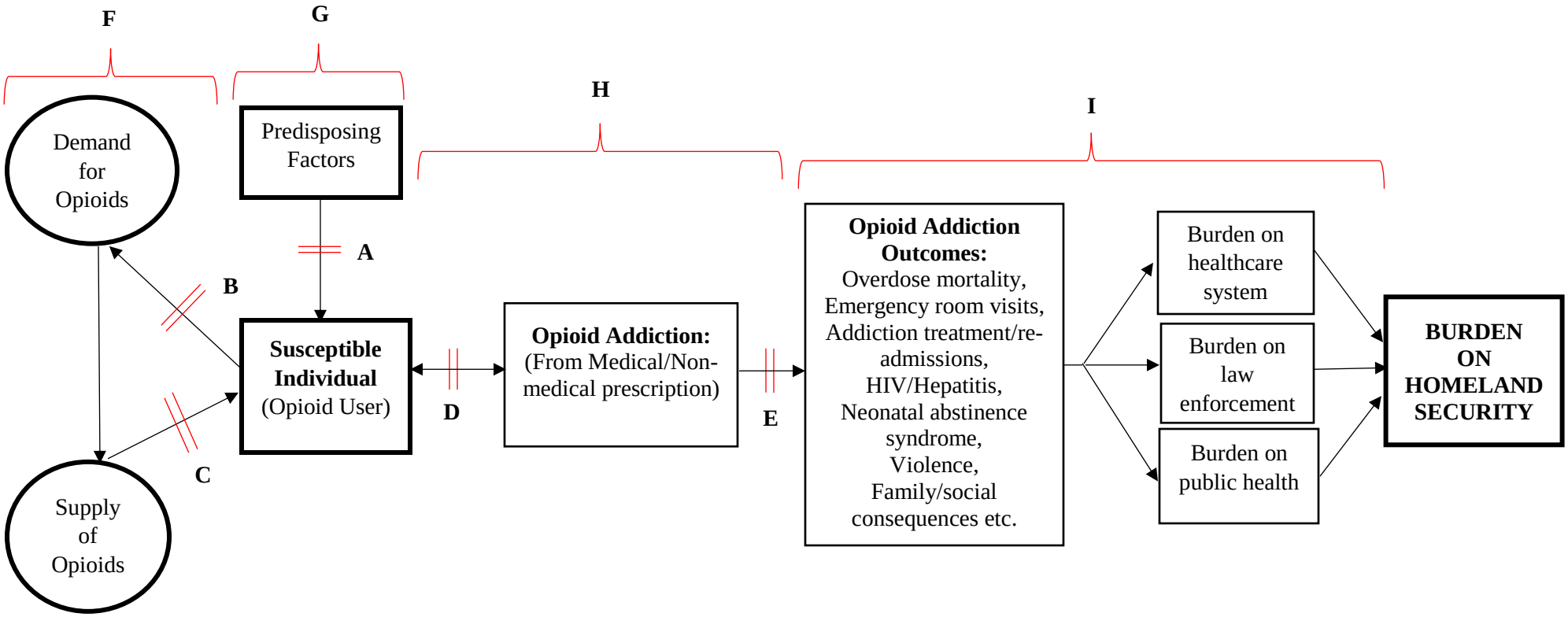
Supply of Opioids: Possible channels through which susceptible individuals receive opioid supplies. These channels include the pharmacy, postal system, or social networks (either via illicit trade or left-overs from friends and relatives).[20-24]

Opioid Addiction: Using standards provided by the Americana Society of Addiction Medicine, opioid addiction can be defined as a chronic and relapsing brain disease that is characterized by an abnormal pursuit for reward and/or relief by opioids.[25] It encompasses inability to consistently abstain from opioids, impaired control over opioid use, craving, reduced awareness of major changes in personal behavior and interpersonal relationships, and altered emotional state.[26]

Opioid Addiction Outcomes: These are the health and social consequences that could arise if opioid addiction is left untreated. They include overdose mortality, emergency room visits, addiction treatment/re-admissions, infectious diseases (e.g. Hepatitis and HIV), neonatal abstinence syndrome, violence, and family and social consequences.[2, 6, 9]

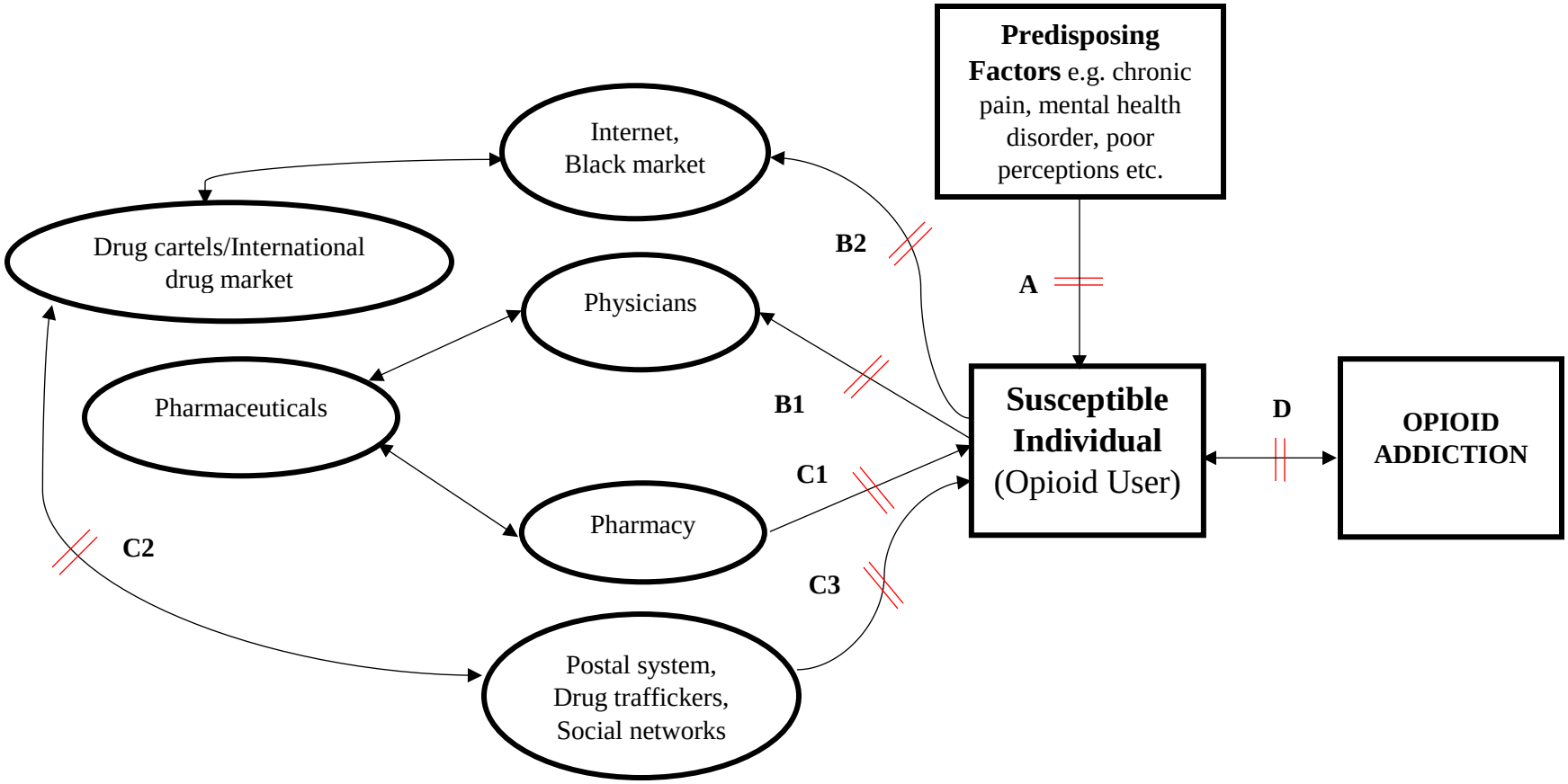
Burden on Health care System, Public Health, and Law Enforcement: Detailed above.

Figure 1: Integrative framework of the link between the opioid epidemic and homeland security, and intervention opportunities



Note: Red lines signify intervention points.

Figure 2: Demand and supply pathway to opioid addiction (medical and non-medical users), and intervention opportunities



Note: Red lines signify intervention points.

Intervention Opportunities

A: In the integrative framework (Figure 1), (A) represents primary prevention strategies that can be implemented before opioid addiction occurs. As detailed by Kolodny et al (2015), primary prevention of opioid addiction entails identifying and addressing predisposing factors (e.g. chronic pain and poor perceptions of harm and addictiveness of opioids) that may increase susceptibility to opioid addiction.[2] Physicians have a gate-keeping role to play by identifying at risk-patients, providing education, and being prudent with opioid prescription.[2,23] The effectiveness of prescriber education programs that provide physicians with accurate information on the risks and benefits of opioid use should be further explored.[2] Public health education programs that emphasize the harm, addictiveness, and consequences of opioid use, should also be encouraged.

B (B1, B2): In Figure 1, **(**B) represents avenues through which susceptible individuals demand opioids. In Figure 2, (B1) denotes multiple circumstances through which a susceptible individual can demand opioids from physicians, while (B2) represents demand for opioids through the internet, and/or illicit drug market. Physicians and law enforcement, including cyber surveillance, are very instrumental in blocking existing loopholes in the growing demand for opioids. Pharmaceutical companies also have a substantial role in educating physicians and the public on appropriate use and potential harm inherent in their products. Examples of legislation that have been enacted to address the increasing demand for opioids in the United States include Controlled Substances Act; and Food and Drug Administration Amendments Act, with its Risk Evaluation and Mitigation Strategy-(REMS).[27-29]

C (C1, C2, C3): In Figure 1 (C) represents channels through which opioids are delivered to susceptible individuals. As depicted in Figure 2, susceptible individuals can be supplied opioid directly through the pharmacy or indirectly through left-overs from opioids prescribed to family or friends (C1).[20] (C2) and (C3) denote channels through which opioids demanded through the internet or illicit drug market are delivered to susceptible individuals. The main actors in these distribution channels are drug cartels, international drug markets, postal systems (both US and international), drug traffickers, illicit drug retail marketers, and social networks of drug users and marketers.[20-24] Law enforcement and U.S postal service are required to effectively limit opioid supply through the aforementioned channels. Effective collaborations with international agencies are also essential for success.[21] The Secure and Responsible Drug Disposal Act of 2010,[30] and the proposed Synthetics Trafficking & Overdose Prevention Act (STOP) Act[31] are examples of legislative acts intended to close the gaps in the supply of opioids to susceptible individuals.

D: In Figure 1, (D) denotes the **s**econdary prevention of opioid addiction. It involves the identification and treatment of susceptible individuals showing early signs of opioid addiction. Intervention at this point prevents progression from use of prescription opioids to illicit opioids (such as heroin) and the development of severe opioid addiction.[2] Physicians and pharmacies have critical roles to play in identifying patients presenting with drug-seeking behaviors including those who obtain opioid prescriptions from multiple providers.[2, 23] Integrated electronic health records are useful in assisting physicians and pharmacies to identify such susceptible individuals. The state-implemented Prescription Drug Monitoring Programs (PDMPs) [32] were created to achieve this objective and should be evaluated and further explored.[2]

E: In Figure 1, (E) represents tertiary prevention of opioid addiction. It entails preventing overdose mortality and other devastating consequences of opioid addiction.[2]. Intervention at this point includes the administration of opioid addiction treatment to control cravings, opioid overdose antidote (e.g. naloxone) to prevent overdose mortality, and syringe exchange programs

to prevent spread of HIV and Hepatitis.[2] This level of prevention also involves rehabilitation to prevent relapse and restore health and social functioning.[2] Multiple players in the healthcare system are currently tasked with these responsibilities. The public health community and law enforcement also have significant roles to play in preventing the adverse outcomes of opioid addiction. Policies increasing access to naloxone and community-based naloxone distribution programs are ongoing efforts to address this component of the opioid epidemic.[2, 33, 34]

Finally, the integrative framework has four components denoted by F, G, H, and I. The stakeholders currently tasked with addressing each component are summarized below.

F: ***Demand and Supply of Opioids:*** Stakeholders include physicians, pharmaceuticals, U.S. Food and Drug Administration, law enforcement (including local and state law enforcement, FBI, DEA, U.S. Customs and Border Protection), and U.S Postal Service.

G: ***Primary Prevention of Opioid Addiction:*** Stakeholders include physicians (particularly primary care), U.S government health agencies (including Department of Health & Human Services, CDC, NIDA, SAMHSA, state and local health departments etc.), and public health community (including researchers, non-profits, and community organizations).

H: ***Secondary and Tertiary prevention of Opioid Addiction:*** Stakeholders include physicians, healthcare system, and public health community.

I: ***Management of Societal Sequelae of Opioid Addiction:*** Stakeholders include physicians, healthcare system, CDC, public health community, social and welfare agencies, and law enforcement.

Conclusion

The integrative framework is an attempt at developing a comprehensive model that captures all the various elements contributing to the opioid epidemic including the potential solutions that have been proffered by experts and other stakeholders. This proposed framework is far from perfect and is subject to continuous revisions with the availability of more information. However, at its current state, the framework simplifies the complexities involved in the opioid epidemic, including its impact on homeland security, and highlights important opportunities for interventions. The proposed framework will be useful in planning, coordinating, and evaluating strategies developed to address the current opioid epidemic in the United States.

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