Adoption of Law Enforcement Naloxone Programs:
Through a Diffusion Theory Framework

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Abstract

The U.S. Department of Health and Human Services (DHHS) has identified law enforcement naloxone programs (LENP) as an essential strategy to expand naloxone access\(^1\). Recruiting law enforcement to play a central role in naloxone expansion is a significant paradigm shift in our nation’s approach to drug use. In law enforcement naloxone programs, officers are in a position to help, rather than punish, drug users at risk of overdose. The abrupt shift in expectations for law enforcement creates a need to evaluate whether a paradigm shift in federal policy has also translated to a shift in attitudes and behaviors of law enforcement towards naloxone use.

The goals of this paper are twofold. First, I aim to identify variables that influence the decision of law enforcement to support or resist the adoption of law enforcement naloxone programs. Guided by a diffusion of innovations theoretical framework\(^2\), I will explore the differences in the rate and process of adoption of LENP in a sample of 5 states. I hypothesize that the adoption rate of law enforcement naloxone programs will be positively associated with a high degree of perceived compatibility, a high degree of perceived relative advantage, and a low degree of perceived complexity for program implementation by law enforcement officers.

Second, I will conduct a systematic review of the literature that evaluates the attitudes and behaviors of law enforcement officials towards naloxone programs. With these two objectives, my goal is to provide evidence that supports future policy-making decisions about law enforcement naloxone programs in the United States.
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Introduction

Since President Nixon declared drug abuse to be “America's public enemy number one,” our nation has come quite a long way in our understanding of the physiologic nature of addiction. Historically, law enforcement officials have addressed substance abuse by enforcing punitive drug laws and policies that criminalized drug use and addiction. However, sharply climbing overdose rates over the last twenty years confirm that we have lost the “War on Drugs” that began in the early 1970’s.

In the United States, drug overdoses have reached what many have called epidemic proportions, surpassing both motor vehicle accidents and firearms as the leading cause of unintentional death in 2008. Over 60% of these drug overdoses have been opioid-related. Since 1999, the rate of opioid-related deaths has nearly quadrupled in number. In 2014, opioid-related overdose deaths, which includes both prescription opioids and illicit opioids such as heroin, reached an all-time high, accounting for 29,467 deaths that year alone.

Realizing that we can no longer arrest our way out of what many consider an epidemic, the Obama administration has transitioned to a national drug policy that treats addiction as an issue of public health, rather than criminal justice. The U.S. Department of Human Health and Services (DHHS) has endorsed a three-pronged approach to addressing opioid-related overdoses: reduce irresponsible prescribing practices, increase access to medication-assisted treatment (MAT), and expand access to naloxone.

To expand naloxone access, the U.S. DHHS has identified law enforcement naloxone programs (LENP) as an effective “best practice naloxone delivery model and strategy.” Law enforcement naloxone programs (LENP) are programs adopted by law enforcement agencies
to equip their officers to carry naloxone and administer if needed. Law enforcement is uniquely posed to be first on the scene of an overdose and thus, save lives with naloxone. Former Attorney General Eric Holder went so far as to recommend that every law enforcement agency in the country be equipped to carry and administer naloxone⁷, and current Attorney General Loretta Lynch has continued to preside over the implementation of that goal, using strategies such as the DOJ’s Bureau of Justice Assistance to create a Naloxone Toolkit for law enforcement agencies⁸.

Increasing expansion of naloxone is a fundamental shift in the federal government’s approach to drug use. Naloxone expansion is a type of harm reduction, which is defined as “a set of practical strategies and ideas aimed at reducing negative consequences associated with drug use.”⁹ But, at the very core of harm reduction is its symbolic representation as “a movement for social justice built on a belief in, and respect for, the rights of people who use drugs.”⁹

Law enforcement naloxone programs (LENP), in particular, represent a significant cultural paradigm shift in the roles, responsibilities, and expectations of law enforcement officials. This sentiment is well reflected by the statements of U.S. Capitol Police Chief, Kim Dine, at the 2014 Police Executive Research Foundation (PERF) Summit, who states, “This is historic. We are hearing police officials from across the country saying, ‘Heroin is a medical problem.’ That is not the way we have viewed this for the last 40 years.”¹⁰

As of April 2016, law enforcement naloxone programs (LENP) had expanded to 971 departments across 36 states¹¹. While increasing numbers of law enforcement agencies are training their officers to administer naloxone, the significant majority of the nation’s 18,000 police departments still have not equipped officials with naloxone.

What is Naloxone?

Although the push to expand naloxone access has gained momentum within the last
decade, naloxone has been available in the United States for quite some time. The FDA approved naloxone in 1971\textsuperscript{12}. But, for much of its lifetime, the drug has been available only as an injectable formulation. Before April 2014, intranasal naloxone administration was given “off-label”. Before the naloxone can be administered, off-label naloxone use requires responders to first connect a mucosal atomizer device (MAD) to a prefilled naloxone syringe (See figure 1). Then, responders may insert the MAD into each of the victim’s nostrils and deliver aerosolized droplets of naloxone into the nasal cavity. Currently, the newer formulations of NARCAN® Nasal Spray and EVZIO® now allow law enforcement to give naloxone through FDA-approved means that are straightforward and uncomplicated.

Naloxone reverses the respiratory depression associated with opioid overdose by displacing opioid molecules from their receptors in the central nervous system. In victims who are physiologically dependent on opioids - as overdose victims frequently are - the abrupt absence of bound opioid receptors results in a state of opioid withdrawal. Opioid withdrawal most commonly results in symptoms such as fever, chills, nausea, vomiting, or psychological distress\textsuperscript{13}.

Naloxone is a prescription medication that can quickly reverse the effects of opioid overdose if it is administered within 1 to 3 hours after the start of overdose symptoms. Naloxone takes effect within minutes of its administration, and is able to revive opioid overdose victims to full consciousness from a near-death state\textsuperscript{13}. The overdose antidote poses little to no risk for adverse side effects, no risk for overdose, and has no potential for addiction\textsuperscript{13}.

**Theoretical Perspective**

In his formative work, “Diffusion of Innovations”, Everett M. Rogers develops a theoretical framework to explicate the variables that influence the rate at which innovations are
adopted by individuals and organizations. E.M. Rogers, an early and very prominent proponent of diffusion of innovation theory, defines an innovation as any “idea, practice, or object that is perceived as new by an individual or other unit of adoption” (pg. 2). Even though naloxone has been commonplace in the pre-hospital setting for decades, its use has been previously restricted to medical first responders, such as paramedics, and/or laypersons, such as friends and family members of drug users. Thus, the innovative nature of law enforcement naloxone programs stems from the clear departure of naloxone use from previous law enforcement practices.

The diffusion of an innovation refers to the “process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system” (Rogers, pg. 11). These four elements of diffusion – an innovation, communication channels, time, and the social system- have the largest influence on the rate at which innovation adoption occurs.

Rogers’ theory has been applied in diffusion research across a wide spectrum of research disciplines that encompass social sciences, public health, and criminal justice research. Given its multidisciplinary breadth, the diffusion of innovations theory is well suited to study law enforcement adoption of LENP programs- an innovative strategy that unifies the public health and criminal justice sectors. Furthermore, there is a well-established body of policing research that has used the diffusion of innovations theory to understand a large number of policing innovations, such as community policing, computerized crime mapping, robbery prevention programs, and electronic communication delivery systems.

In this paper, I will explore how diffusion theory can help explain variation in the rate of adoption of law enforcement naloxone programs in five key states: Florida, Massachusetts, New York, Ohio, and Pennsylvania.
Methods

Sample Selection

After selecting an appropriate theoretical framework, I then selected a sample of states for in-depth analysis that met two inclusion criteria: high rates of opioid overdose and LENP authorization enacted prior to July 2015. Given that the majority of LENP authorization laws have been enacted within the last 3 years, I deemed 1 year to be sufficient in length to explore the rate of LENP adoption within the state. Among those states that met inclusion criteria, I ultimately chose a sample of five states to conduct a case study comparative analysis of LENP adoption within each state. The five states were Massachusetts, New York, Florida, Ohio, and Pennsylvania.

My aim was to select a sample of states that varied in the time frames for diffusions, their experiences and strategies with LENP adoption, and the subsequent degree of success among law enforcement adoption and buy-in of naloxone programs. To accomplish my objectives of characterizing LENP adoption process and rates, my ideal protocol would have been designed with a larger sample size. Given the time restrictions and scope of this master’s paper, I was limited to a smaller sample size than ideally designed. The study is also limited in scope geographically to states that were sampled from the regions of New England, Mid-Atlantic, and Florida. This study thus largely fails to sample from the West Coast, Midwest, and the South, and thus may limit the generalizability of results to states in those regions.

Estimation of the Number of Law Enforcement Agencies

In order to comment on the rate of LENP adoption, it is necessary to know the total number of law enforcement agencies in each state. The difficulty of determining the total number of law enforcement agencies in the United States has been well documented. There are three
sources of national data on the number of law enforcement agencies: the Uniform Crime Reporting (UCR), Annual Survey of Public Employment and Payroll (ASPEP), and the Census of State and Local Law Enforcement Agencies (CSLLEA). All three sources use different inclusion criteria for law enforcement agencies. To estimate the number of law enforcement agencies in each state, I used the Census of State and Local Law Enforcement Agencies (CSLLEA).

Compared to the UCR and the ASPEP, the CSLLEA uses the most inclusive criteria to define a law enforcement agency. The CSLLEA includes the following agencies: campus police, transit police, primary state police, sheriffs’ offices, local police departments, tribal police, and special jurisdiction agencies (which includes campus police). In the CSLLEA, federal agencies and agencies that do not employ sworn officers are excluded from the total count of law enforcement agencies.

Despite using the most comprehensive source of data on law enforcement agencies, the most recent data publicized on the number of law enforcement naloxone programs in New York surpassed the total number of law enforcement agencies in New York reported by the CSLLEA. I attempted to contact the state contact for author of the publication reporting the number of LENP programs to determine the inclusion criteria used in counting the number of law enforcement agencies. The author had not responded by the date at which this paper was submitted (July 2016).

Data Extraction

I extracted data on LENP programs from each of the five states from peer-reviewed literature searches, and multiple sources of “grey literature,” which included newspaper articles, video interviews, press releases, and minutes or proceedings from conferences, community task
forces, and state task forces at which law enforcement leaders were present. During the extraction process, data was extracted from information and quotes that demonstrated or suggested the perceptions, opinions, attitudes, and behaviors of law enforcement that related to opioid overdoses, naloxone and/or law enforcement drug policies. Given the hierarchal structure of law enforcement, any relevant quotes and/or actions by leaders of law enforcement agencies (police chiefs or sheriffs) were included during the data extraction process.

To search for relevant newspaper publications on LexisNexis, I used a search strategy with keywords that included “naloxone”, “narcan”, “law enforcement”, “sheriff,” and “police”. The search strategy is outlined in detail in Table A-1. For each state, the search was performed and a geographical state filter was applied. Duplicates with “high similarity” were filtered out of the search results.

**Findings and Discussion**

The nation’s opioid overdose epidemic is also evident in the five states I analyze here. See Table 1 for comparison of the age-adjusted opioid overdose death rates in each state in 2013 and 2014. Among the sample of five states, Ohio has seen the highest rates of opioid overdose. In 2014, Ohio was ranked fifth in the country with an opioid overdose rate of 24.6 per 100,000 people. New York experienced the lowest rates of opioid overdose with a rate of 11.0 per 100,000 people. Between 2013 and 2014, the overdose epidemic significantly worsened in three out of the five states. Massachusetts, Ohio, and Pennsylvania all experienced statistically significant increases in opioid overdose deaths.

In the United States, law enforcement agencies are typically structured as hierarchal paramilitary organizations that operate under the leadership of a single police chief or sheriff. Thus, a single leader –typically, a police chief or sheriff- usually makes the final decision about LENP adoption.
Rogers argues that half to more than four fifths of program adoption is attributable to five variables: relative advantage, compatibility, complexity, trialability, and observability².

Figure 1 depicts Rogers’ theoretical framework of how an innovation’s adoption rate is influenced by these variables, with the understanding that their degree of influence also varies by innovation, social systems, and external change agents². A straightforward application of Rogers’ diffusion theory predicts that LENP adoption will occur at a faster rate if police chiefs and sheriffs perceive LENP programs as (a) relatively advantageous, (b) compatible with their beliefs, values, and past experiences, (c) simple to understand and implement, and (d) easily observable. To that point, I will use Rogers’ diffusion theory framework to explore the variation in LENP adoption rate across my five selected states, New York, Pennsylvania, Massachusetts, Ohio, and Florida.

As of April 2016, New York had over a 100% adoption rate, with a count of 523 LENP programs¹⁹, ²⁰. A discussion of possible explanations for this discrepancy in data can be found in the Methods section. Pennsylvania has the second highest adoption rate of 30.7%.¹⁹, ²⁰. For the remaining states, in descending order, the LENP adoption rates are as follows: Massachusetts (13.7%), Ohio (6.0%), and Florida (1.3%)¹⁹, ²⁰. See Table 2 for a side-by-side comparison of the LENP program adoption rates between states.

**Observability Effects in the Early Stages of Adoption**

Observability, or “the degree to which the results of an innovation are visible to others, (Rogers, pg. 258)” plays an important role in the early phases of diffusion. The earliest LENP pilot programs in the country included the LENP pilot programs adopted by Massachusetts in 2010²¹, New York in 2012, and Ohio in 2013²². LENP adoption in Pennsylvania and Florida began quite some time later, in late 2014 and late 2015, respectively. Falling into the “early
“majority” of innovative states to adopt naloxone programs for law enforcement, neither state developed a pilot program before expanding LENP authorization statewide.

For the early adopters - NY, and OH- the observability of Quincy’s naloxone program helped to drive the adoption of early LENP pilot programs for both states. Massachusetts’ LENP pilot program, Quincy Police Department, was the first LENP in the nation in 2010. After Quincy’s officers began saving lives, states such as New York and Ohio sought to replicate LENP pilot programs in their own states.

**Massachusetts.** In November 2007, the Massachusetts Department of Public Health piloted the state's Overdose Education and Naloxone (OEND) program to distribute free naloxone to bystanders at 8 pilot sites located in high-overdose communities. Between December 2007 and June 2010, the OEND program trained over 6,700 potential bystanders and resulted in at least 670 documented naloxone reversals across the 8 pilot locations. The OEND pilot program set the stage for Massachusetts to expand naloxone access to its police and fire departments. In 2010, the MDPH expanded its OEND pilot program to include the Revere Fire Department and the Quincy Police Department, the first law enforcement naloxone program in the country.

**New York.** Two years after the Quincy Police Department adopted the first LENP, New York piloted a 20-month (April 2012 - December 2013) naloxone expansion program for EMTs. The New York pilot program trained 2,035 basic EMTs, resulting in 223 naloxone rescues with a 10% treatment diversion rate. Following the lead of Massachusetts, New York developed a second naloxone pilot program in May 2012, this time for Suffolk County law enforcement.

Given the high overdose rates in Suffolk County, law enforcement officials were in a position to encounter overdoses, and were thus able to put their naloxone training to use. In Suffolk County, the LENP pilot was initially adopted by a smaller cohort of officers rather than
immediately by the entire department. Still in the early phases, within 5 months of the pilot program, the cohort of trained police officers had 32 naloxone rescues under their belt. The rapid pace and visible nature of outcomes in just the first five months of the pilot led the police department to quickly expand the naloxone program to all of the officers.

*Ohio.* In October 2013, the first law enforcement programs in Ohio were adopted in Lorain County, located just west of Cleveland, in Ohio’s major northern urban rustbelt region. The Lorain County Drug Task Force – which included local law enforcement leaders - first lobbied state legislators to introduce and pass Senate Bill 57, which authorized a 1-year pilot program in Lorain County. The pilot program - named Project DAWN (Deaths Avoided With Naloxone) of Lorain County - successfully trained law enforcement in 10 out of Lorain County’s 18 police departments, and several fire departments as well. Due to a deadly batch of heroin, in the first month of the pilot program, first responders had 16 successful naloxone rescues. Project DAWN of Lorain County was the product of a collaborative effort by a county drug task force, 3 county hospital systems, 2 county health departments, and the Alcohol and Drug Addiction Services Board of Lorain County.

Yet, still a number of Lorain County police chiefs reportedly remained reluctant, wanting to “wait and see” the experiences and outcomes of the pilot program. Detective Greg Mehling of the Lorain County Drug Task Force explains that positive media coverage of naloxone rescues caught the attention of local mayors - who then convinced these reluctant police chiefs to stop “waiting it out” and adopt similar programs in their towns. Thus, media-driven observability drove a more rapid spread of LENP programs throughout Lorain County.

**Compatibility with Law Enforcement Culture**

Compatibility is “the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (Rogers, pg. 224). In turn,
Among potential adopters, Rogers argues that the perceived compatibility of an innovation is strongly influenced by the indigenous knowledge systems of their social systems. Another social scientist, Warren (1991) describes indigenous knowledge as, “knowledge that is unique to a given culture or society,” emphasizing that it frequently serves as “the basis for local-level decision-making,” even when it conflicts, “with the international knowledge system generated by universities, research institutions and private firms”27.

For many law enforcement agencies, their indigenous knowledge systems about drug use has undergone a dramatic transformation from what was thought to be true during the “War on Drugs” era of years past. Thus, LENP compatibility will depend upon whether or not the existing values and knowledge systems of potential adopters has moved away from their indigenous knowledge systems from a past era - one that criminalized drug use and thought of addiction as a moral failing.

Law enforcement leaders who have become early adopters and champions for naloxone programs perceive LENPs to be very compatible with their law enforcement duty “to protect and to serve”. The founder of the first LENP in the country, Lieutenant Detective Patrick Glynn, illustrates this point: "We're in the business of saving lives. The individuals we treat through this program have a disease, and it is our place to treat them”28.

Another commonality seen among LENP adopters is their recognition that the existing values of today’s law enforcement must move away from their past experiences with the criminalization of drug users. Lieutenant Detective Glynn describes how the Quincy Police Department has moved away from its punitive policies of the past. He says “the philosophy before was basically to arrest everyone. Basically as a bean counter, arrest, arrest, arrest, arrest. And as time went on we realized we had to change our philosophy.”29 Similar sentiments were expressed
by the Police Chief Cel Rivera of the Lorain Police Department, one of the ten departments to participate in Ohio’s LEND pilot program. He comments that,

Our role is to enforce laws. Now, we are saying, more than likely, we’re not even going to charge you. We just want to come and help you. And that’s a shift in philosophy for most departments.\textsuperscript{30}

This change in philosophy goes deeper than just a change of protocol. LEND adopters and LEND resisters demonstrate a fundamental difference in how they empathize with people who are affected by addiction. One theme among LEND supporters is a shared empathy for the family and loved ones of drug users. For instance, in Pennsylvania, Richmond Police Chief, Michael Burgan has said “These aren't just addicts. They're someone's brother. They're someone's son or daughter”. As Suffolk County (NY) Sheriff Vincent DeMarco advocates for addiction treatment, he talks about how the mistakes are made by drug users, yet, the repercussions of drug use are felt by their loved ones. He says, “I know all too well how families are affected by drug use. Unfortunately, many individuals who use and abuse drugs risk life-threatening overdose situations, I want to encourage people to seek help before it’s too late”\textsuperscript{31}.

But, law enforcement acceptance of this paradigm shift has not been universal. Many officers continue to have drug-related stigmas that arise from a fundamental \textit{incompatibility} with how they have defined their core identities as law enforcement officers. During the early adoption phases, LEND observability helped considerably with changing the stigma of law enforcement stigma towards drug addiction, and by extension, changing the perception of LEND compatibility. The “observability effect” on perceived compatibility is demonstrated during the periods that followed the initiation of pilot projects in Massachusetts and Ohio. Both Lieutenant Detective Glynn (Quincy PD, MA) and Police Chief Cel Rivera (Lorain PD, OH) have stated that they were able to achieve buy-in from initially reluctant officers after they witnessed the
positive effects of naloxone use on victims, family members, and with improving the relationship of law enforcement with the community\textsuperscript{30,32}.

**Compatibility with State Culture**

In addition to the indigenous culture of law enforcement, the compatibility of naloxone programs can also be influenced by the state culture within which law enforcement operates. For New York and Florida, unique state cultures and experiences have played a role in shaping current drug policies in each state.

**New York: A Culture of Public Health.** New York ranks first among the five states with close to a 100% adoption rate of naloxone programs by law enforcement agencies\textsuperscript{20}. Compared to the rest of the nation, New York is one of only a select few states to achieve universal or near-universal adoption\textsuperscript{11}. As of April 2016, close to 30% of states (n=14) are still devoid of any LENP expansion whatsoever\textsuperscript{11}.

The rapid rate at which New York law enforcement commenced LENP adoption reflects proactive statewide coordination, and on a deeper level, a state culture that prides itself on its status as a innovator. In 1969, Walker’s well-known study on state-level policy diffusion, New York ranked first with the highest composite innovation score of all 50 states\textsuperscript{33}. Of note, Massachusetts – which would later become home to the nation’s first LENP program – earned the second highest composite innovation score\textsuperscript{33}.

New York’s strong innovative culture has continued to its public health policies today. In June 2015, Trust for America's Health and the Robert Wood Johnson Foundation released a report on the status of state policies that address injury prevention - an umbrella category that includes drug overdoses, motor vehicle accidents, falls, sexual assault, rape, and suicide\textsuperscript{34}. The report scored the states by the presence or absence of 10 evidence-based injury prevention policies that represent a range of different types of injuries\textsuperscript{34}. New York ranked first in the nation
with a score of 9/10, surpassing the majority of states by a wide margin. Out of the remaining 4 states, Massachusetts scored a 5/10, Pennsylvania scored a 4/10, Ohio scored a 3/10, and Florida scored a 2/10. Nationwide, Florida shared last place in a four-way tie with Iowa, Missouri, and Montana.

New York’s culture of innovation has extended to multiple strategies to expand naloxone access. In addition to the state’s near-universal LENP adoption, New York also leads the country in the number of community-based naloxone programs for friends and families of drug users. Home to 274 community-based naloxone programs, New York outpaces the second ranked state, New Mexico, by a factor of five. The distribution of community-based naloxone programs in the other states ranges from a high of 43 programs in Massachusetts to 1 program in Florida.

**Florida: The Former Pill Mill Capital of the United States.** Among the five states in this study, Florida’s authorization of law enforcement was the most recent, with the passage of the Emergency Treatment and Recovery Act in June 2015. To understand the context of Florida’s relatively late efforts to authorize LENP programs, we first must consider Florida’s past experiences with law enforcement strategies and opioid overdoses.

Up until 2011, Florida reigned as the nationwide capital of “pill mills” – illegitimate “pain management” clinics run to make large amounts of money by prescribing opioids that are not medically necessary to patients. Within one year of Florida’s efforts, the state slashed its Oxycodone-related overdose rate by 97% by taking action on two fronts: implementing a prescription drug monitoring program (PDMP) and widespread policing efforts to prosecute owners of illegitimate pain management clinics.

Given the remarkable results that followed the policing of pill mills, I would predict that Florida’s law enforcement would be reluctant to follow the rest of the nation’s paradigm shift
away from arrests and toward prevention and treatment. The actions of law enforcement in Manatee County, Florida, for example, suggest a reluctance to change their approach to drug use: Manatee County may illustrate the slow uptake of LENP programs in Florida. 

In 2014 and 2015, Manatee County, Florida had the highest per capita rate of heroin and fentanyl-related deaths among all of Florida’s counties. Yet, despite earning the title of Florida’s “heroin capital,” Manatee County is devoid of a single law enforcement naloxone program. Manatee County Sheriff Brad Steube has given a number of reasons, including faster EMS and firefighter response times for 911 overdose dispatch calls, naloxone storage requirements, and logistics of deputy training. While any number of these variables may in fact be legitimate reasons not to adopt a LENP, part of his decision seems to stem from a belief that “cracking down” on drug use is in of itself an effective strategy to reduce overdose rates in Manatee County. In April 2016, he said, "over a month ago we arrested 15 people for trafficking, sale and possession of heroin. The overdoses and deaths have significantly decreased since those arrests.”

**Relative Advantage and the Stigmatization of Drug Use**

Relative advantage is “the degree to which an innovation is perceived as being better than the idea it supersedes” (Rogers, p. 212). According to Rogers, the relative advantage of an innovation is most commonly perceived along one or more of the following sub-dimensions: “economic profitability, low initial cost, a decrease in discomfort, social prestige, a saving of time and effort, and immediacy of reward” (p. 233). In this research, the findings suggest that for law enforcement officers to perceive naloxone as relatively advantageous, officers must first perceive naloxone as compatible – before considerations of economic profitability, social prestige, and so forth, begin to influence the adoption decision of naloxone programs.

For many LENP adopters, naloxone programs are fundamentally at odds with the drug
policies that they supersede. If officer values remain grounded in the “old” drug policies of law enforcement, the perception of incompatibility will eclipse any perceived relative advantage of “economic profitability, low initial cost, a decrease in discomfort, social prestige, a saving of time and effort, and immediacy of reward”. In my exploratory research analysis, I have found that officers’ perceptions of naloxone’s relative advantage are inherently tied to how compatible naloxone is with their values, beliefs, and identity as law enforcement officers.

Leaders of law enforcement agencies that have opted not to adopt naloxone programs have identified several barriers to adoption, which include concerns related to costs, storage, medical complications after naloxone administration, and reliance on medical responders. These challenges to implementation are legitimate for many departments that lack support in the state and the community. However, for others, these reasons may veil an underlying stigmatization or, at best, a lack of understanding of addiction. Across the country, law enforcement officials have voiced concern that expanded access to naloxone enables addiction by giving individuals a “safety net” that will protect them from potential overdose. Among the 5 sample states, this safety net concern has been voiced outright to media sources by police chiefs and sheriffs in both Ohio 40 and Florida 41.

In Ohio, law enforcement’s stigmatization or misunderstanding about naloxone and addiction has gone so far as to interfere with the ability of opioid overdose prevention programs to distribute naloxone in the community. In a survey administered to 18 Ohio community-based naloxone programs, 22% (n=4) of programs identified law enforcement stigma as a barrier to naloxone distribution. One program reported that local law enforcement frequently confiscated naloxone kits from drug users. One health worker from an Ohio community-based naloxone program says “The law enforcement community have been the hardest to sway. They continue to
say that naloxone gets traded for heroin” 42.

Yet, not all law enforcement officials have been impossible to sway. My search for media coverage of Ohio’s naloxone programs uncovered documentation of a change of opinion towards naloxone on the part of at least one county sheriff. During the early phases of Ohio’s LENP adoption in 2013, Montgomery County Sheriff Phil Plummer, said, "I don't think giving people Narcan so they can do heroin again is the answer. We are putting a Band-Aid on the problem” 43. By February 2016, Sheriff Plummer had changed his mind, stating that, “We definitely support [naloxone access without a prescription] for everybody with any involvement with a heroin addiction. Narcan is definitely saving lives in this community.” 44 While we are limited to speculation of the variables that led to Sheriff Plummer’s change in position, his statements suggest that there has been a change in how relatively advantageous he perceives naloxone to be.

**Complexity of Naloxone Storage and Administration**

Complexity is “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers, pg. 257)². Several police chiefs have explained their decision not to adopt naloxone programs because of the complicated storage and administration requirements of naloxone. One area where this has been particularly prevalent is rural Western Pennsylvania, where LENP prevalence is much lower than the rest of the state. Despite the area’s high local rates of overdose, law enforcement leaders have blamed the complicated requirements of using and storing naloxone for their decision to not pursue LENP adoption 45–47.

Police chiefs have taken particular issue with storage of naloxone. Naloxone is sensitive to extreme temperatures, and thus should be stored indoors overnight or between shifts in a ventilated place that remains between 59 and 86° F for intranasal naloxone and under 104° F for EVZIO®. One such department to blame its rejection of naloxone training for its complexity is the North Berks Police Department in Western Pennsylvania. Police Chief Steve Eakon has
argued the following leads North Berks PD:

Is that going to justify me having to take naloxone in and out of the police car every shift, every day, flip it back and forth between the cars for something that maybe I can envision? Where does it stop for police? We’re carrying everything under the sun, now we’re going to be medical people. At what point does it stop?48

To some degree, his statement is rooted in stigma, suggesting that the value of a drug user’s life has not justified the minimal additional burden that would be required of him and his officers to transfer naloxone kits during shift changes. In Columbus, Ohio, Sargent Rich Weiner has also blamed naloxone storage for his department’s decision to not adopt a LENP program. He explains, “We have close to 900 patrol officers. Where are we going to store [the naloxone]? … It’s easier for the medics to carry it.”49

To ease any uncertainty that surrounds such logistical questions, the BJA’s Law Enforcement Naloxone Toolkit includes several LEA naloxone protocols for reference50. In Massachusetts, the Norwood Police Department’s Protocol instructs officers to store naloxone kits with AED (automated external defibrillator) equipment at the beginning and end of each shift. By integrating naloxone storage into existing AED protocols, Norwood Police Department’s policy effectively neutralizes potential or actual resistance from officers that may contest an additional duty that is required of them – particularly one that they perceive to be incompatible with their responsibilities.

Officers may also be reluctant or unwilling to put themselves in a situation that requires them to manage or treat complications that may ensue after the patient receives naloxone. Between 2010 and 2014, Massachusetts’ police and fire departments with naloxone programs reported 645 rescues, nearly half of which were reported as absent of any adverse effects51. When first responders did report adverse effects, all were associated with withdrawal symptoms
and none were life threatening in nature. Adverse effects experienced by overdose victims include irritability and/or anger (24%), feelings of "dope sickness" (26%), vomiting (11%), combativeness (5%), and other (7%) which was an umbrella category for confusion, disorientation, headache, chills and body aches, crying, diarrhea, and/or emotions of happiness or feeling miserable.\textsuperscript{51}

In New York, law enforcement collected data on nearly 1,000 naloxone rescues, reporting that 6 out of 10 overdose victims experienced no adverse effects. The remaining overdose victims who were saved by naloxone experienced "dope sick" effects (23%), respiratory distress (7%), and "other" (15%). As in Massachusetts, the majority of New York’s law enforcement naloxone rescues were not associated with adverse effects. But, the degree of severity of adverse side effects remains unclear with New York’s data. In the data brief published by the New York State Department of Health, no further explanation or clarification was provided for the categories of respiratory distress and other.\textsuperscript{52}

In my literature search of media reports and official documents, I was unable to find further discussion of adverse side effects that were serious and/or life threatening. This suggests that there has been minimal concern in New York for risk of serious adverse effects with naloxone use. This conclusion would also be consistent with previous evaluations of pre-hospital naloxone administration. However, further inquiry into New York’s data collection methods would be necessary before making any conclusions about the absence of serious side effects in naloxone rescues by New York’s law enforcement.

**Challenges to LENP Adoption**

**Rising naloxone costs.** For many law enforcement agencies without access to negotiated discount rebates or state funds, the rising cost of naloxone has restricted the adoption of expansion of naloxone programs in police departments. Significant media coverage has been
given to allegations of pharmaceutical price gauging of this life-saving drug in the midst of rising overdose rates\textsuperscript{53,54–56}. As of February 2016, the wholesale price of the auto-injectable formulation of naloxone, known as EVZIO\textsuperscript{®}, had reached $4,500\textsuperscript{57}. Despite its high wholesale price, the pharmaceutical company that produces EVZIO\textsuperscript{®}, Kaleo, has made a concerted effort to ensure that naloxone is affordable for law enforcement agencies and other first responder groups.

Since October 2014, the "Kaleo Cares Product Donation Program," has donated EVZIO\textsuperscript{®} kits free of charge to over 120 first responder organizations. In November 2014, “The Kaleo Cares Product Donation Program,” provided 2,000 kits (4,000 doses) for police and fire departments in 23 high-risk overdose communities throughout Massachusetts\textsuperscript{23}. More recently, Kaleo’s donations have also been essential in the development of Florida’s first two LENP programs- Sarasota County Sheriff’s Office and Delray Beach Police Department\textsuperscript{58}.

However, the finite nature of Kaleo’s donation program leaves police departments uncertain about how to fund naloxone kits that will eventually be needed to replenish those that were donated. For the many police departments with limited financial resources, current strategies such as pharmaceutical donations or one time grants, will not be able to sustain law enforcement naloxone programs over the long term. This uncertainty has contributed to the reluctance of several police departments to invest the time and resources in starting a naloxone program.

Today, the most affordable layperson-friendly naloxone formulation for law enforcement is the NARCAN \textsuperscript{®} Nasal Spray. Adapt Pharmaceuticals Inc., the sole manufacturer of NARCAN\textsuperscript{®} Nasal Spray, has established a more affordable public interest price for “qualified purchasers”, which include law enforcement agencies and other community entities or
organizations, to purchase NARCAN® Nasal Spray\textsuperscript{59}. For minimum orders of 48 naloxone kits or more, qualified purchasers are currently able to purchase a kit of NARCAN® Nasal Spray at a 40\% discount for $75 ($37.50 per dose)\textsuperscript{59}. Unfortunately, the requirement for a minimum naloxone order is likely to be cost-prohibitive for small police departments who may not be able to use 48 kits within a time frame that meets the 2-year shelf life requirements for naloxone\textsuperscript{59}.

Even with the “affordable” public interest price, the going rate of $75 per naloxone kit is likely to remain cost-prohibitive for smaller police departments with fewer resources to spend on policing innovations such as naloxone. Among Pennsylvania police departments that have not adopted naloxone programs, 51\% reported cost concerns as a prohibitive factor.\textsuperscript{60}

**Strong Police Unions.** Out of the five sample states, only Massachusetts seemed to face collective bargaining conflicts from police unions. In Massachusetts’ towns such as Somerville\textsuperscript{61}, Taunton\textsuperscript{62}, and Newton\textsuperscript{63}, and communities, police unions have argued that naloxone training and administration represents an additional duty for law enforcement officers, and thus requires a contract renegotiation. Collective bargaining conflicts in these towns have prevented the adoption of LENP programs by local departments- in spite of support of local mayors and/or police chiefs.

I found no news articles that covered police union resistance to naloxone programs in Florida, Ohio, or Pennsylvania. One instance of union-led resistance was found in Buffalo, New York. In this case, union-led resistance surfaced \textit{after} the Buffalo Police Department had adopted its LENP program. Buffalo’s police union filed a formal complaint during the early phases of implementation after Buffalo had trained 50 of its 700+ officers\textsuperscript{64}. But, unlike in Massachusetts, there is no evidence to suggest that union resistance has had a dampening effect on either Buffalo Police Department’s plans to continue training officers or on adoption decisions of neighboring
How States Have Approached LENP Expansion

Amphastar Naloxone Purchasing Agreements. In New York, Ohio, and Massachusetts, state attorneys general have played a key role to ensure that the cost of naloxone is not the reason for law enforcement failure to adopt naloxone programs. After Amphastar Pharmaceuticals, Inc. nearly doubled the cost of naloxone in late 2014, New York’s Attorney General Schneiderman successfully negotiated a $6 discount rebate per syringe for law enforcement agencies and other eligible organizations with Amphastar. Soon after, Ohio’s Attorney General, Mark DeWine, followed Schneiderman’s lead to petition Amphastar Pharmaceuticals, Inc. for reduced naloxone costs through the New York model of discount rebates.

As of June 2016, attorneys general in 8 states have negotiated Amphastar contracts, all of which are structured as discount rebates with the exception of Massachusetts (Table 4). Rather than naloxone discount rebates, Massachusetts Attorney General Healey negotiated a lump sum donation of $325,000 (or an estimated purchase of 10,000 naloxone doses) from Amphastar to the Commonwealth's Municipal Naloxone Bulk Purchase Trust Fund. Whereas New York’s and Ohio’s discount rebates rely on a retrospective reimbursement system, Massachusetts’s purchasing agreement requires a much lesser degree of statewide coordination in the allocation of naloxone grants. In addition to negotiating contracts with Amphastar, Massachusetts and New York have both pioneered innovative strategies to reduce the cost of naloxone purchasing for law enforcement agencies (LEA).

Massachusetts’ Naloxone Bulk Purchasing Fund. In the 2014-2015 Budget, the Massachusetts State Senate appropriated $125,000 toward bulk purchasing of naloxone in order to standardize LEA naloxone costs and purchasing procedures. Rather than leave price negotiations up to
individual police departments, naloxone is now purchased by the Massachusetts Department of Public Health (MDPH), which will serve as a central resource from which municipal police and fire departments can purchase naloxone kits at reduced price. Through a centralized naloxone purchasing system, the MDPH negotiates a rate for naloxone kits with the Massachusetts wholesale provider. After a negotiated rate is determined by the MDPH, the Bulk Purchase Trust Funds allows for an additional discount in cost for each naloxone kit that is purchased from the MDPH. As of November 2015, the final cost to law enforcement for naloxone was $20 per syringe and $4.32 per atomizer. Prior to statewide coordination of naloxone purchasing, Massachusetts law enforcement naloxone programs reported paying anywhere from $22 per dose in Norfolk County up to $67 per dose in Needham and Wrentham Counties.

**New York’s Community Overdose Prevention (COP) Program.** To reduce naloxone prices even further for law enforcement, Attorney General Schneiderman pioneered the creation of New York’s Community Overdose Prevention (COP) program. The first program of its kind in the country, the COP program commits $5 million dollars of criminal and civil asset seizure monies towards reimbursing New York law enforcement agencies for naloxone purchases.

Since the program was enacted in April 2014, COP program funds have significantly expanded the number of law enforcement officers who are now trained to carry and administer naloxone. It wasn’t until the development of the COP program spurred the largest police department in the country - the New York City Police Department (NYPD)- to equip its force of 20,000 police officers with 19,760 naloxone kits ($1,185,600).

Schneiderman’s COP program was instrumental in speeding up the rate of LENP program adoption across New York. Within five weeks of his announcing the COP program,

1 The cost of $20 comes from a discount of $13.27 that is subtracted from the statewide negotiated rate for naloxone. At the time of November 2015, the negotiated rate was $33.27 per syringe.
over 100 law enforcement agencies had applied for funds to purchase naloxone. By the 2-month mark, the number of applications had risen to 150 departments. Table 4 presents a timeline to show the rapid rate at which the number of LENP programs expanded across the state of New York.

As of January 2015, the NY’s COP Program has given law enforcement agencies across New York State approximately $1.8 million worth of naloxone kits, funding the purchase of 2,593 kits ($140,435) in Long Island, 1,642 kits ($94,688) in the mid-Hudson region, 1,180 kits ($94,688) in Western New York and 595 kits ($44,825) in central New York area. 18

By developing regional training programs, New York state agencies have also streamlined the state’s naloxone training of law enforcement officers. The training program is a product of regional and state-level collaboration among the New York State AIDS Institute, the Division of Criminal Justice Services, the Office of Alcoholism and Substance Abuse Services, Albany Medical Center, and the Harm Reduction Coalition52. Between April 2014 and December 2015, naloxone training and free naloxone kits were provided to 7,873 law enforcement officers in New York. New York’s provision of in-person training to several departments at once facilitates peer-to-peer interactions among officers from different departments, which likely contributes to increased buy-in and support for LENP programs among local law enforcement.

No Statewide Push to Expand Naloxone in the Sunshine State. In contrast to the efforts of State Attorneys General in Massachusetts, Ohio, and New York, Florida’s Attorney General Pam Bondi has remained notably silent on the issue of naloxone. Although Florida has seen a precipitous rise in heroin overdose rates in recent years, Attorney General Bondi’s outspoken support for cracking down on pill mills and drug dealers has not applied to harm reduction strategies, such as naloxone expansion. During my research into Florida’s LENP programs38, I
was not able to find any statements or opinions about naloxone by Attorney General Pam Bondi.

One likely reason for the slow rate of LENP adoption in Florida may be the absence of any statewide coordination thus far to expand naloxone access. Without any statewide apparatus to negotiate lower naloxone costs or coordinate LENP implementation, the burden of responsibility is left for individual police departments in Florida to determine the means to purchase naloxone, acquire funding, and train officers.

The Buckeye State: An Example of Criminal Justice and Public Health Partnerships. In Ohio, local partnerships between law enforcement and public health stakeholders have been important to the implementation of LENP programs. Dating back to the Lorain County Pilot Program, local health departments (LHDs) have played a key role in the planning and implementation phases of local LENP programs. As LENP programs subsequently expanded outside of Lorain County, Ohio has continued to encourage mobilization and coordination for LENP adoption at the county level.

Like New York and Massachusetts, Ohio also allocated state funds to cover the costs associated with adopting and sustaining LENP programs. In the 2016-2017 FY budget, Ohio appropriated $500,000 for purchasing naloxone for first responders. Rather than distribute monies directly to law enforcement agencies, Ohio designated local health departments to be the county-level receiving entities for naloxone funds. By establishing a central role for local health departments to distribute naloxone funds to responders, Ohio emphasizes county-level coordination of LENP programs rather than the more centralized statewide apparatus that is seen in New York and Massachusetts.

Pennsylvania: A District Attorney-Centered Model for LENP Expansion. Ohio’s LHD-centered collaborative model has simply not been a feasible option in Pennsylvania due to the
state’s large rural population and historically weak public health infrastructure. All 48 of Pennsylvania’s rural counties lack a local health department\(^7\)\(^6\), and Pennsylvania has the lowest ratio of public health workers to residents in the nation with only 37 public health workers per 100,000 people, compared to a national average of 138 workers\(^7\)\(^6\).

Instead, efforts by two key groups of stakeholder have driven the increased rate of LENP adoption: health insurance companies and district attorneys. In Pennsylvania, private-public partnerships with several health insurance companies\(^ii\) has been essential to equipping law enforcement with naloxone\(^7\)\(^7\). Capital Blue Cross provided a $50,000 grant in 2014, and a $100,000 grant in 2015, to pay for naloxone purchasing by law enforcement in its 21-county service area\(^7\)\(^8\). The state’s District Attorney’s Association oversees the allocation of the Capital Blue Cross grants to the 21 district attorney’s within this region across central Pennsylvania and the Lehigh Valley. In Figure 3, the 21-county region is outlined in green on a state map that shows the status of Pennsylvania’s LENP programs as of June 2015\(^6\)\(^0\).

The combination of private-public partnerships and the proactive efforts of county district attorneys have together resulted in LENP expansion through much of Pennsylvania. District attorneys such as Jack Whelan of Delaware County have taken on the role of LENP champions, coordinating the funding of naloxone kits and collaborating with police chiefs in their counties. In Delaware County, DA Whelan, has appeared to champion LENP programs with the same initiative and passion as that of Attorney General Schneiderman on a statewide level in New York.

In 2012, Whelan enacted the Delaware County Heroin Task Force, the driving force that lobbied for the introduction and passage of Act 139, which authorized naloxone use by law and

\(^{ii}\) Aetna, Geisinger Health, Health Partner Plans, and Highmark
provided limited criminal immunity for overdose victims and bystanders through a Good Samaritan clause\textsuperscript{79}. Even before Act 139 had been passed into law, Whelan was working to gain support for LENP programs from county leaders of law enforcement agencies. As soon as Act 139 took effect in November 2014, all 42 police departments in DA Whelan’s Delaware County were trained and equipped with naloxone\textsuperscript{80}.

In April 2015, York County became the second county in Pennsylvania to achieve 100% countywide adoption of law enforcement naloxone programs (n=23). Three months later, Lancaster County became the third county in Pennsylvania to achieve this feat. Akin to Delaware County, the additional countywide LENP adoption rates reflect significant efforts by York County DA Tom Kearney and Lancaster County DA Craig Stedman.

As of June 2015, 108 municipal police departments in Pennsylvania reported the presence of LENP programs\textsuperscript{iii}. Almost one year later, by April 2016, the number of LENP programs had more than tripled in Pennsylvania (n=343)\textsuperscript{11}. This significant increase in LENP program adoption seems to be largely a reflection of the efforts by county district attorneys in Pennsylvania.

However, in several Western Pennsylvanian communities, district attorneys have struggled to convince police chiefs to adopt LENP programs\textsuperscript{81}. For instance, despite providing free naloxone kits to police departments through state grants, LENP adoption has been quite scant in Berks County. The resistance to LENP programs has been pervasive throughout Western Pennsylvania (see Figure 3)\textsuperscript{60,81}, suggesting a need for greater regional coordination, rather than leaving expansion up to the efforts of individual district attorneys in each county in Western Pennsylvania.

\textsuperscript{iii} This number (n=108) may contain some degree of under-estimation of Pennsylvania’s total LENP count due to non-response bias from police departments who did not respond to the survey.
Conclusion

Naloxone expansion through law enforcement remains crucial to our multi-pronged approach to prevent, reverse, and treat individuals addicted to opioids. Several barriers remain in our efforts to equip law enforcement officials with naloxone. Persisting stigmatization of drug overdose and a misunderstanding of addiction among law enforcement still shape the perceived attributes of naloxone programs, including its relative advantage to law enforcement, compatibility with law enforcement identities and roles, and its complexity involved with side effects, storage, and administration.

Moving forward, the application of Rogers’ diffusion of innovation theory can help shape future policy-making that aims to expand LENP adoption practices in the United States. This series of case studies showed that for law enforcement officers to buy-in to the idea of naloxone programs, naloxone must be perceived as compatible with their values and with their constructs of the roles, duties, and values of their law enforcement identity. Because of the central role that indigenous knowledge systems, and thus the perceived compatibility of LENP programs, has had among law enforcement, I propose a modified theoretical framework to understand the decision of law enforcement leaders to support or reject LENP program adoption (Figure 4). The indigenous knowledge (IK) systems about drug use has influenced not only how law enforcement perceive LENP compatibility, but serves as the lens which law enforcement perceive the complexity and relative advantage of adopting LENP programs.

The findings support the conclusion that the degree of perceived compatibility of LENP programs also exerts influence over the additional domains of naloxone attributes – complexity and relative advantage. It is important to note that there are significant limitations to generalizing results from these results due to the case study research design and the geographically limited
sample of states. These findings, however, do point to an area of interest for future research. While Rogers’ diffusion of innovations framework has been well validated over multiple disciplines of study, a slightly modified framework may be more appropriate for policing innovation adoption that requires law enforcement to diverge from previous or current indigenous knowledge systems.
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Tables and Figures

### Table 1. Opioid-Related Overdose Rates (per 100,000)

<table>
<thead>
<tr>
<th>State</th>
<th>2013</th>
<th>2014</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>12.6</td>
<td>13.8</td>
<td>+ 4.8</td>
</tr>
<tr>
<td>New York</td>
<td>11.3</td>
<td>11.3</td>
<td>0</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>16.0</td>
<td>19.0</td>
<td>+ 18.8</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>19.4</td>
<td>21.9</td>
<td>+ 12.9</td>
</tr>
<tr>
<td>Ohio</td>
<td>20.8</td>
<td>24.6</td>
<td>+ 18.3</td>
</tr>
<tr>
<td>United States</td>
<td>13.8</td>
<td>14.7</td>
<td>+ 6.5</td>
</tr>
</tbody>
</table>

**Source:** Centers for Disease Control and Prevention (CDC). (2016, January 1). Increases in Drug and Opioid Overdose Deaths — United States, 2000–2014."
<table>
<thead>
<tr>
<th>State</th>
<th>LENP Programs (State LENP Adoption %)</th>
<th>Total Number of Law Enforcement Agencies (LEA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>June 2015</td>
<td>April 2016</td>
</tr>
<tr>
<td>New York</td>
<td>212</td>
<td>523</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>108</td>
<td>343</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>42</td>
<td>51</td>
</tr>
<tr>
<td>Ohio</td>
<td>30</td>
<td>66</td>
</tr>
<tr>
<td>Florida</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>United States</td>
<td>579</td>
<td>1289</td>
</tr>
</tbody>
</table>

Notes:

a The number of LENP Programs in Ohio was estimated by summation of the NCHRC LENP estimate (n=56 + “multiple departments in Putnam County”) and the number of law enforcement agencies in Putnam County, Ohio (n=10).

b The number of LENP Programs in the United States was estimated by summation of the NCHRC LENP estimate (n=971, as of April 26, 2016) and the number of LENP Programs that were identified by New York’s Department of Health (n=523), but not by the NCHRC (n=205). i.e. 971 + (523 – 205) = 1289

Sources:


### Table 3. Timeline of Important Events for Law Enforcement Naloxone Programs (LENP) Adoption in New York State

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>May Start of Suffolk County Pilot Department LENP Pilot, 400 officers trained</td>
</tr>
<tr>
<td>2014</td>
<td>April 3 NY AG announces Community Overdose Prevention (COP) program and $5 million in naloxone funding for LENPs; NY AG sends letter out that week to all local and state police encouraging them to apply</td>
</tr>
<tr>
<td></td>
<td>April 30 260 officers from 42 LEAs registered for upcoming training sessions held by NY state agencies</td>
</tr>
<tr>
<td></td>
<td>May 2 At 4 weeks after COP announced, 85 LEAs have applied to COP for naloxone funding</td>
</tr>
<tr>
<td></td>
<td>May 6 100 LEAs have applied to COP, requesting funding for approx. 3300 kits</td>
</tr>
<tr>
<td></td>
<td>May 27 NYPD (largest police force in the country) joins COP program; LENP will equip all 19,500 officers in New York City; total of 150 LEAs have applied to COP, requesting funding for approx. 25,000 kits</td>
</tr>
</tbody>
</table>

**Sources:**


Sources: Information was retrieved from the official websites of the Offices of the State Attorneys General 65,67–72,83,84

Table 4. States that Have Negotiated Contracts with Amphastar for Naloxone Purchasing Discounts, as of June 2016

<table>
<thead>
<tr>
<th>State</th>
<th>Attorney General</th>
<th>Time Length of Contract a (in chronological order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. New York</td>
<td>Eric Schneiderman</td>
<td>1 year: 01/27/15 – 01/26/16 Extension: 01/27/16 – 01/28/17</td>
</tr>
<tr>
<td>2. Ohio</td>
<td>Mike DeWine</td>
<td>1 year: 03/02/15 – 03/01/16 Extension: 03/02/16 – 03/03/17</td>
</tr>
<tr>
<td>3. New Jersey</td>
<td>John Hoffman</td>
<td>1 year: 06/01/15 – 05/31/16</td>
</tr>
<tr>
<td>4. Massachusetts</td>
<td>Maura Healey</td>
<td>$325,000: 08/31/15 b</td>
</tr>
<tr>
<td>5. Delaware</td>
<td>Matthew Denn</td>
<td>1 year: 09/18/15 – 09/17/16 c</td>
</tr>
<tr>
<td>6. Vermont</td>
<td>Bill Sorrell</td>
<td>1 year: 12/19/15 – 12/18/15</td>
</tr>
<tr>
<td>7. Wisconsin</td>
<td>Brad Schimel</td>
<td>1 year: 02/02/16 – 02/01/17</td>
</tr>
<tr>
<td>8. Connecticut</td>
<td>George Jepsen</td>
<td>1 year: 04/05/16 – 04/04/17</td>
</tr>
</tbody>
</table>

Notes. Indiana Attorney General Zoeller has also implemented a statewide naloxone grant program for community-based organizations and first responders. The grant program was funded through a settlement received from Amgen, a global pharmaceutical company, for deceptive marketing of medications for plaque psoriasis. Amphastar was not involved in the funding or development of the grant program.

a Unless indicated otherwise, negotiated Amphastar contracts are for a $6 discount rebate per naloxone syringe.

b Delaware’s initial discount rebate was negotiated for $4 per syringe, but according to the Delaware Office of Attorney General’s website, the discount rebate has since been negotiated to $6 per syringe.
Figure 1. Rogers' Analytical Framework to Identify the Variables that Determine the Rate of Adoption of Innovations

**Figure 2.** Training Materials Used to Teach Ohio Law Enforcement Officers How to Prepare and Administer Naloxone Through Off-Label Intranasal Delivery

**Figure 3.** A State Map of Pennsylvania’s Law Enforcement Naloxone Programs (LENP) as of June 2015, and the Coverage Area in Which Law Enforcement Agencies are Eligible to Receive Funding Through the Capital BlueCross Naloxone Grant

**Key:** Region within green outline represents the 21-county service area in which law enforcement agencies are eligible for the Capital BlueCross Naloxone Grants

*Note. The green outline to identify 21-county service area was super-imposed onto the original image by the author.*

Figure 4. A Modified Theoretical Framework to Understand the Variables that Influence the Rate of Adoption for Law Enforcement Naloxone Programs (LENP)

Source: Created by Author on July 6, 2016 with Microsoft Word SmartArt
Appendix 1. Systematic Review

Introduction

Drug overdoses have exceeded motor vehicle accidents as the leading cause of injury death in the United States\(^1\). Prescription and illicit opioid addiction has fueled the rising rates of drug overdose, now accounting for approximately six out of ten overdose deaths\(^2\). Across the country, opioid overdose rates have continued to rise each year despite a multitude of policy efforts to reduce or curb rates of overdose\(^3\). The Department of Human Health and Sciences has identified naloxone expansion as one of three chief policy strategies in the federal government’s multi-pronged approach to reduce opioid overdose rates\(^2\). Naloxone is an overdose antidote that effectively reverses opioid-induced respiratory depression within minutes of administration to an overdose victim\(^4\).

Since the first community-based naloxone program in the United States was established in 1996\(^5\), similar programs throughout the United States have worked to prevent overdoses by distributing naloxone to community bystanders- i.e. drug users, and friends and family of drug users. Only in the last decade has the law enforcement community begun to actively participate in harm reduction strategies such as carrying naloxone. In October 2010, the Quincy Police Department of Quincy, Massachusetts developed the nation’s first law enforcement naloxone program (LENP) by training and equipping its 211 officers with naloxone. As of April 2016, law enforcement naloxone programs have been adopted by at least 976 law enforcement agencies in 36 states\(^6\). That number will likely continue to grow in light of President Obama’s recent National Rx Drug Abuse and Heroin Summit Announcement in which he declared that an additional 11 million SAMSHA dollars would go towards equipping first responders with naloxone\(^7\). Given the nationwide push to expand adoption of law enforcement naloxone
programs, there is a pressing need to conduct a systematic review that synthesizes the existing evidence about the effectiveness and implementation of naloxone programs by law enforcement.

The purpose of this systematic review is to synthesize the existing literature about law enforcement naloxone programs to identify variables that impede or facilitate the implementation and effectiveness of law enforcement naloxone programs in the community.

Methods

Eligibility Criteria

Study design Inclusion criteria was quite broad due to the limited body of existing literature. Studies were included if they were randomized studies, non-randomized studies (quasi-randomized controlled, controlled before-and-after [CBA’s], interrupted time series) controlled observational studies (cohort and case-control) and non-controlled observational (cross-sectional surveys, case series). Qualitative studies were also included to provide supporting information about variables that facilitate or impede implementation of naloxone programs by law enforcement. Exclusion criteria included editorials, literature reviews, or legal reviews. Table A-2 presents the full description of eligibility criteria.

Population For this review, law enforcement officials comprised the participants in the study populations. I used the Bureau of Justice Assistance’s (BJA) definition of law enforcement, which encompasses sheriffs, deputy sheriffs, chiefs of police, city police officers, sworn-in law enforcement personnel of port and transit authorities, and campus police officers employed by local city and/or community college districts.8

Intervention Interventions were law enforcement naloxone programs (LENP). I used the BJA’s definition, which were programs that “are designed to teach law enforcement officers to recognize and reverse an active opioid overdose using naloxone”9.
Comparison and Outcomes Criteria for comparison groups were not used as inclusion criteria. I included studies that reported any data or outcome measures about law enforcement overdose reversal programs. This includes qualitative studies that examine knowledge, perceptions and/or behavior of law enforcement officers about naloxone.

Literature Search Strategy

I performed literature searches in PubMed, PsycInfo and Web of Science databases. I used the Yale MeSH Analyzer to select essential keywords and MeSH headings for my literature search. Figure A-1 presents the MeSH analysis grid that shaped my search strategy. The final search strategy consisted of search terms that included the following terms: opioid-related disorders, police, law enforcement, overdose, and naloxone. I also hand-searched reference lists for additional studies that may be appropriate for inclusion. Figure A-2 presents the literature search process outlined in greater detail through a PRISMA flow diagram.

Data Collection Process

I did not use formal data management software to identify duplicates, extract data, or review articles. I performed a title and abstract review on all literature search items. At this stage, if I had any uncertainty about whether articles did or did not meet inclusion criteria, those studies were assumed to meet criteria and included for full text review. Time limitations did not permit an independent article review by a second author.

Data Extraction

I used a modified version of The Community Guide’s data abstraction form that is used for systematic reviews of community health-related interventions. For each quantitative or qualitative study, I extracted the following data items: setting, study population, time period, results, and information about intervention feasibility. As recommended in The Community
Guide, I categorized feasibility information across a set of 8 attributes that characterize an intervention: costs (monetary and non-monetary), harms, other benefits, the process of implementation, barriers to implementation, community involvement, coalition formation, and ethical considerations 10.

Quality Assessment

I independently evaluated the quality and risk of bias for each of the 9 studies. A second individual was not involved in the review process due to the time and resource limitations that were present during this systematic review. To evaluate the quality of strength of each study, I followed the methodology for quality assessment recommended by The Community Guide 10. Thus, for each quantitative study, I evaluated the strengths and limitations across 5 domains: descriptions, sampling, measurement, analysis, and interpretation of results. If any issues in study design affected multiple domains, I used my best judgment and selected the domain that I felt was most fitting or most appropriate for inclusion 10. In my narrative review, I considered the strengths and limitations that applied to the execution of the study design, in addition to what was inherent to the study design itself. I did not perform a meta-analysis due to significant heterogeneity in study design and outcome measures. Instead, I presented study findings and themes in a narrative review format.

RESULTS AND DISCUSSION

Study Selection

A total of 9 studies met the inclusion criteria for this systematic review. My search of PubMed, PsycInfo and Web of Science produced a total of 111 citations. Hand-searching reference lists produced an additional 11 citations. All together, 122 studies total were screened for eligibility. After duplicates were removed, 78 citations remained. I performed a title and
abstract review of these citations, and determined that 64 citations did not meet inclusion criteria. I evaluated the full text of the remaining 14 citations in great detail, and excluded 5 citations for the following reasons. Two studies were excluded due to lack of access, 1 legal review article and 1 literature review article for study design, 1 study for wrong population, and 1 study for wrong intervention.

Study Characteristics

Study Design Nine articles met criteria for inclusion in the systematic review. Five studies explored LEO attitudes and knowledge about naloxone. Three of those studies used written surveys to measure self-reported outcomes, and two studies used qualitative methods to analyze data from key informant interviews with officers. The two qualitative studies, Deonarine et al (2016) and Banta-green et al (2015), explored LEO perceptions through thematic content analysis of interviews with officers.

Four studies focused on the effectiveness and implementation of law enforcement naloxone programs. Three of these studies were descriptive case series that reported data about the number of naloxone rescues and the overdose victims, such as demographics and health outcomes. I presented the characteristics of the quantitative and qualitative studies in Table A-3 and Table A-4, respectively.

Setting The studies were carried out between 2011 and 2016, with publication dates ranging between 2013 and 2016. One study took place in British Columbia, Canada, while the remaining studies were in the United States. Specifically, studies took place in the following states: Connecticut, Indiana, Maryland, North Carolina, Ohio, Rhode Island, and Washington. One study took place in an urban setting, but did not identify a city or state.
**Population** The study populations varied in scope of law enforcement involvement. Three studies focused on individual law enforcement agencies. Officers were sampled from the Seattle Police Department, the Southwest District of the Indianapolis Metropolitan Police Department, and a large unidentified urban police department that responds to over 400,000 dispatch calls per year. The other studies were larger in scope and focused on law enforcement within a given county, state or multi-state region. Among all the studies, sample sizes ranged from 2 to 310 law enforcement officers.

Four studies provided little to no description about the characteristics of the study population, such as age, gender, the number of years served as an officer, and past history of exposure to opioid overdoses. Three of those studies focused on program implementation rather than officer perceptions, and thus, did not necessitate inclusion of the study population demographics. Doyon et. al (2016) described naloxone rescues (n=69) reported by law enforcement officers to the Maryland Poison Center over a 16-month period. Using data from officer and EMS incident reports, Fisher et. al (2016) described the naloxone rescues (n=126) given by law enforcement officers in an urban setting of unidentified location.

Limited information about the study population only proved to be a limitation for one study, Deonarine et. al (2016), because of the study’s focus on the law enforcement population, rather than the law enforcement program. Deonarine et. al (2016) analyzed data obtained from key informant interviews with 2 Canadian law enforcement officers. The authors did not explain their reasoning for omission, thus we can only hypothesize about their rationale. It may have been necessary to omit information in order to protect officer anonymity.

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\[^{iv} \text{Percentages are calculated out of a total of 78 naloxone rescues, which represents the naloxone rescues performed by officers (n=69) and community bystanders (n=9). Only aggregate data was reported about naloxone rescues.}\]
In the other qualitative study included in the review, Banta-green et. al (2015) provided descriptive information about the 13 law enforcement officers that were sampled from 3 suburban towns in Connecticut and Rhode Island.

**Outcomes** Themes and measures that were common across studies were classified across the following domains: (1) Knowledge about Good Samaritan Legislation, (2) Knowledge about overdose response, competency, and readiness, (3) Naloxone Rescues, (4) Financial Barriers, (5) Post-overdose protocols.

- **Knowledge about Good Samaritan Legislation**

  Banta-green et. al (2013) administered a written survey to Seattle Police Departments to examine the officers’ knowledge and opinions of Washington State’s Good Samaritan Law. Officers showed limited awareness of the state’s overdose prevention laws, with only 16% (n=39) having ever heard of Washington State’s Good Samaritan Law. One explanation for these results may be Washington State’s early adoption of the Good Samaritan Law, relative to the rest of the nation\(^{14}\). In June 2010, Washington State became the second state in the nation to enact a Good Samaritan Law\(^{14}\). By Fall 2011 – the time at which the survey was given to the Seattle Police Department- only 4 states had enacted Good Samaritan Laws\(^{20}(\upsilon)\). By that logic, we would predict officer knowledge about Good Samaritan Laws to improve as the law’s observability increases with time. Saucier et. al (2016) conducted a more recent survey evaluation of Rhode Island officers. Prior to any naloxone training, approximately 80% of officers correctly answered a question about the content of Rhode Island’s Good Samaritan Law.

- **Knowledge about Overdose Response, Competence, and Readiness**

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\(^{\upsilon}\) New York and Connecticut passed Good Samaritan legislation in September 2011 and October 2011, respectively.
Saucier et. al (2016)\textsuperscript{15} compared LEO survey responses before and after naloxone training. The officers’ knowledge about opioid overdose management was measured by the Brief Overdose Recognition & Response Assessment (BORRA), Naloxone training was associated with statistically significant improvements in naloxone administration scores (10.15 to 12.59), and anticipated overdose response behaviors (65.7\% change from passive to active response behaviors)\textsuperscript{21}.

Ray et al. (2015)\textsuperscript{13} used a modified 15-item Opioid Overdose Attitudes Scale (OOAS) to measure the perceived competency, concern and readiness among law enforcement for opioid overdose management. Competency scores were significantly higher for officers exposed to opioid overdose within the last month (17.0 vs. 15.9; \( p < 0.01 \)) and for officers exposed to opioid overdose 6 or more times in the past year (17.4 vs. 15.7, \( p < 0.001 \)). There was no difference in concern and readiness scores among officers.

- **Opioid Overdose Reversals**

In both Fisher et. al (2016) and Doyon et. al (2016), law enforcement officers most commonly administered naloxone in the home (62\%, Fisher et. al, 2016; 78.8\% (\( n = 61 \)), Doyon et. al, 2016) and during the late afternoon and evening (57.9\% during 3 PM-9PM, Fisher et. al, 2016; 60\% during 4 PM – 12 AM, Doyon et. al, 2016).

Doyon et. al (2016) measured several outcomes that were not described in Fisher et. al (2016), such as the type of overdose agent and the victim’s health and care following naloxone administration. The well-documented data in the study was collected by a centralized data collection protocol for pre-hospital naloxone use that is administered by the staff at the Maryland Poison Center\textsuperscript{16}. In Doyon et. al (2016), heroin-related overdoses (\( n = 43 \)) were more frequent than those related to prescription opioids (\( n = 31 \)) Most commonly, overdose victims received care
in the emergency department (n=51), but some victims required admission to the intensive care unit (ICU) (n=11), or the psychiatric unit (n=2). The study also measured the long-term health outcomes of the 11 ICU-admitted patients: 9 patients improved to ICU discharge status under 48 hours. 1 patient remained in the ICU for 2 weeks due to renal failure, and 1 patient died from overdose by heroin and fentanyl\textsuperscript{16}.

Rando et al. (2015)\textsuperscript{18} is the only study to include an outcome measure related to opioid-related overdose rates. Rando et al. (2015)\textsuperscript{18} evaluated the effectiveness of Ohio’s law enforcement naloxone program that was piloted in 2013 by 10 of the 18 law enforcement agencies in Lorain County. To do so, Rando et al. (2015) measured and compared the quarterly\textsuperscript{vi} number of opioid overdose-related deaths before and after implementation of the county’s naloxone pilot program. Prior to the start of the pilot program (October 2013), opioid-related overdose deaths increased by three-fold between 2011 (5.1 deaths per quarter) to 2012 (15.3 deaths per quarter) in Lorain County. Opioid-related overdose deaths peaked just prior to the start of the pilot program, reaching a quarterly average of 16.6 deaths in quarter 3 (Q3) of 2013. During the pilot program ([Q4 of 2013] to [Q3 of 2014]), the average quarterly number of opioid-related overdose deaths declined to 13.4 deaths per quarter\textsuperscript{18}.

- **Financial Barriers**

  In Pitt County, intranasal naloxone kits were funded by grants from a non-profit organization in North Carolina called Project Lazarus. Kitch and Portela (2016) expressed concerns about program sustainability due to Project Lazarus’ high purchasing costs for both intranasal naloxone ($15 - $40 per dose) and the intramuscular naloxone auto-injector ($500 - $600).

\textsuperscript{vi} Quarter was defined as annually by the authors and refers to a three month time period, where quarter 1 (Q1) of 2013 refers to January – March, quarter 2 (Q2) of 2013 refers to April – June, etc.
• **Post-Overdose Protocols**

While not explicitly discussed, another challenge that seems to face Pitt County law enforcement is what appears to be the absence of a post-overdose reversal protocol that attempts to divert victims to addiction treatment with access to mediation-assisted treatment. Among the overdose victims (n=4) in Pitt County, victims were provided care in the emergency department (n=3) and when needed, in the intensive care unit (ICU) (n=1). However, all 4 patients were eventually discharged home with no mention of providing resources about addiction treatment. For one patient, this reported naloxone rescue was his second overdose reversal within three days. It is possible that addiction treatment resources were offered and turned down by this particular patient. But, without explicit mention of such actions, the Pitt County case series seems to suggest the need for systems analysis to identify opportunities to divert victims to treatment during the time period following an overdose reversal.

**CONCLUSION**

Given the urgency of the opioid overdose problem, state and national policymakers have put forth several different strategies in hopes of reducing rates of opioid overdoses, which continue to climb each year. The current literature suggests that trained law enforcement officers are able to effectively administer naloxone to prevent fatal opioid overdoses. Unfortunately, the conclusions that can be drawn from this review remain limited by the absence of high-quality studies that have been published about implementation and effectiveness of naloxone programs by law enforcement officers. All 9 studies retrieved about law enforcement naloxone programs in the literature were either non-controlled interventions (before-after or cross-sectional) or non-comparative studies (case series) that described the implementation of law enforcement naloxone
programs in specific settings. Out of these studies, only a small number have examined the perceptions of law enforcement towards naloxone use. All of these studies remain limited in the quality of their results due to study design issues, such as small sample size and convenience sampling with no reported methodology of the rationale that guided sampling choices. Furthermore, the presence of additional opioid overdose interventions has made it very difficult to parse out the implementation effects of law enforcement naloxone programs, or any single strategy, from external contextual variables.

Further research is needed to better evaluate the common barriers to successful implementation of naloxone programs: financial barriers and limited treatment diversion of victims. By focusing future research efforts on these barriers to implementation, we can inform future policy-making efforts to support successful implementation of law enforcement naloxone programs.
### Table A-1. Literature Search Strategies

<table>
<thead>
<tr>
<th>Database</th>
<th>Literature Search Strategy</th>
</tr>
</thead>
<tbody>
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<td><strong>Case Studies</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LexisNexis</strong></td>
<td>Naloxone AND (naloxone OR narcan OR “opioid antagonist” OR “opioid antidote” OR “heroin antidote”) AND (police OR officers OR officer OR “law enforcement” OR sheriff OR deputy OR deputies)</td>
</tr>
<tr>
<td>Updated: 06/30/16</td>
<td>Source: newspapers</td>
</tr>
<tr>
<td><strong>Appendix 1: Systematic Review</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PubMed</strong></td>
<td>(((((officer, police[MeSH Terms]) OR police) OR law enforcement)) AND (((naloxone[MeSH Terms]) OR narcotic antagonists[MeSH Terms]) OR naloxone)</td>
</tr>
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<td>6/06/2016</td>
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<tr>
<td><strong>PsychInfo</strong></td>
<td>(TX naloxone) AND (TX police OR TX law enforcement)</td>
</tr>
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<td>6/07/2016</td>
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Table A- 2. Eligibility Criteria for Systematic Review

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<th>Criteria</th>
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<tr>
<td>Population</td>
<td>Individuals classified as “law enforcement”, which encompasses sheriffs, deputy sheriffs, chiefs of police, city police officers, sworn in law enforcement personnel of port and transit authorities, campus police officers employed by local city and/or community college districts</td>
</tr>
<tr>
<td>Intervention</td>
<td>Law enforcement naloxone programs, i.e. programs that allow, provide, or mandate law enforcement officials to carry naloxone for the purposes of overdose reversal. History of law enforcement officer administration of naloxone is not a necessary requirement for inclusion.</td>
</tr>
<tr>
<td>Comparators</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Outcome</td>
<td>Any outcome that measures attitude, perception, or knowledge of law enforcement officials towards use of naloxone as an overdose prevention tool (Includes naloxone use by law enforcement, non-law enforcement first responders, or laypersons); Any outcome related to opioid-related mortality and morbidity</td>
</tr>
<tr>
<td>Setting</td>
<td>United States or Canada; English language only</td>
</tr>
<tr>
<td>Study design</td>
<td>Randomized controlled trials, controlled (non-randomized) trials, cohort studies, interrupted time series, case series, cross-sectional studies, qualitative interviews or methods</td>
</tr>
<tr>
<td>Study</td>
<td>Methods</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Doyon et. al, 2016</td>
<td>Record review Case series</td>
</tr>
<tr>
<td>Fisher et. al, 2016</td>
<td>Record review Case series</td>
</tr>
</tbody>
</table>
| Kitch et. al, 2016 | Record review Case series | 2 PD- Pitt County NC              | 48 hours   | Location, OD agent, naloxone dose, role of EMS, medical care needed                | **Other benefits:** Community relations  
**Coalition:** Project Lazarus  
**Costs ($):** Sustainability |
| Saucier et. al, 2016 | Written survey Pre-post evaluation | Several PD: Rhode Island           | 2014 – 2015 | Attitudes*; self-efficacy; naloxone knowledge, behavioral intentions; legal knowledge: T/F | **Coalition:** NOPE-RI of the RI  
Disaster Medical Assistance Team and Medical Reserve Corps |
| Rando et. al, 2015 | Record review Interrupted time series | 10 PD: Lorain County, OH          | 13 months  | Survival rate, county opioid overdose death rate, victim demographics              | **Coalition:** Hospital systems, local health department, county coroner  
**Costs ($):** Limits generalizability |
| Ray et. al, 2015 | Written survey Cross-sectional | 1 PD: Indianapolis, IN            | Spring 2014 | LEO perceptions: concerns, LENP adoption, behavioral intentions, competency        | **Not discussed**                                                                            |
| Banta-green et. al, 2013 | Written survey Cross-sectional | 1 PD: Seattle, WA                 | Fall 2011  | Legal knowledge, Attitudes on naloxone use, LENPs, past LEO exposure to overdose calls | **Costs ($):** No legal funding  
**Implementation:** Legal change has not translated to LEO policy change |
Table A- 4. Critical Appraisal of Quantitative Studies

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<th>Measurement</th>
<th>Analysis</th>
<th>Interpretation of Results</th>
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<td>No LEO-specific outcomes</td>
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<td>N=119</td>
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<td>N=251</td>
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<td><strong>Rando et. al, 2015</strong></td>
<td>Victims: 3/3</td>
<td>Limited description</td>
<td>Unclear methods</td>
<td>N=247</td>
<td>Yes</td>
<td>Overdoses not reported as age-adjusted rates</td>
<td>No flaws noted</td>
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<td>Limited description</td>
<td>Unclear methods</td>
<td>N=247</td>
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<td>Overdoses not reported as age-adjusted rates</td>
<td>No flaws noted</td>
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<td>Unclear methods</td>
<td>N=247</td>
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<td>Overdoses not reported as age-adjusted rates</td>
<td>No flaws noted</td>
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<td>Limited description</td>
<td>Unclear methods</td>
<td>N=247</td>
<td>Yes</td>
<td>Overdoses not reported as age-adjusted rates</td>
<td>No flaws noted</td>
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<td><strong>Ray et. al, 2015</strong></td>
<td>LEO: 3/3</td>
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<td>EEP</td>
<td>N=119</td>
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<td>OOAS not validated in study population; no comparison data</td>
<td>N/A</td>
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<td>OOAS not validated in study population; no comparison data</td>
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<td>OOAS not validated in study population; no comparison data</td>
<td>N/A</td>
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<td>EEP</td>
<td>N=119</td>
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<td><strong>Banta-green et. al, 2013</strong></td>
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<td>EEP</td>
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<td>No flaws noted</td>
<td>N/A</td>
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<td>N/A</td>
<td>EEP</td>
<td>N=251</td>
<td>Yes</td>
<td>No flaws noted</td>
<td>N/A</td>
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<td>EEP</td>
<td>N=251</td>
<td>Yes</td>
<td>No flaws noted</td>
<td>N/A</td>
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<td>N/A</td>
<td>EEP</td>
<td>N=251</td>
<td>Yes</td>
<td>No flaws noted</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*NR: Not reported

33.3% incomplete records: reasons for missing data provided
22.2% EMS data unknown due to restricted EMR
84.9% participation
11.9% lost to F/U (n=8)
<1% did not complete survey
3% missing (n=7)
### Table A- 5. Characteristics and Limitations of Qualitative Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Methods</th>
<th>LEA and Setting</th>
<th>Themes</th>
<th>Limitations</th>
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</thead>
<tbody>
<tr>
<td><strong>Deonarine et. al, 2016</strong></td>
<td>Interview: Qualitative thematic analysis</td>
<td>2 PDs in BC, Canada</td>
<td>1. LEO reluctance to LENP adoption&lt;br&gt;2. No access to intranasal naloxone in Canada</td>
<td>1. Very small sample (n=2)&lt;br&gt;2. Convenience sampling criteria NR&lt;br&gt;3. Confounding NR&lt;br&gt;4. Description of study population NR</td>
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<tr>
<td><strong>Green et. al, 2013</strong></td>
<td>Interview: Qualitative thematic analysis</td>
<td>3 PDs in suburban towns of Connecticut and Rhode Island</td>
<td>1. Conflicting roles of law enforcement at overdose scene&lt;br&gt;2. Futility - inadequate treatment resources in community, inability to change MD prescribing practices&lt;br&gt;3. Greater empathy when addiction starts with prescriptions, blame shifted to doctors&lt;br&gt;4. Naloxone = safety net&lt;br&gt;5. Desire for law enforcement follow-up with victim</td>
<td>1. Anonymous location – no community context or idea of officer exposure to LENP programs&lt;br&gt;2. Confounding NR&lt;br&gt;3. Limited description of study population – only officer rank provided</td>
</tr>
</tbody>
</table>
### Figure A-1. Yale MeSH Analysis Grid Used to Develop Search Strategy

<table>
<thead>
<tr>
<th>PMID</th>
<th>Title</th>
<th>Journal Title</th>
<th>Author (Year)</th>
<th>MeSH Headings</th>
<th>Author Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>2495132</td>
<td>Intranasal naloxone administration by police first responders ...</td>
<td>The American journal of emergency medicine</td>
<td>Randi J (2013)</td>
<td>Admin, Adolescent</td>
<td>Naloxone, Opioids, Pain</td>
</tr>
<tr>
<td>2702033</td>
<td>An initial evaluation of law enforcement overdose training in R...</td>
<td>Drug &amp; alcohol dependence</td>
<td>Santer CD (2016)</td>
<td>Addiction, Epidemiology</td>
<td>Opioids, Opioid overdose</td>
</tr>
</tbody>
</table>

- **PMID**: PubMed identifier
- **Title**: Title of the article
- **Journal Title**: Title of the journal
- **Author (Year)**: Author's name and year of publication
- **MeSH Headings**: Medical Subject Headings
- **Author Keywords**: Keywords used by the author
Figure A-2. PRISMA Diagram

Records identified via databases:
- PubMed: 48 06/06/16
- Web of Science: 37 06/06/16
- PsycInfo: 26 06/07/16

Records identified via other sources:
- Hand-search of reference lists: 11

Total: 122
Duplicates removed: 44

Records screened via title/abstract review: 78

Records excluded: 64
- Full-text articles excluded: 5
  - No access: 2
  - Literature or legal review: 2
  - Wrong Population: 1
  - Wrong Intervention: 1

Full-text articles assessed for eligibility: 14

Studies included in systematic review: 9
REFERENCES


