

Illicit Supply of Fentanyl and Other Synthetic Opioids

Transitioning Markets and Evolving Challenges

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Illicit Supply of Fentanyl and Other Synthetic Opioids: Transitioning Markets and Evolving Challenges

Testimony of Bryce Pardo¹
The RAND Corporation²

Before the Committee on Homeland Security
Subcommittee on Intelligence and Counterterrorism and Subcommittee on Border Security,
Facilitation, and Operations
United States House of Representatives

July 25, 2019

Chairman Rose, Chairwoman Rice, Ranking Member Walker, Ranking Member Higgins, and other distinguished members of the Subcommittee on Intelligence and Counterterrorism and Subcommittee on Border Security, Facilitation, and Operations, thank you very much for the opportunity to testify before you today. For 30 years, the RAND Drug Policy Research Center has worked to help decisionmakers in the United States and throughout the world address issues involving alcohol and other drugs. The center brings an objective and data-driven perspective to this often emotional and fractious policy arena. I was asked to speak to you today about ongoing developments related to the current opioid crisis in the United States, focusing on some of the research we at RAND are doing to better understand the illicit supply of fentanyl and other synthetic opioids.

The introduction of illicitly manufactured synthetic opioids to U.S. drug markets presents new challenges for contemporary drug policy. The potency of synthetic opioids raises the risk to those who use drugs and challenges first responders. In addition, the development of novel opioids that fall outside existing drug controls impedes regulatory efforts, and the ability with which these substances can be produced and shipped with ease complicates traditional supply reduction efforts.

Today, I will begin briefly describing our country's ongoing opioid overdose crisis. Understanding recent developments and the shifting supply of opioids is critical to developing effective policy responses. I will then describe the emergence of synthetic opioids and the harms

¹ The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of the RAND Corporation or any of the sponsors of its research.

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they generate. Given the topic of this hearing, I will focus most of my testimony on illicit imports of fentanyl and other synthetic opioids. Although most of these substances reportedly come from China and Mexico, many aspects of supply and distribution remain unclear. That said, China's export-led economic strategy and lack of regulatory oversight have created favorable conditions for the mass production and exportation of inexpensive synthetic opioids and related chemicals. Similarly, Mexican drug trafficking organizations might view fentanyl as an attractive, cheaper alternative to heroin. I conclude with some policy options going forward, aimed at the new challenges posed by these substances.

Arrival of Synthetic Opioids to Illicit Markets

The drivers behind overdose deaths in the U.S. have changed in the last ten years. Although the overdose crisis was initially fueled by oversupply of prescription painkillers, such as oxycodone and hydrocodone, by 2018, synthetic opioids, such as fentanyl, were involved in approximately two-thirds of all opioid overdose deaths.³ While diversion of prescription fentanyl, such as transdermal patches and transmucosal lozenges, has been documented,⁴ today's problem largely comes from illicitly manufactured synthetic opioid powders, particularly fentanyl.⁵ Unlike traditional street-sourced opioids, such as heroin or diverted prescription painkillers, synthetic opioids are often much more potent. Some of these chemicals are active in the tens of micrograms,⁶ making precise dosing very difficult without sophisticated equipment. As fentanyl permeates U.S. markets, so does the risk of fatal overdose.

Provisional numbers from the Centers for Disease Control and Prevention demonstrate a slowdown in total overdose deaths in recent years. Still, today's drug overdose crisis, which now claims some 70,000 lives a year, surpasses major public health epidemics of prior generations, including the HIV/AIDS epidemic, which peaked at 50,000 deaths a year in the mid-1990s.⁷ And

³ F. B. Ahmad, L. A. Escobedo, L. M. Rossen, M. R. Spencer, M. Warner, and P. Sutton, "Provisional Drug Overdose Death Counts," *National Center for Health Statistics*, 2019. As of July 19, 2019: <https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>

⁴ J. Kuhlman, R. McCaulley, T. J. Valouch, and G. S. Behonick, "Fentanyl Use, Misuse, and Abuse: A Summary of 23 Postmortem Cases," *Journal of Analytical Toxicology*, Vol. 27, No. 7, 2003, pp. 499–504.

⁵ M. Spencer, M. Warner, B. A. Bastian, J. P. Trinidad, and H. Hedegaard, "Drug Overdose Deaths Involving Fentanyl," *National Vital Statistics Reports*, Vol. 68, No. 3, 2019; Drug Enforcement Administration (DEA), *2018 National Drug Threat Assessment*, Springfield, Va., DEA-DCT-DIR-032-18, October 2018b; R. Matthew Gladden, Pedro Martinez, and Puja Seth, "Fentanyl Law Enforcement Submissions and Increases in Synthetic Opioid-Involved Overdose Deaths—27 States, 2013–2014," *Morbidity and Mortality Weekly Report*, Vol. 65, No. 33, 2016, pp. 837–843.

⁶ According to the European Monitoring Centre for Drugs and Drug Addiction, the lethal dose of ingested fentanyl for those without opioid tolerance is approximately two milligrams (2,000 micrograms), roughly the amount of two grains of salt. See European Monitoring Centre for Drugs and Drug Addiction, "Fentanyl Drug Profile," webpage, 2015. As of July 19, 2019: <http://www.emcdda.europa.eu/publications/drug-profiles/fentanyl#pharmacology>.

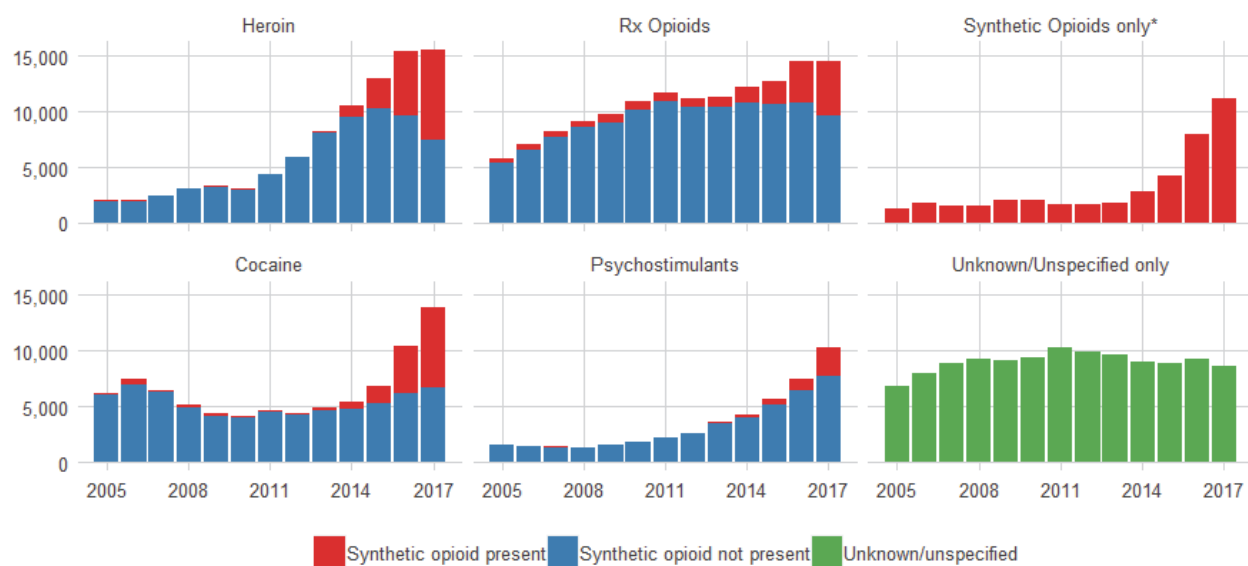
Transdermal patches containing fentanyl release 12.5 to 100 micrograms per hour, depending on the prescription.

⁷ Holly Hedegaard, Arialdi M. Miniño, and Margaret Warner, "Drug Overdose Deaths in the United States 1999–2017," NCHS Data Brief, No. 329, November 2018. As of July 19, 2019: <https://www.cdc.gov/nchs/data/databriefs/db329-h.pdf>

while the annual number of opioid-involved deaths remained steady at just under 50,000 in each 2017 and 2018,⁸ the majority of these deaths involved synthetic opioids. In 2018 this amounted to double the number of overdoses from heroin or prescription opioids.⁹ Overall, overdose deaths involving synthetic opioids have jumped tenfold between 2013 and 2018.

In addition, overdose figures and law enforcement reports suggest that synthetic opioids, initially sold as powdered heroin or prescription tablets, may be entering non-opioid drug markets.¹⁰ While half of heroin-involved deaths in 2017 included synthetic opioids, approximately an equal share of fatal cocaine overdoses did as well. Figure 1 shows national trends regarding the presence of synthetic opioids among fatal overdoses across several drug categories.

Figure 1. U.S. Drug Overdose Death Count by Year and by Drug Category



*Excludes cocaine, heroin, Rx opioid, and psychostimulant deaths from synthetic opioids

SOURCE: Data are deidentified public-use Multiple Cause of Death certificate files produced by the National Center for Health Statistics, 2005–2017.

Examination of overdose fatalities by state shows that the synthetic opioid problem is concentrated in the eastern half of the United States.¹¹ The ten states with highest synthetic opioid overdose death rates in 2017 contain only 12 percent of the country’s population yet comprised 35 percent of the 28,500 fatal overdoses involving synthetic opioids. Ohio’s share

Centers for Disease Control and Prevention, “Thirty Years of HIV—1981–2011,” *Morbidity and Mortality Weekly Report*, Vol. 60, No. 21, June 3 2011.

⁸ Ahmad et al., 2019.

⁹ Ahmad et al., 2019.

¹⁰ DEA, Special Testing and Research Laboratory, *Emerging Threat Report, Annual 2017*, Springfield, Va., 2018a.

¹¹ Michael Zoorob, “Fentanyl Shock: The Changing Geography of Overdose in the United States,” *International Journal of Drug Policy*, Vol. 70, 2019, pp. 40–46.

alone was almost 12.5 percent, although the state only has about 3.5 percent of the country's total population.

In several acutely affected states, fatal overdoses involving heroin free of synthetic opioids have continued to decline, only to be replaced by a rising number of overdoses involving synthetic opioids. For example, in Ohio, the total number of deaths mentioning heroin actually fell in 2017, for the first time since 2009; few heroin overdose deaths in Ohio do not involve synthetic opioids as well. In New Hampshire, only one-quarter of heroin overdoses do not involve synthetic opioids and total heroin overdoses have fallen dramatically, suggesting that illicit drug markets in that state may be far along in the transition to fentanyl or other synthetic opioids.

An examination of state-level drug seizures shows similar spatial and temporal patterns. In states acutely affected by synthetic opioids, law enforcement seizures of heroin have been declining since around 2014. The same cannot be said for seizures of fentanyl and related substances. An examination of data from U.S. Drug Enforcement Administration's National Forensic Laboratory Information System (NFLIS) through 2017 suggests that several regional markets appear to be transitioning toward synthetic opioids and away from heroin. The overdose crisis could worsen if synthetic opioids enter major illicit opioid markets west of the Mississippi river.¹²

Shifting Supply of Synthetic Opioids

The country's upward trend in synthetic opioid overdoses is mirrored by the trend in drug seizures. U.S. Customs and Border Protection (CBP) seized approximately one kilogram of fentanyl in fiscal year (FY) 2013; by FY 2018, CBP seized nearly 1,000 kilograms.¹³ Likewise, reports from NFLIS show a sharp increase in the number of seizures containing fentanyl or fentanyl analogues submitted by state and local drug laboratories. Although these increases may be partially explained by changes in law enforcement procedures or priorities, the number of fentanyl seizures submitted to NFLIS also jumped from about 1,000 in 2013 to more than 59,000 in 2017.¹⁴ State-level analysis shows a strong correlation between the number of law enforcement drug seizure exhibits containing fentanyl or fentanyl analogues and reported synthetic opioid overdose deaths.¹⁵

In addition to the rise in reports of fentanyl seized in domestic drug markets, DEA has noted increases in the number of novel synthetic opioids. According to DEA's *Emerging Threat*

¹² For example, recent spikes in fentanyl-involved overdose deaths in San Francisco, California may be an early indicator of such expansion. See Erin Allday, "Fentanyl Rising as Killer in San Francisco—57 Dead in a Year," *San Francisco Chronicle*, June 23, 2019. As of July 19, 2019: <https://www.sfchronicle.com/health/article/Fentanyl-rising-as-killer-in-San-Francisco-57-14030821.php?psid=dlc8z>

¹³ U.S. Customs and Border Protection, *CBP Enforcement Statistics*, Washington, D.C., 2019. These seizures are not adjusted for purity and reflect the gross total weight. It is important to adjust seizures for purity, as federal law enforcement has noted the disparity in purity of seizures originating from China, which are nearly pure, versus those originating from Mexico, which are often of low purity.

¹⁴ DEA. 2018b.

¹⁵ Zoorob, 2019.

Reports, ten synthetic opioids were seized and identified for the first time in 2017, followed by seven in 2018.¹⁶ These chemicals were previously unknown in U.S. drug markets. Even though producers continue to manufacture new substances and the overall mix of analogues found in markets changes over time, fentanyl remains the dominant synthetic opioid reported in seizure reports and overdose death certificates.

This is not the first time the United States has experienced an outbreak of illicitly manufactured fentanyl in drug markets. During a brief period in the mid-2000s, illicitly manufactured fentanyl appeared in major heroin markets in the Midwest and mid-Atlantic, claiming about 1,000 lives.¹⁷ Federal and local response was swift, expanding access to naloxone and seizing product from the street. In May 2006, Mexican law enforcement and the DEA identified and closed the illicit manufacturing operation in Toluca, Mexico.¹⁸ Illicitly manufactured fentanyl would not return to drug markets until late 2013.

However, much has changed since the closure of the lab in Toluca. Law enforcement in the United States and Canada report that most synthetic opioids and precursors originate not from a single clandestine source, but from what could be many semi-legitimate manufacturers and vendors, most of whom are in China.¹⁹ Chinese suppliers ship these substances via the international postal system and private express consignment carriers, such as FedEx and DHL, as well as by cargo.²⁰ According to DEA, Mexican drug traffickers are another major source.²¹ Given that drug trafficking organizations in Mexico have a history of importing methamphetamine precursors from China,²² it would appear that they are doing the same with fentanyl and fentanyl precursors. Regardless of their source, nearly all of today's illicitly manufactured synthetic opioids are imported. DEA last reported a seizure of a clandestine fentanyl laboratory in the U.S. almost 15 years ago.²³

Seizure data at ports of entry offer some insights into the dimensions of illicit imports. CBP reports seizing synthetic opioids, including fentanyl, at land points of entry and checkpoints on the southwest border, as well as at mail and express consignment facilities and other air ports of entry. Table 1 shows that in FY 2018, seizures of fentanyl near or at the border ports of entry

¹⁶ DEA, Special Testing and Research Laboratory, 2018a; DEA, Special Testing and Research Laboratory, 2019.

¹⁷ Centers for Disease Control and Prevention, "Nonpharmaceutical Fentanyl-Related Deaths—Multiple States, April 2005–March 2007," *Morbidity and Mortality Weekly Report*, Vol. 57, No. 29, July 25, 2008.

¹⁸ DEA, National Drug Intelligence Center, *Fentanyl: Situation Report*, Springfield, Va., SR-000001, June 5, 2006.

¹⁹ C. Bairns, "Charges to Be Laid Involving Fentanyl Shipments from China: RCMP," *Globe and Mail*, September 18, 2017; U.S. Drug Enforcement Administration, *Counterfeit Prescription Pills Containing Fentanyls: A Global Threat*, Springfield, Va., 2016.

²⁰ U.S. Senate, Committee on Homeland Security and Governmental Affairs, Permanent Subcommittee on Investigations, *Combatting the Opioid Crisis: Exploiting Vulnerabilities in International Mail*, Washington, D.C., 2018; CBP, "Philadelphia CBP Seizes Nearly \$1.7 Million in Fentanyl Shipped from China," press release, June 28, 2018. As of July 19, 2019:

<https://www.cbp.gov/newsroom/local-media-release/philadelphia-cbp-seizes-nearly-17-million-fentanyl-shipped-china>

²¹ DEA, 2018b.

²² S. O'Connor, *Meth Precursor Chemicals from China: Implications for the United States*, Washington, D.C.: U.S.-China Economic and Security Review Commission, 2016.

²³ DEA, 2006.

significantly outweighed those at mail and express consignment carrier facilities. However, after adjusting for purity, almost 70 percent of fentanyl seized by CBP in FY 2018 arrived by air, mostly at mail and express consignment carrier facilities. Analysis of FY 2017 seizure data reports a similar breakdown.²⁴ Law enforcement and congressional investigations have suggested that many of the packages at mail and express consignment facilities originate from China.²⁵ If CBP seizures represent the true nature of trafficking patterns, then these preliminary calculations support law enforcement’s conclusion that China is an important source country of illicitly manufactured synthetic opioids.

Table 1. CBP Seizures of Fentanyl in Fiscal Year 2018 by Mode of Transport

Mode of Transport	Weight (kg)	Estimated Purity-Adjusted Weight (kg)	Seizure Incidents	Average Weight of Seizure (gross kg)
Land (mostly southwest border Border Checkpoints (Border Patrol))	654.00	49.05	182	3.59
Express consignment	52.62	47.36	76	0.69
Mail	61.72	55.55	455	0.14
Air (other)	50.06	45.05	2	25.03
Total	994.76	210.24	715	—

Source: CBP, *Strategy to Combat Opioids*, Washington, D.C., 2019; DEA, *National Drug Threat Assessment*, Springfield, Va., 2017.

Note: According to DEA, the purity of fentanyl arriving at mail and express consignment facilities is often 90 percent or more, while seizures at the southwest border are reportedly 5 to 10 percent pure; here we use the midpoint of 7.5 percent.

The smuggling of synthetic opioids from China may be evolving. In late June 2018, CBP at the Philadelphia port of entry seized 50 kilograms of 4-fluoroisobutyryl fentanyl hidden in barrels of iron oxide in an air shipment from China.²⁶ CBP noted that the shipment was high purity, which would make this seizure one of the largest to originate from China and perhaps the largest single seizure of a fentanyl-like substance.

China: A Source of New Drugs and Chemical Precursors

The manufacture of many of these new drugs and precursors is linked to China’s large and underregulated chemical and pharmaceutical sectors. China is a leading exporter of active pharmaceutical ingredients and chemicals that can be used in the production of controlled substances and other medications. These include methamphetamine precursors and cocaine

²⁴ Bryce Pardo, *Evolution of the U.S. Overdose Crisis: Understanding China's Role in the Production and Supply of Synthetic Opioids*. Santa Monica, Calif.: RAND Corporation, CT-497, 2018. As of July 19, 2019: <https://www.rand.org/pubs/testimonies/CT497.html>

²⁵ U.S. Senate, Committee on Homeland Security and Governmental Affairs, Permanent Subcommittee on Investigations, 2018; T. Owen, testimony before the U.S. Senate Committee on Homeland Security and Governmental Affairs, January 25, 2018.

²⁶ CBP, 2018.

reagents, such as ephedrine, pseudoephedrine, and potassium permanganate.²⁷ To avoid detection by customs authorities, Chinese producers or distributors often use technically legal workarounds and, when necessary, outright deception. It has been reported that Chinese traffickers and chemical exporters will mislabel shipments, modify chemicals, or ship pre-precursors that fall outside international controls.²⁸

Lack of international control manifested by the UN system of drug conventions has allowed Chinese manufacturers to export fentanyl precursors. Although they have been scheduled in the United States for over a decade, N-Phenethyl-4-piperidinone (NPP) and 4-anilino-N-phenethylpiperidine (4-ANPP) were not subject to international controls until October 2017.²⁹ In late 2016, the U.S. Department of State identified nearly 260 producers of these precursors, more than half of which were in China.³⁰ These chemicals were finally scheduled in China early last year.³¹ Previously, there was little scrutiny on their manufacture, and producers faced little, if any, reporting requirements or production and exporting restrictions.

Much like circumvention of precursor regulations, Chinese manufacturers often synthesize new substances that fall outside national and international laws, including drugs that mimic the effects of cannabis, stimulants, benzodiazepines, and opioids. To stem the growing production of uncontrolled and novel psychoactives, the Chinese government has added new chemicals to national drug schedules. In late 2015, China added 116 new substances, including 38 synthetic cannabinoids, 26 synthetic cathinones (e.g., “bath salts”), 23 phenethylamines (e.g., MDMA analogues), and six synthetic opioids to its drug control laws.³² Since then, China has scheduled additional fentanyl analogues as U.S. and Canadian law enforcement bring them to the attention of Chinese authorities.³³ In January 2017, China’s Ministry of Public Security listed four additional synthetic opioids, including the highly potent carfentanil.³⁴ This was followed six months later with four new substances, including two non-fentanyl synthetic opioids, U-47700

²⁷ O’Connor, 2016; U.S. Department of State, *International Narcotics Control Strategy Report*, Washington, D.C., 2017.

²⁸ O’Connor, 2016.

²⁹ International Narcotics Control Board, “INCB: Scheduling of Fentanyl Precursors Comes into Force,” October 18, 2017.

³⁰ J. Whalen, “U.S. Seeks Curb on Chemicals Used to Make Fentanyl, a Powerful Opioid,” *Wall Street Journal*, October 14, 2016.

³¹ DEA, “China Announces Scheduling Controls on Two Fentanyl Precursor Chemicals,” press release, January 5, 2018. As of July 19, 2019: <https://www.dea.gov/press-releases/2018/01/05/china-announces-scheduling-controls-two-fentanyl-precursor-chemicals>

³² United Nations Office on Drugs and Crime Early Warning Advisory on New Psychoactive Substances, “China Announces Controls over 116 New Psychoactive Substances,” press release, October 2015. As of July 19, 2019: <https://www.unodc.org/LSS/Announcement/Details/83b02e73-4896-4ed5-944c-51a7646647aa>

³³ U.S. Drug Enforcement Administration, 2018; Royal Canadian Mounted Police, “RCMP and Chinese Ministry of Public Security Commit to Combat the Flow of Fentanyl into Canada,” November 16, 2016. As of July 19, 2019: <http://www.rcmp-grc.gc.ca/en/news/2016/24/rcmp-and-chinese-ministry-public-safety-commit-combat-the-flow-fentanyl-canada>

³⁴ Chinese Ministry of Public Security, “Notice on Inclusion of Four Fentanyl Substances, Such as Fentanyl, in the Supplement to the Catalog of Nonmedical Narcotic Drugs and Psychotropic Substances Control,” March 1, 2017.

and MT-45.³⁵ Most recently, the Chinese government, at the request of the U.S. government, has adopted a generic ban on all substances that are “structurally related to fentanyl;” the ban went into effect in May of this year.³⁶

Although China has made efforts to control fentanyl and fentanyl analogues, many of these chemicals continue to show up in drug seizures at ports of entry and in domestic drug markets. The ease of ordering these substances online and having them shipped directly to the United States hampers supply reduction efforts.³⁷ Chinese chemical and pharmaceutical firms openly advertise these substances on English-language websites accessible by a simple internet search. Vendors will sometimes purposefully conceal shipments through freight forwarding systems, mislabel packages, or route them through a third country to conceal efforts to trace packages to their original source.³⁸

In addition to the supply of synthetic opioids and their chemical inputs, U.S. and Canadian law enforcement have also seized industrial-grade press machines, dies, and stamps imported from China that are used in the manufacture of counterfeit prescription tablets.³⁹ According to the DEA, drug distributors in the United States use imported powder formulations of synthetic opioids and press machines to manufacture counterfeit tablets.⁴⁰ The distribution of fake tablets is of great concern because they resemble regulated products of known dose and consistency. They might also appeal to a broader population of individuals who do not inject drugs or are averse to using heroin.

Other Sources of Synthetic Opioids

Mexico is another important source of illicit fentanyl destined for U.S. drug markets. Drug trafficking organizations in that country have long supplied much of the heroin that is used in the United States. In recent years, there has been a noticeable increase in the amount of fentanyl seized at the U.S.-Mexico border by U.S. law enforcement and Mexican authorities.⁴¹ The DEA

³⁵ DEA, “China Announces Scheduling Controls of New Psychoactive Substances/Fentanyl-Class Substances,” June 19, 2017.

³⁶ Liu Yuejin, “SCIO Briefing on Fentanyl-Related Substances Control,” webpage, April 2, 2019. As of July 19, 2019:
http://www.china.org.cn/china/2019-04/02/content_74637197.htm

³⁷ U.S. Senate, Committee on Homeland Security and Governmental Affairs, Permanent Subcommittee on Investigations, 2018.

³⁸ U.S. Senate, Committee on Homeland Security and Governmental Affairs, Permanent Subcommittee on Investigations, 2018.

³⁹ DEA, 2018b; Royal Canadian Mounted Police. “RCMP Arrest Opioid Drug Trafficker,” press release, December 6, 2018. As of July 19, 2019:
<http://www.rcmp-grc.gc.ca/en/news/2018/rcmp-arrest-opioid-drug-trafficker>
DEA, *Counterfeit Prescription Pills Containing Fentanyls: A Global Threat*, Springfield, Va., July 2016. As of July 19, 2019:
https://content.govdelivery.com/attachments/USDOJDEA/2016/07/22/file_attachments/590360/fentanyl%2Bpills%2Breport.pdf

⁴⁰ DEA, 2016.

⁴¹ CBP, 2019; J. Nacar, “Fentanilo Tiene Sus Epicentros en BC y CDMX,” *Eje Central*. February 9, 2019.

has noted that Mexican drug trafficking organizations are importing fentanyl and fentanyl precursors from China. Drug traffickers are smuggling powder fentanyl alongside heroin or pressing it into counterfeit tablets made to look like genuine pharmaceutical-grade products.⁴² Synthetic opioids, which can be readily made in a lab, are attractive alternatives to poppy-based heroin, which is susceptible to blight, drought, eradication, and labor shortages. Also, the very high potency-to-weight ratio of fentanyl makes it ideal for smuggling.

Since late 2017, five clandestine labs have been seized in Mexico. Most were in densely populated residential areas in such major cities as Mexicali and Mexico City.⁴³ The scale and access of chemical precursors and pill press machines from China, combined with easier synthesis techniques allows for the minimally trained to manufacture fentanyl virtually anywhere—making supply disruption more challenging.

The DEA also notes Canada as another source of fentanyl.⁴⁴ Parts of that country are also experiencing a surge in synthetic opioid overdoses, much like the United States. Rather than a source of production of synthetic opioids, Canada may serve as a transshipment point. DEA notes that synthetic opioids are imported from China into Canada, where they are pressed into counterfeit tablets, some of which are smuggled into the United States.⁴⁵

India is another country with a robust pharmaceutical industry which faces limited regulatory oversight.⁴⁶ It is unclear to what extent Indian-sourced fentanyl is arriving in the United States, but in 2018, Indian authorities reported two relatively large seizures of fentanyl destined for North America.⁴⁷

Currently, U.S. authorities believe China to be the primary source for fentanyl, fentanyl analogues, precursor chemicals, and press machines used in the manufacture of counterfeit tablets. As such, I turn to China's chemical and pharmaceutical industries.

China's Industry Growth and Regulatory Deficiencies

Although the Chinese central government has taken steps to control new chemicals and precursors, the problem persists. Regulatory capacity in China is inadequate to police the country's expansive pharmaceutical and chemical industries. Unauthorized manufacture and handling of fentanyl is prohibited in China, but not fentanyl itself. In fact, the country

⁴² DEA, 2016.

⁴³ DEA, 2018b; "PGR Asegura Supuesto Laboratorio de Fentanilo en CDMX," *El Financiero*, December 12, 2018; "Aseguran en Culiacán, Sinaloa Presunto Laboratorio de Fentanilo," *El Debate*, April 11, 2019; PGR. Comunicado DPE/6719/17. Inicia PGR investigación por aseguramiento de laboratorio clandestino en Sinaloa. November 23, 2017. "Médico Búlgaro, Exmilitar, Kulkin Tenía, en un Cuartito de Mexicali, Laboratorio "AAA" de Fentanilo," *Que Hacer Politico*, September 18, 2018.

⁴⁴ DEA, 2018b.

⁴⁵ DEA, 2016.

⁴⁶ India Brand Equity Foundation, "Indian Pharmaceuticals Industry Analysis," May 2019. A. Altstedter and A. Edney, "Culture of 'Bending Rules' in India Challenges U.S. Drug Agency," *Bloomberg*, January 31, 2019.

⁴⁷ "Three, Including Mexican National, Held with Drugs Worth Rs 100 Cr in Madhya Pradesh," *Business Standard*, September 28, 2018; D. Singh, "Mumbai: Anti-Narcotics Cell Seizes Drug Worth Rs 1000 Crore," *India Today*, December 28, 2018.

legitimately produces fentanyl for medical purposes.⁴⁸ And fentanyl remains the most common synthetic opioid reported in overdose deaths and drug seizures in the U.S., suggesting inadequate regulatory capacity and enforcement on the part of Chinese authorities.

Government-led market reforms in the past 30 years have helped China become a global manufacturing center driven by exports. The expansion of e-commerce and inexpensive shipping have made global trade cheaper and more convenient. Together, these phenomena helped make many of China's industries important links in international supply chains. The same is true for its expansive pharmaceutical and chemical industries.

Today, China's pharmaceutical industry counts some 5,000 manufacturers that produce more than 2,000 products, with an annual production capacity of more than 2 million tons, making the country the single largest exporter of active pharmaceutical ingredients (APIs) in the world.⁴⁹ According to the World Health Organization (WHO), China's pharmaceutical industry is now the second-largest in the world, with recent annual sales revenues of more than \$100 billion.⁵⁰

In addition to its pharmaceutical industry, the Department of State estimates that China could have as many as 400,000 chemical manufacturers or distributors, some of which are operating without legal approval.⁵¹ These firms produce tons of chemicals each week intended for industrial and commercial use.⁵² One private-sector analysis estimates that China's chemical industry has grown by an annual average of 9 percent in recent years and made up 3 percent of the national economy in 2016, generating more than \$100 billion in profits that year.⁵³

Rapid commercial growth brought on by market reforms has outpaced the capacity and design of China's regulatory regime.⁵⁴ Regulatory gaps and bureaucratic fragmentation continue to hamper China's ability to oversee its pharmaceutical and chemical industries. In the past decade, the China Food and Drug Administration (CFDA) has made efforts to adopt better enforcement and production guidelines, including good manufacturing practices (GMPs). The GMP standards cover most basic aspects of manufacturing, including environmental protections, sanitary working conditions, product testing and tracking, and record keeping.⁵⁵

However, the division of regulatory design and enforcement responsibilities among national governmental entities is a commonly noted problem. Lack of coordination and competing regulatory oversight create opportunities for some firms to hide unregulated activities in plain sight. According to one report written by staff of the U.S.-China Economic and Security Review

⁴⁸ W. Zheng, "China's Fentanyl Firms Back Crackdown on Opioid," *South China Morning Post*, December 3, 2018.

⁴⁹ World Health Organization, *China Policies to Promote Local Production of Pharmaceutical, Products and Protect Public Health*, 2017.

⁵⁰ World Health Organization, 2017.

⁵¹ U.S. Department of State, *International Narcotics Control Strategy Report*, Washington, D.C.: Bureau of International Narcotics and Law Enforcement Affairs, 2014; U.S. Department of State, *International Narcotics Control Strategy Report*, Washington, D.C.: Bureau of International Narcotics and Law Enforcement Affairs, 2015.

⁵² O'Connor, 2016.

⁵³ Atradius, "Market Monitor: Focus on Chemicals Performance and Outlook," 2017.

⁵⁴ Li and Sun, 2014; World Health Organization, 2017.

⁵⁵ World Health Organization, 2017.

Commission, at one time there were eight governmental entities involved in promulgating and enforcing production and export requirements for pharmaceuticals or chemicals.⁵⁶

In addition to the patchwork of responsible agencies, competing incentives between levels of government impede enforcement. Provincial authorities protect, promote, and sometimes manage local economies and industries.⁵⁷ Although the central government, through the CFDA, designs rules to govern GMP standards, it relies on provincial governments to enforce them. According to the WHO, provincial governments are mainly tasked with inspecting and certifying companies for GMP approval.⁵⁸ This division in regulatory design and enforcement generates opportunities for regulatory capture, nonenforcement, or outright corruption when the economic incentives of provincial governments misalign with those of good governance.

Beyond gaps in regulatory design and misaligned incentives, the government's regulatory capacity is limited. The division in enforcement strategy, in which the CFDA inspects only a subset of manufacturers, leaving the rest up to provincial authorities, may reflect this limitation. The CFDA and other regulators are unable to effectively inspect and police the large number of pharmaceutical manufacturers. The WHO notes that, although the CFDA is attempting to hire more inspectors, its efforts are complicated by lack of time and resources; private industry salaries are highly competitive, complicating efforts to retain qualified staff.⁵⁹

Data from the CFDA show that regulators are increasing the number of inspections, yet gaps remain. Annual reports indicate an increase in inspected firms and applicants from 698 in 2015 to 751 in 2017, although there was a dip in inspections in 2016.⁶⁰ The number of CFDA inspectors has remained around 2,000 over the same period; however, regulators have shifted focus to GMP certification inspections away from other forms of inspections, such as preapproval and overseas inspections. These regulatory efforts, which have traditionally been assigned to provincial governments, more than doubled, from just over 200 in 2015 and 2016 to 428 in 2017.⁶¹ The number of unannounced inspections remained steady over this period, while those that included international inspectors (such as the U.S. Food and Drug Administration [FDA]) modestly increased in recent years.

Of the 428 GMP inspections carried out in 2017, 37 firms or applicants did not pass, and one-quarter were issued warning letters for violations. According to the most recent CFDA annual report, 15 firms that manufacture narcotic or psychotropic drugs, precursors, or pharmaceuticals were inspected that year; three did not pass inspection for failure to properly handle mailing and transportation certificates or failure to control samples.⁶² These numbers

⁵⁶ O'Connor, 2017.

⁵⁷ T. Gong, "Corruption and Local Governance: The Double Identity of Chinese Local Governments in Market Reform," *Pacific Review*, Vol. 19, No. 1, 2006, pp. 85–102.

⁵⁸ World Health Organization, 2017.

⁵⁹ World Health Organization, 2017.

⁶⁰ CFDA, Center for Food and Drug Inspection, *Annual Report of Drug Inspection 2015*, 2016; CFDA, Center for Food and Drug Inspection, *Annual Report of Drug Inspection 2016*, 2017; CFDA, Center for Food and Drug Inspection, *Annual Report of Drug Inspection 2017*, 2018.

⁶¹ CFDA, Center for Food and Drug Inspection, 2016, 2017, 2018.

⁶² CFDA, Center for Food and Drug Inspection, 2018.

suggest that regulators are inspecting a small share of companies and that a sizable portion of manufacturers of controlled substances inspected in 2017 failed inspection for improper handling and transport.

The situation is similar for China's chemical regulators, which cannot adequately enforce regulations on all manufacturers and distributors.⁶³ Regulatory gaps have led to a large increase in the number of unlicensed or "semi-legitimate" chemical manufacturers or distributors.⁶⁴ There are reports that use of shell facilities and weak oversight lets some chemical and pharmaceutical manufacturers avoid scrutiny, allowing companies to produce and sell beyond their legal limits.⁶⁵ In 2007, industry insiders estimated that uncertified chemical manufacturers produced half of the APIs sold in China, with most exported to foreign markets.⁶⁶ It is unclear how many uncertified manufacturers are supplying international API markets today or how many synthetic opioids or other precursors are produced and exported via shell entities. The Department of State also points to insufficient regulatory oversight and corruption of local government officials as explanations behind illicit drug and chemical production.⁶⁷

Chinese authorities recognize these problems, and the government has made some efforts to expel corrupt officials. In 2015, President Xi Jinping demanded that authorities increase penalties and stiffen drug regulation.⁶⁸ In March 2018, the central government proposed another reorganization of the CFDA, combining it with other regulatory entities.⁶⁹ Industry observers suggest that this reorganization is intended to extend the agency's regulatory reach and reduce gaps in oversight.⁷⁰

Potential Policy Responses

Congress and federal authorities have several existing options to combat the synthetic opioid crisis. However, given the scope of this problem and the new challenges it presents, Congress and executive agencies must look beyond available drug policy tools.

First, given the lack of information about supply and demand, there is dire need to improve how agencies collect and analyze drug market indicators. Greater effort and resources are needed to improve measurement and analysis of seizures and overdoses, which are likely to be undercounted because of the novelty of analogues.⁷¹ Most of our drug policy data collection and analysis systems are inadequate to accurately estimate the number of drug-using individuals that

⁶³ O'Connor, 2017.

⁶⁴ O'Connor, 2016.

⁶⁵ O'Connor, 2016.

⁶⁶ W. Bogdanich, "Chinese Chemicals Flow Unchecked onto World Drug Market," *New York Times*, October 31, 2007.

⁶⁷ U.S. Department of State, 2017.

⁶⁸ World Health Organization, 2017.

⁶⁹ Xinhua News Agency, "Explanation of the State Council's Institutional Reform Plan," March 14, 2018.

⁷⁰ A. Liu, "China Creates New Drug Regulator in Biggest Government Overhaul in Years," *FiercePharma*, March 13, 2018.

⁷¹ C. J. Ruhm, "Corrected US Opioid-Involved Drug Poisoning Deaths and Mortality Rates, 1999–2015," *Addiction*, Vol. 113, No. 7, 2018.

are at risk of exposure to fentanyl or assess the arrival of synthetic opioids in a locality. Congress could direct federal authorities to reintroduce expanded data collection systems, such as the Arrestee Drug Abuse Monitoring Program (ADAM) and the Drug Abuse Warning Network (DAWN) or other novel analysis methods, such as wastewater testing, which can be used to enhance measures of prevalence of use estimates as well serve as early warning systems to alert to the arrival of synthetic opioids in a market. Given how fast new substances emerge, we need to improve measurement and reduce data lags. This is crucial, considering the need for early warning systems to safeguard communities that have not yet been exposed to synthetic opioids. Additionally, more research is needed to understand the decisionmaking and operational processes of mid- and high-level importers so as to better craft policy responses to disrupt and deter online sourcing and distribution from individuals in the United States.

Second, Congress could encourage federal authorities to work with Chinese counterparts to strengthen the country's regulatory and enforcement capabilities. In the short term, China needs to be approached as a steward of the international system and a global partner in protecting the public against the harms from drugs. This includes constructively engaging China and other partner countries at relevant multilateral institutions. In the medium term, efforts could be made to enhance joint partnerships in other areas of drug policy. The DEA has opened a new office in Guangzhou, yet greater collaboration is needed. For example, the problems of methamphetamine misuse in China may give way to enhanced U.S.-Chinese research into improved treatments and responses or joint law enforcement investigations that result in disruption of supply. In the long term, Congress could encourage U.S. regulators to engage with Chinese authorities to improve joint monitoring and evaluation efforts of regulation violations, as well as aid the CFDA to hire, train, and retain qualified personnel. Congress could also consider appropriating additional resources to aid U.S. authorities that work with international partners and direct the FDA, DEA, Department of Homeland Security, and Department of State to improve interagency coordination and cooperation on synthetic opioids with Chinese counterparts.

Third, there is a need to better understand and target producers, importers, and high-level distributors both in the United States and in China. The supply of synthetic opioids deviates from the traditional paradigm of plant-based drugs. Synthetic opioids are advertised and sold on the internet and often distributed via the postal system. This presents a challenge but also an opportunity to U.S. law enforcement in gathering evidence and informing threat detection. Additional resources and innovative thinking will be needed; Congress may consider strengthening cyber-intelligence gathering efforts already underway, such as the Department of Justice's Joint Criminal Opioid Darknet Enforcement team, or encourage new efforts aimed at producers and vendors that operate outside of the darknet. Additionally, enhancing DEA's ability to chemically analyze fentanyl seizures, through its existing Fentanyl Signature Profiling Program, might offer insights into illicit manufacture. With additional tools, resources, and a greater understanding of the problem, law enforcement might be able to rapidly build cases against importers as well as quickly share actionable information and intelligence with Chinese authorities to effectively prosecute producers and distributors that flaunt Chinese laws.

Last and most importantly, we need to strengthen federal efforts aimed at reducing demand for opioids and overdose risk. Demand reduction could lessen economic incentives for drug

dealers and save the lives of those suffering from opioid-use disorder. Demand reduction for opioids includes improving access to existing and proven therapies, such as methadone and buprenorphine. Some steps that Congress could take are encouraging the expansion of pharmacological treatments covered by private and public insurance, subsidizing the cost of medication treatments to those who cannot afford them, and reviewing and reducing regulatory barriers on their provision. Congress could also direct federal health authorities, such as the FDA, to assess additional innovative and evidence-informed medication treatments.⁷² While expanding access to treatment may take time, greater efforts are immediately needed to reduce overdose risk. Increasing the availability of naloxone is one possible short-term, life-saving intervention. Recent analysis has found that direct dispensing of naloxone by pharmacists is associated with reductions in fatal overdoses.⁷³ Congress could look to reduce barriers to access to naloxone or subsidize its provision. Additionally, expanding access to interventions aimed at informing those who use drugs, especially stimulants, about the presence of synthetic opioids might be worth exploring. This could entail developing and disseminating tools, like test strips, aimed at detecting the presence of fentanyl or other synthetic opioids.

The arrival of illicitly manufactured synthetic opioids creates uncertainty in illicit drug markets, raising the risk of overdose. These substances are changing the drug policy landscape and stretching our ability to respond effectively. Decisionmakers will need to consider the new challenges presented by fentanyl and related substances to stem the rising trend in overdoses.

⁷² There have been several randomized control trials examining the efficacy of other agonist therapies, including injectable hydromorphone and diacetylmorphine when treating those who have not benefited from routine treatments like methadone, see Beau Kilmer, Jirka Taylor, Jonathan P. Caulkins, Pam A. Mueller, Allison J. Ober, Bryce Pardo, Rosanna Smart, Lucy Strang, Peter H. Reuter, *Considering Heroin-Assisted Treatment and Supervised Drug Consumption Sites in the United States*, Santa Monica, Calif.: RAND Corporation, 2018. As of July 19, 2019: https://www.rand.org/pubs/research_reports/RR2693.html

⁷³ R. Abouk, R. L. Pacula, and D. Powell, “Association Between State Laws Facilitating Pharmacy Distribution of Naloxone and Risk of Fatal Overdose,” *JAMA Internal Medicine*, Vol. 179, No. 6, 2019, pp. 805–811.