

Opioid Burden

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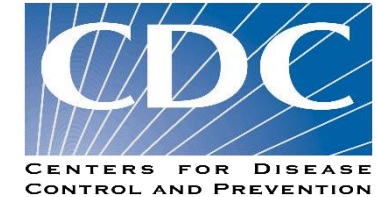
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Objectives

1. Opioid Overdose
2. Trends in Opioid Use
3. Mortality Burden of Opioid Overdose
4. Economic Burden of Opioid Overdose
5. Conclusions

Methodology

- PubMed search
 - Search terms: “Opioid Burden”, “Opioid Abuse Trend”, “Opioid Epidemiology”, “Opioid Crisis”, “Opioid Financial Burden”, and other
 - Search timeline: Last 20 years
- Centers of Disease Control and Prevention (CDC) website
- National Institute on Drug Abuse (NIDA) website
- U.S. Health and Human Services (HHS) website



1. Opioid Overdose

Pain

- Pain is more prevalent than diabetes, cancer, and heart diseases¹
- About 126 Million adults in the US suffer from pain (2012 data)²
- Pain is classified into two groups: Acute and Chronic
 - Acute: Short duration, intense pain usually following surgery or trauma. May resolve on its own
 - Chronic: 3 month or more lasting pain. Requires medical intervention
- If acute pain is not controlled, it may result in chronic pain

1. National Institute of Health (NIH) fact sheets – pain management. NIH website. <https://report.nih.gov/nihfactsheets/ViewFactSheet.aspx?csid=57>. Accessed July 12, 2018

2. Nahin RL. Estimates of Pain Prevalence and Severity in Adults: United States, 2012. *J Pain*. 2015;16(8):769-780. <https://doi.org/10.1016/j.jpain.2015.05.002>

Opioids

Opioids³

- Prescription products:
 - Oxycodone (OxyContin[®]),
 - Hydrocodone (Vicodin[®]),
 - Codeine,
 - Morphine, and
 - Others
- Prescription synthetic products such as fentanyl
- Illegal heroin

Indication and Mode of Action³

- Opioids are used to treat acute and chronic pains
- Opioids attach to pain and pleasure receptors located in the brain, spinal cord and other organs
 - Prevent pain signals sent from the brain to the body
 - Release large amounts of dopamine throughout the body and thus making the user want to repeat the experience

3. National Institute on Drug Abuse (NIDA) website. <https://www.drugabuse.gov/drugs-abuse/opioids>. Accessed July 12, 2018

Signs and Symptoms of Opioid Abuse

Inappropriate use of prescription and illegal opioids is substantial



Signs ^{4,5}

- Sudden Energy Spikes and Falls
- Confusion
- Constant head movement
- Doctor Shopping
- Social Withdrawal
- Sudden Financial Problems

Symptoms ^{4,5}

- Headache
- Nausea
- Sweating
- Inability to Sleep
- Tiredness

4. NIDA. Opioid Addiction. Jan. 2018. NIH website. www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/evidence-based-approaches-to-drug-addiction-treatment/pharmacotherapies. Accessed July 15, 2018

5. Centers for Disease Control and Prevention (CDC). Vital Signs. 16 Mar 2018. CDC website. www.cdc.gov/vitalsigns/opioid-overdoses/. Accessed July 15, 2018

Treatment and Prevention of Prescription Opioid Abuse

Treatment For Prescription Opioid Abuse ⁶

- Methadone is a long-acting synthetic opioid agonist medication that can prevent withdrawal symptoms
- Buprenorphine is a synthetic opioid medication that acts as a partial agonist at opioid receptors
- Naltrexone is a synthetic opioid antagonist that blocks opioids from binding to their receptor; thereby prevents euphoric effects

Prevention of Opioid Abuse ^{7, 8}

- Safe disposal of drugs after the prescription ends
- Safe Opioid prescribing
- Timely physician check-ups
- Strictly follow dosage instructions

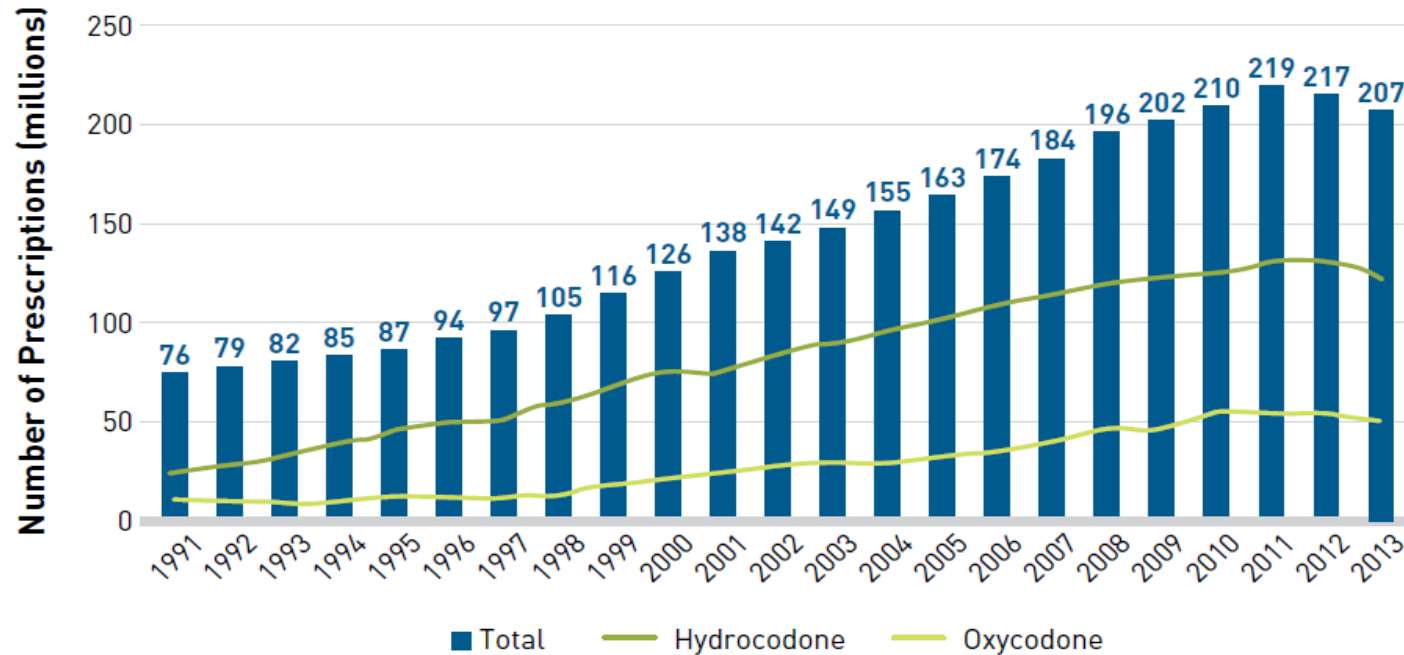
6. NIDA. How Do Medications to Treat Opioid Use Disorder Work? NIH website. June 2018. www.drugabuse.gov/publications/research-reports/medications-to-treat-opioid-addiction/how-do-medications-to-treat-opioid-addiction-work. Accessed July 18, 2018

7. U.S. Department of Health and Human Services (HHS). What Are Opioids? HHS website. 15 May 2018, www.hhs.gov/opioids/prevention/. Accessed July 18, 2018

8. NIDA. How Can Prescription Drug Misuse Be Prevented? NIDA website. Jan. 2018, www.drugabuse.gov/publications/research-reports/misuse-prescription-drugs/how-can-prescription-drug-misuse-be-prevented. Accessed July 20, 2018

2. Trends in Opioid Use

Opioid prescriptions dispensed by US retail pharmacies

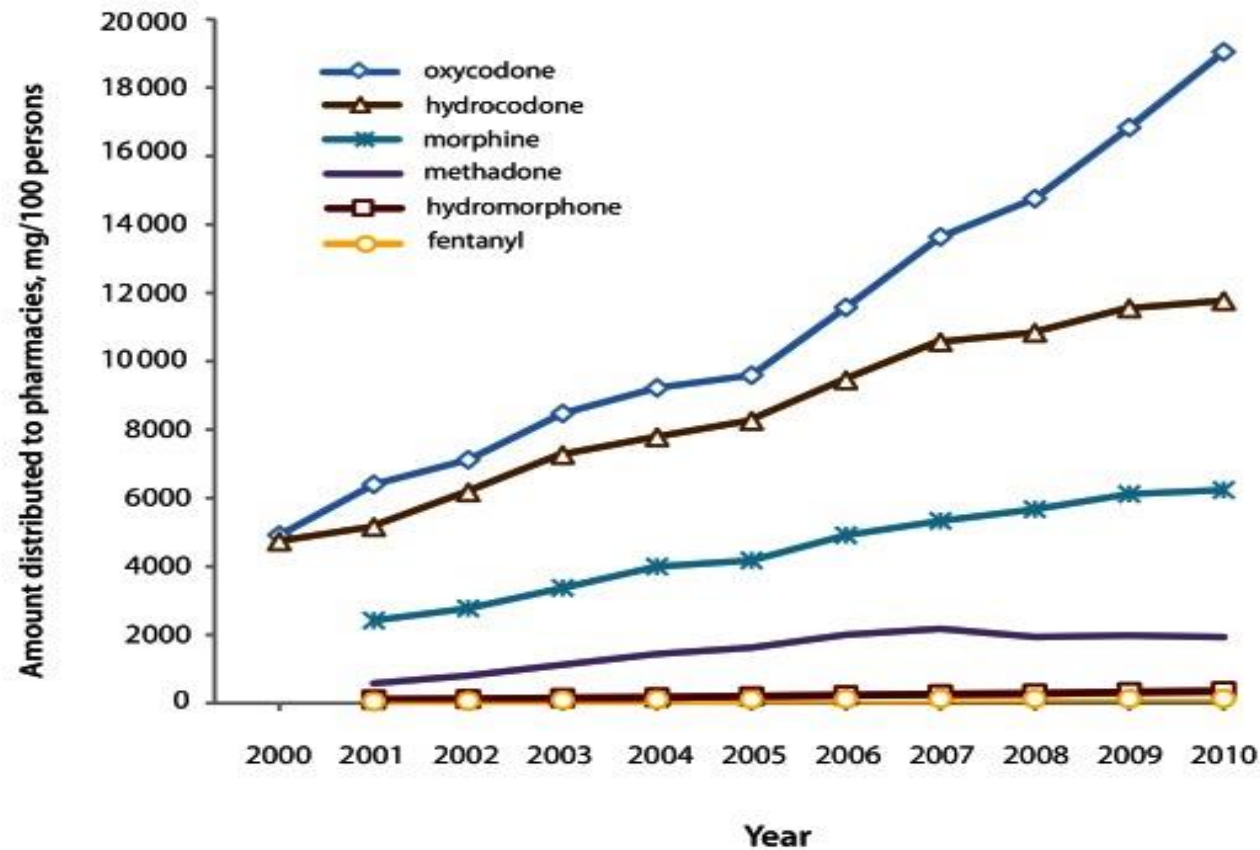


IMS Health. National Prescription Audit. Years 1997-2013. Data extracted 2014.

The figure shows increasing prescription opioids dispensed by retail pharmacies. From 1991 through 2013⁹

9. NIDA. America's addiction to opioids: heroin and prescription drug abuse. NIDA website. drugabuse.gov/about-nida/legislative-activities/testimony-to-congress/2016/americas-addiction-to-opioids-heroin-prescription-drug-abuse. Updated May 14, 2014. Accessed July 20, 2018

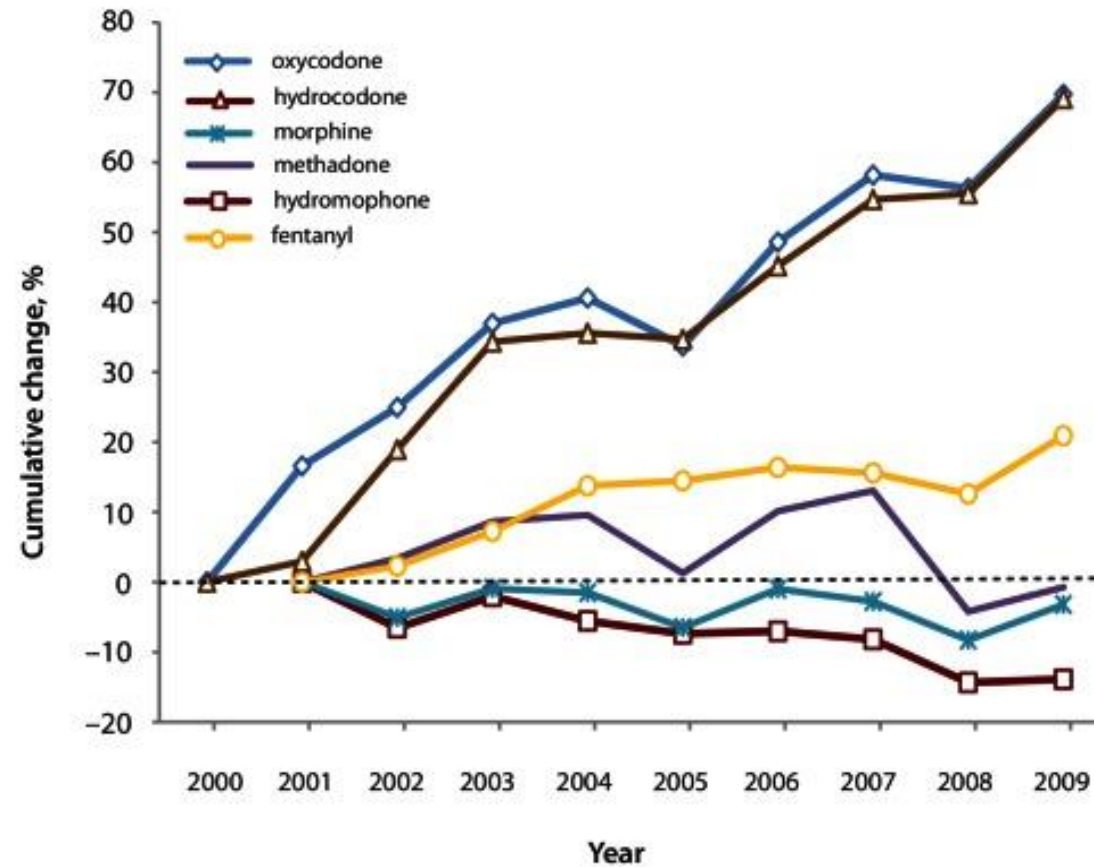
Distribution for Opioids to US pharmacies



The figure shows the average size in change of the opioids distributed to pharmacies from 2000 to 2010.¹⁰

10. Kenan K et al. Trends in prescriptions for oxycodone and other commonly used opioids in the United States. *Open Medicine*, Apr. 2012; 6(2): e41–e47

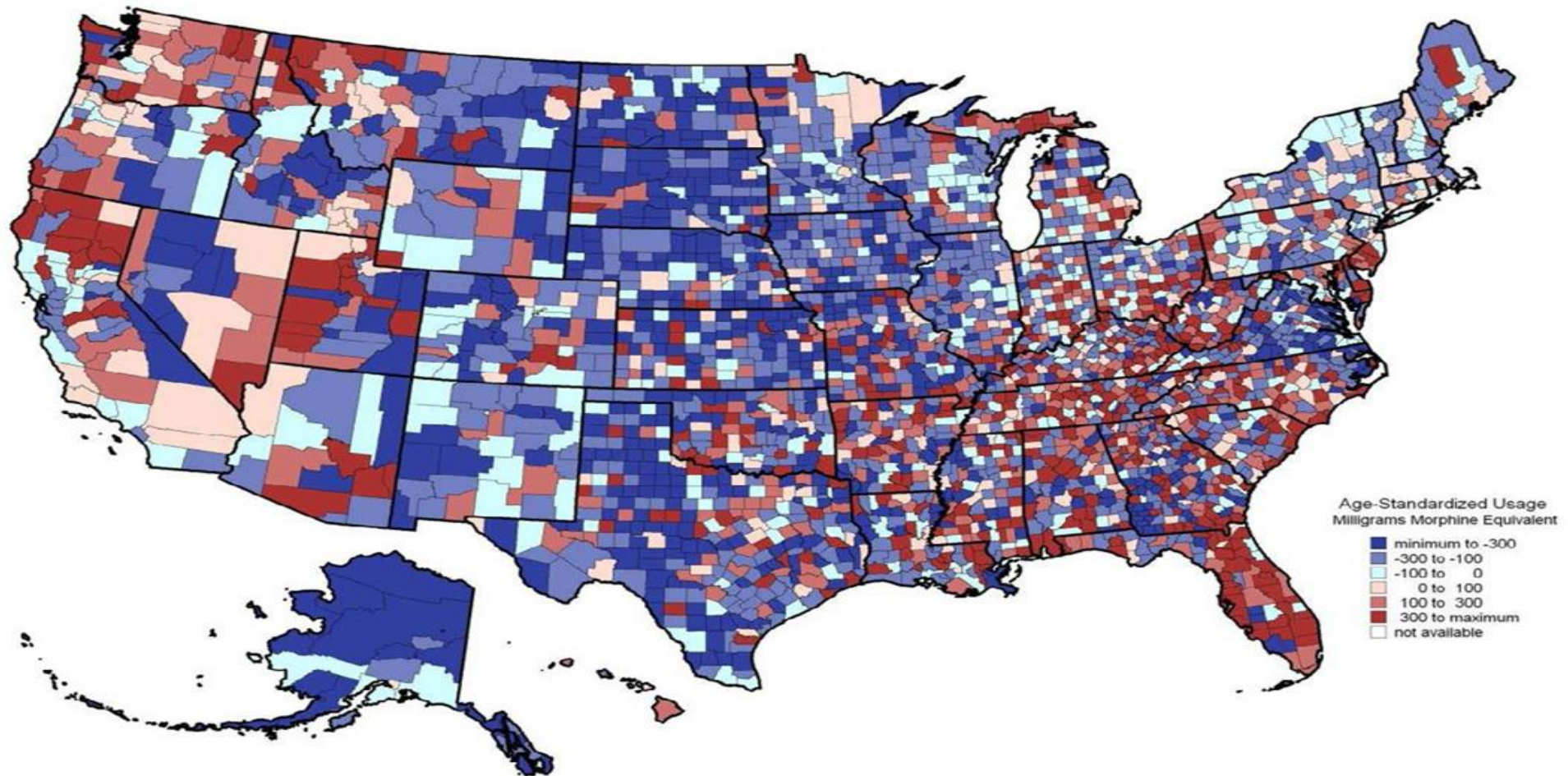
Size of Prescriptions for Opioids in the US



The figure shows the percentage change in the size of opioid prescriptions to patients.¹⁰

10. Kenan K et al. Trends in prescriptions for oxycodone and other commonly used opioids in the United States. *Open Medicine*, Apr. 2012; 6(2): e41–e47

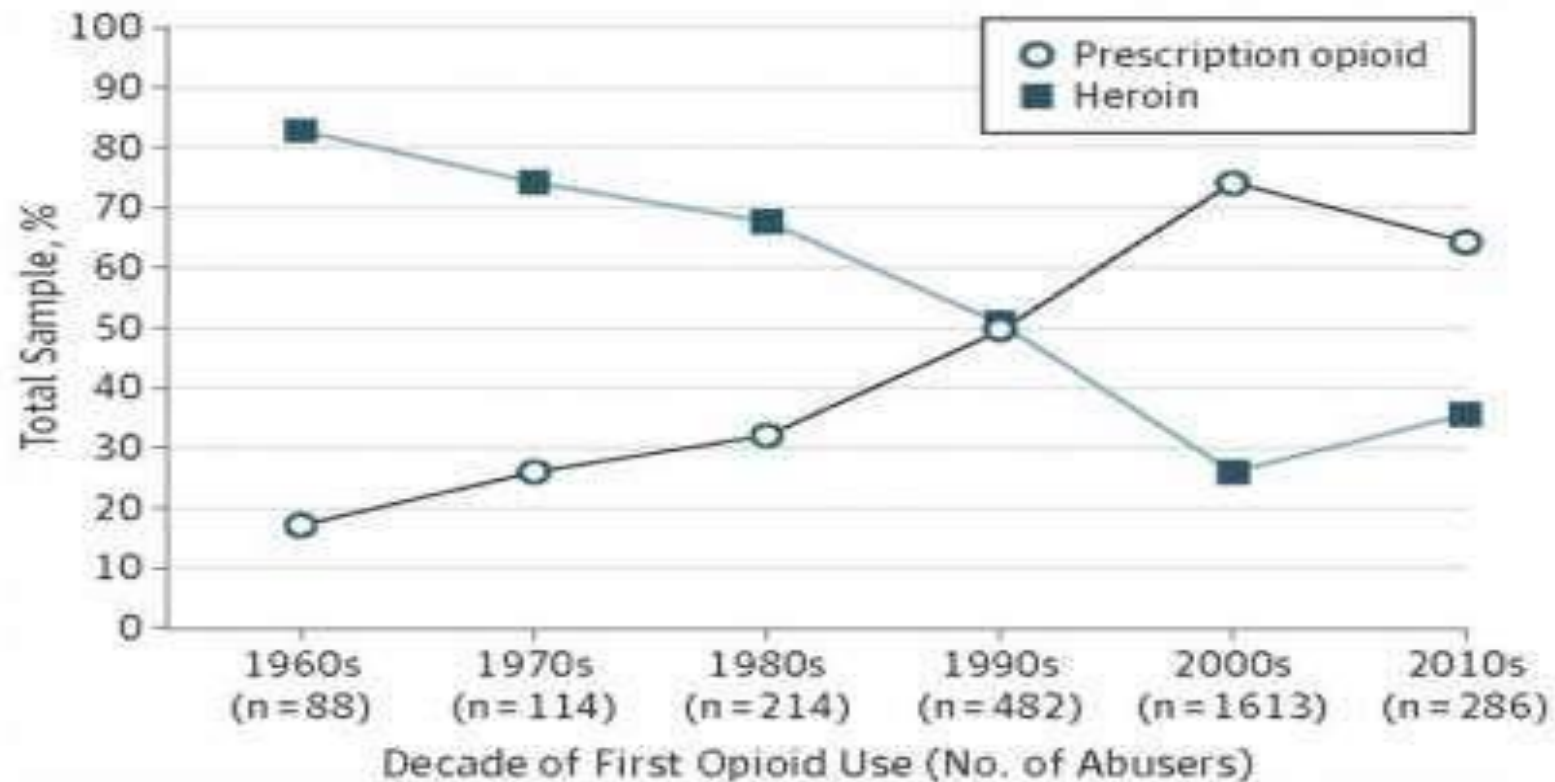
Variation of Opioids Dispensed in the US



County variations (in milligrams) dispensed by retail pharmacies, per county resident and standardized by age and gender, 2008.¹¹

11. McDonald DC, Carlson K, Izrael D. Geographic variation in opioid prescribing in the U.S. *J Pain*. 2012;13(10):988-996. doi: 10.1016/j.jpain.2012.07.007

Prescription Opioid and Heroin Abuse (1)



The above graph shows the percentage of the total heroin-dependent sample that used heroin or a prescription opioid as their first opioid of abuse. Data are plotted as a function of the decade in which respondents initiated their opioid abuse. For example, of those who began abusing opioids in the 2000s, 75 percent reported that their first opioid was a prescription drug (adapted from Cicero et al, 2014)¹²

12. NIDA. Prescription Opioid Use Is a Risk Factor for Heroin Use. NIDA website. Jan. 2018, <https://www.drugabuse.gov/publications/research-reports/relationship-between-prescription-drug-heroin-abuse/heroin-use-rare-in-prescription-drug-users>. Accessed July 22, 2018

Prescription Opioid and Heroin Abuse (2)

| | Total (n=50) | Inject Opioid Before Heroin (n=15) | Inject Heroin Before Opioid (n=25) | Never Inject Opioid (n=10) |
|-------------------------------------|--------------|---------------------------------------|---------------------------------------|-------------------------------|
| Initiated Injection Drug Use | | | | |
| Opioid | 11 (22%) | 11 (73.3%) | 0 | 0 |
| Heroin | 25 (50%) | 0 | 18 (72%) | 7 (70%) |
| Cocaine or Methamphetamine | 14 (28%) | 4 (26.7%) | 7 (28%) | 3 (30%) |
| Means Ages of Initiation | | | | |
| Opioid Misuse | 14.6 | 13.9 | 14.2 | 16.9 |
| Opioid Injection | 17.7 | 16.6 | 18.3 | -- |
| Heroin | 16.6 | 16.6 | 16.4 | 17.0 |
| Heroin Injection | 17.5 | 17.9 | 16.8 | 18.8 |
| First Opioid Injected | | | | |
| Oxycontin | 18 (36%) | 9 (60%) | 9 (36%) | 0 |
| Dilaudid | 7 (14%) | 3 (20%) | 4 (16%) | 0 |
| Morphine | 6 (12%) | 2 (13.3%) | 4 (16%) | 0 |
| Other | 9 (18%) | 1 (6.7%) | 8 (22%) | 0 |

Results from a study of young, urban injection drug users interviewed in 2008 and 2009 (adapted from Table 3)¹³

13. Lankenau SE, Teti M, Silva K, Jackson Bloom J, Harocopos A, Treese M. Initiation into prescription opioid misuse amongst young injection drug users. *Int J Drug Policy*. 2012;23(1):37-44

Prescription Opioid and Heroin Abuse (3)

- Prescription opioid abuse is a growing risk factor for start of heroin use
 - The incidence of heroin initiation was 19 times higher among those who reported prior nonmedical pain reliever use compared to those who did not¹⁴
- Prescription opioid abuse preceded heroin use by an average of 2 years¹⁵
- 4 percent of people who had abused prescription opioids started using heroin within 5 years¹⁶
- Prescription opioid users and abusers are more likely to switch to heroin¹⁵
 - Dependence on or abuse of prescription opioids is shown to be associated with a 40-fold increased risk of dependence on or abuse of heroin¹⁵

14. NIDA. Prescription Opioids and Heroin Have Similar Effects, Different Risk Factors. NIDA website. Jan. 2018, www.drugabuse.gov/publications/research-reports/relationship-between-prescription-drug-abuse-heroin-use/rx-opioids-heroin-have-similar-effects-different-risk-factors. Accessed July 23, 2018

15. NIDA. "A Subset of People Who Abuse Prescription Opioids May Progress to Heroin Use." NIDA website. Jan. 2018, www.drugabuse.gov/publications/research-reports/relationship-between-prescription-drug-abuse-heroin-use/subset-users-may-naturally-progress-rx-opioids-to-heroin. Accessed July 23, 2018

16. NIDA. Prescription Opioid Use Is a Risk Factor for Heroin Use. NIDA website. Jan. 2018, <https://www.drugabuse.gov/publications/research-reports/relationship-between-prescription-drug-heroin-abuse/heroin-use-rare-in-prescription-drug-users>. Accessed July 23, 2018

Opioid Use for Post Surgical Pain

- Pain after surgery is one of the most common causes of acute pain (i.e. pain lasting less than 3 months) for adults in the United States
- Estimated 34.4 million hospital discharges, excluding newborns, in 2007¹⁷
- A German study showed open reduction of the calcaneus (6.68), spinal fusion (6.61), cesarean section (6.14), shoulder replacement (6.09), and open appendectomy (5.95) as some of the most painful procedures (first day after surgery with 10 as the worst pain)¹⁸
- Twenty-five percent of hospital patients had a opioid receipt within 72 hours of discharge¹⁹
- Another study showed that patients undergone total hip arthroscopy, hip fracture repair, cholecystectomy, and other surgical procedures at 11 hospitals reported that 99.8% received opioids while recovering in the hospital²⁰

17. Hall MJ et al. National Hospital Discharge Survey: 2007 Survey. National Health Statistics Report. Oct 26, 2010. Volume 16. <https://www.cdc.gov/nchs/data/nhsr/nhsr029.pdf>. Accessed July 24, 2018

18..Meissner W, Mescha S, Rothaug J, Zwacka S, Goettermann A, Ulrich K, et al. Quality improvement in postoperative pain management: results from the QUIPS project. *Dtsch Arztebl Int.* 2008;105(50):865-870

19. Calcaterra, SL, et al. Opioid Prescribing at Hospital Discharge Contributes to Chronic Opioid Use. *J Gen Intern Med.* 2016 May;31(5):478-85. doi: 10.1007/s11606-015-3539-4.

20. Minkowitz HS, Gruskus SK, Shah M, Raju A. Adverse drug events among patients receiving postsurgical opioids in a large health system: Risk factors and outcomes. *Am J Health Syst Pharm.* 2014;71(18):1556-1565

3. Mortality Burden

Public Health Problem from Opioid Overdose

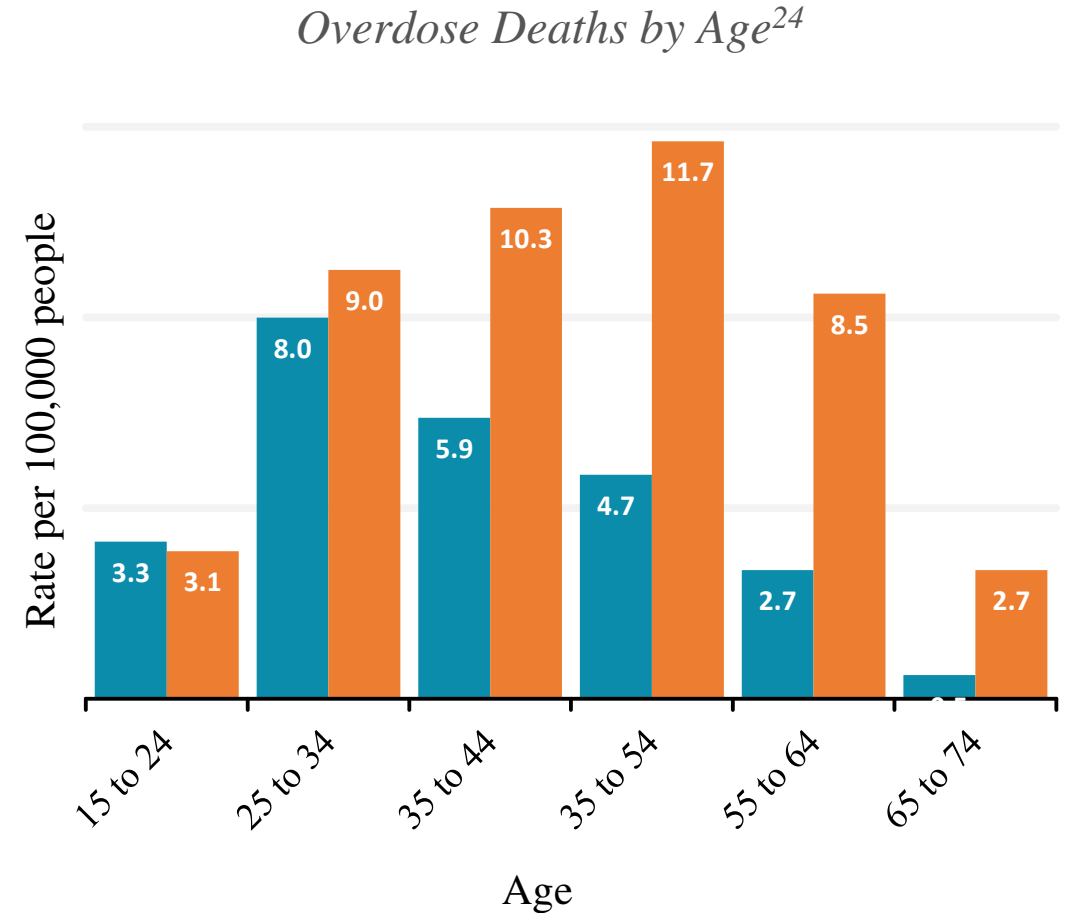
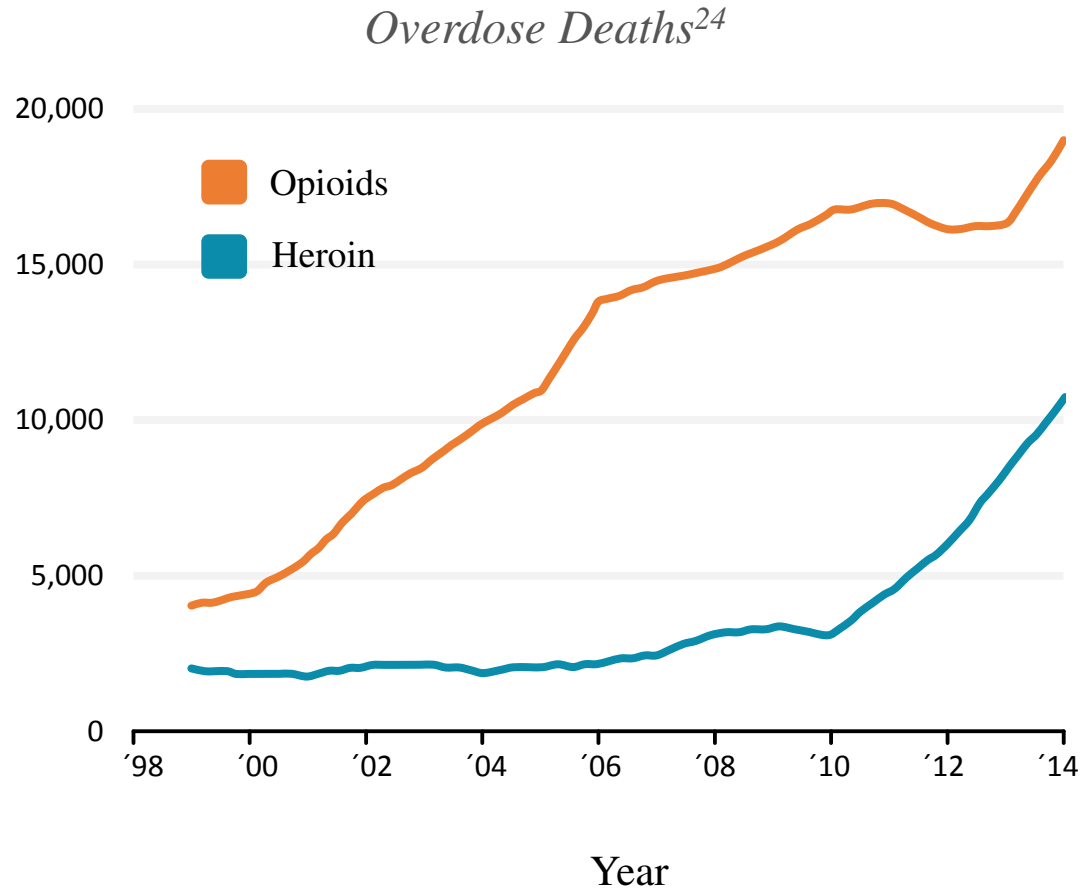
- Opioids were involved in 42,249 deaths in 2016 ²¹
 - Opioid overdose deaths are five times higher in 2016 than 1999 ²¹
- Heroin related overdose deaths increased fivefold from 2010 to 2016 ²²
 - Between 2015 and 2016, heroin overdose deaths increased by 19.5%
- In 2016, males aged between 25 and 44 had the highest heroin death rate at 15.5 per 100,000 ²²
 - This was an increase of 17.4% since 2015
- Prescription opioid–related deaths are considered to be one of the nation’s leading preventable public health problems²³

21. CDC. Opioid Overdose. Centers for Disease Control and Prevention website, 19 Dec. 2017, www.cdc.gov/drugoverdose/data/statedeaths.html. Accessed July 25, 2018

22. CDC. Opioid Overdose. Centers for Disease Control and Prevention website, 26 Jan. 2017, www.cdc.gov/drugoverdose/data/heroin.html. Accessed July 25, 2018

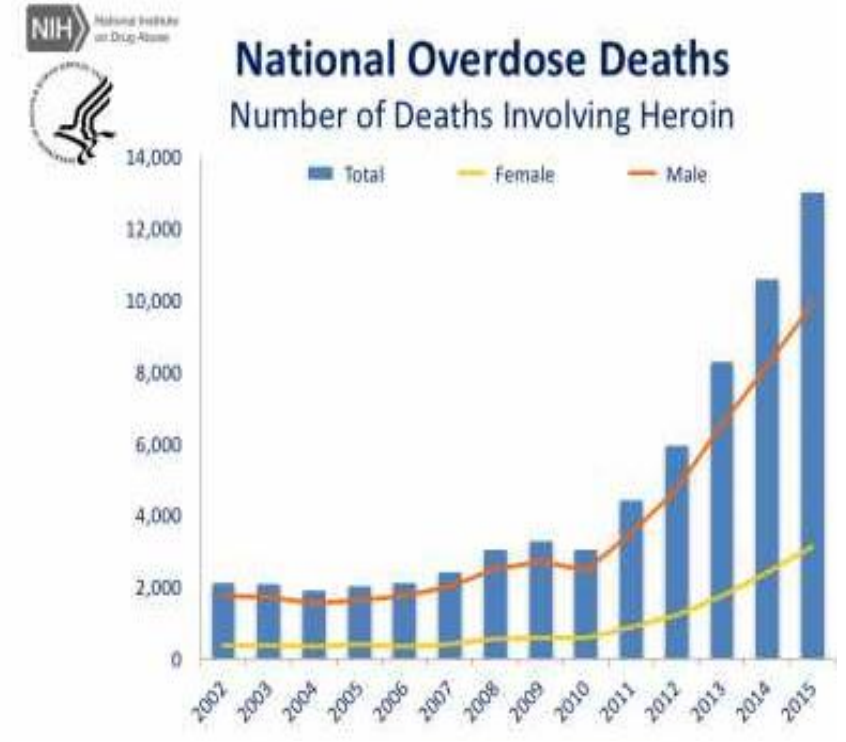
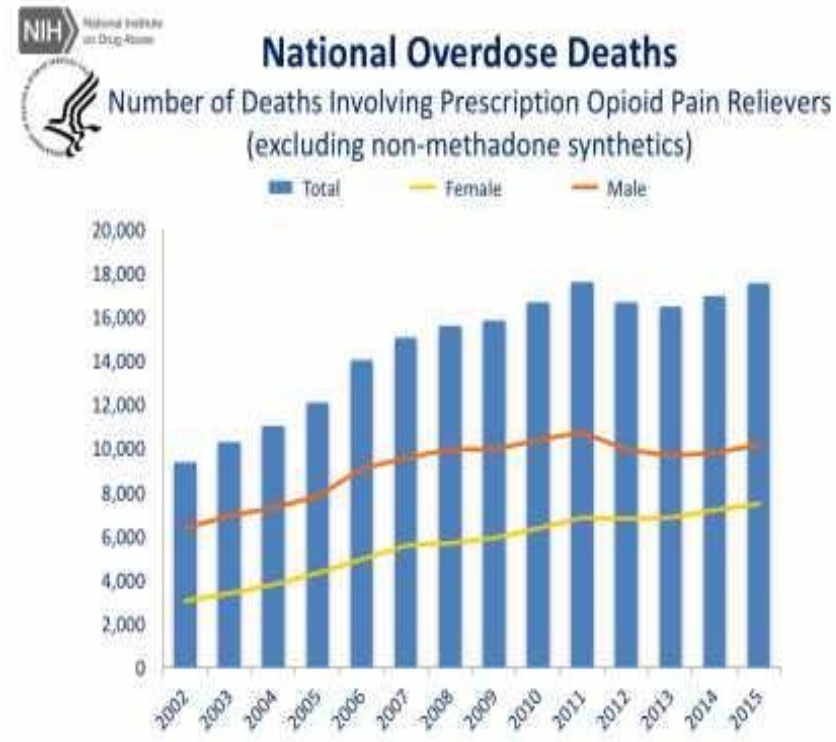
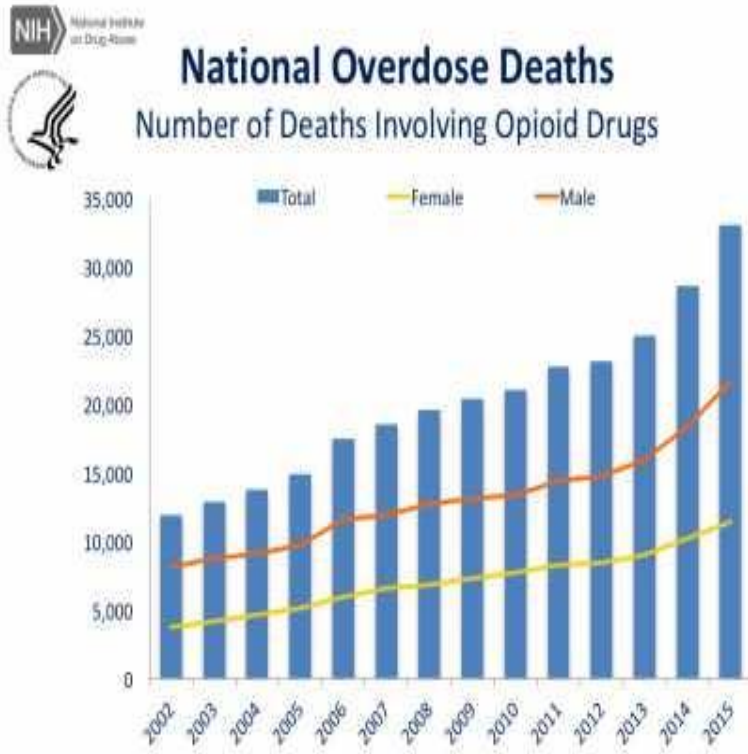
23. HHS. Office of Disease Prevention and Health Promotion. Section 7: Opioids. Oct. 2014. <https://health.gov/hcq/pdfs/ADE-Action-Plan-Opioids.pdf>. Accessed July 25, 2018

Opioid and Heroin Overdose Death



24. Nolan D, Amico C. How Bad is the Opioid Epidemic? Feb. 2016. <http://www.pbs.org/wgbh/frontline/article/how-bad-is-the-opioid-epidemic/>. Accessed July 26, 2017

Deaths from All Opioids ²⁵



From 2002 to 2015 there was a 2.8-fold increase in the total number of deaths from **prescription opioids and heroin**

From 2002 to 2011 there was a 1.9-fold increase in the total number of deaths from **prescription opioids**, but it has remained relatively stable since then

From 2002 to 2015 there was a 6.2-fold increase in the total number of deaths from heroin only

25. NIDA. Overdose Death Rates. NIDA website, 15 Sept. 2017, www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates. Accessed July 26, 2018

4. Economic Burden

Economic Burden

- Prescription opioid overdose hospital admission increases from 10.7 per 100,000 in 2001 to 25.8 per 100,000 in 2012 (2.4 fold increase). Heroin related hospital admission increases from 1.75 to 3.34 (1.9 fold increase) per 100,000 persons during this time²⁶
- Opioid overdose is responsible for about 147,654 emergency room visits²⁷
 - Estimated direct medical costs \$153 Million
- Mean annual excess health care costs for opioid abusers with *private insurance* ranged from \$14,054 to \$20,546 per patient in the US²⁸
- Mean annual excess health care costs for opioid abusers with *Medicaid* ranged from \$5,874 to \$15,183 per patient in the US²⁸
- A 2017 retrospective claims database study of privately insured patients validated the previous study results and estimated that opioid abusers incur annual excess health care costs of over \$14,000 per patient relative to non-abusers³⁰
- Societal costs attributable to prescription opioid abuse were estimated at \$78.5 billion in 2013;²⁹ however a recent estimate showed that economic burden could reach as high as \$504 Billion³¹

26. Hsu D. et al. Trends in hospital admissions and costs associated with heroin and prescription opioid overdoses: Analysis of National Inpatient Sample Data 2001-2012. *American Journal of Respiratory and Critical Care Medicine* 2016;193:A2961

27. Guy GP, Pasalic E, Zhang K. Emergency department visits involving opioid overdoses, U.S., 2010–2014. *Am J Prev Med*. 2018;54(1):e37-e39. doi: 10.1016/j.amepre.2017.09.003

28. Meyer R, Patel AM, Rattana SK, Quock TP, Mody SH. Prescription opioid abuse: a literature review of the clinical and economic burden in the United States. *Popul Health Manag*. 2014;17(6):372-387. doi: 10.1089/pop.2013.0098

29. Florence CS, Zhou C, Luo F, Xu L. The economic burden of prescription opioid overdose, abuse, and dependence in the United States, 2013. *Med Care*. 2016;54(10):901-906. doi: 10.1097/MLR.0000000000000625.

30. Kirson NY et al. The Economic Burden of Opioid Abuse: Updated Findings. *J Manag Care Spec Pharm*, 2017 Apr;23(4):427-445. <https://doi.org/10.18553/jmcp.2017.16265>

31. Council of Economic Advisers (CEA). The underestimated cost of the opioid crisis: executive summary. Washington, DC: Council of Economic Advisers (CEA); 2017. [whitehouse.gov/sites/whitehouse.gov/files/images/The Underestimated Cost of the Opioid Crisis.pdf](https://www.whitehouse.gov/sites/whitehouse.gov/files/images/The_Underestimated_Cost_of_the_Opioid_Crisis.pdf). Accessed July 28, 2018

Conclusions

Opioid abuse is

- Responsible for significant loss of lives
- Debilitating for patients, young and old
- Costly to the society and payers
- An epidemic in the USA

Thank You!