Opioid Overdose: How to Spot the Signs and Act

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Author Note

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Abstract

Background and Aims: Due to the significant rise in opioid use and fatal opioid overdoses, an opioid reversal agent naloxone has been made available to the public through standing orders at Arizona pharmacies. The aim of this project is to implement a virtual naloxone education program to increase community knowledge of opioid addiction, opioid overdose, and opioid overdose response. **Design:** Utilized a one group, pretest-posttest design utilizing Brief Opioid Overdose Knowledge (BOOK) screening tool. Participants recruited through Mesa Community College website as an online event open to students, staff, and public. **Setting:** Online WebEx event through Mesa Community College. **Intervention:** Presented a 45-minute educational PowerPoint on opioids, opioid overdose, and opioid overdose response with a 15-minute question answer session. **Participants:** A total of 67 people attended the online event, 38 participated in pre-test and 19 participated in post-test survey. Demographics included 73.7% female, 55.3% between ages 18-30, 86.7% identify as white/Caucasian, and 92% signed up with a community college email address. **Findings**: Statistically significant results, with alpha value of 0.05, $t(13) = -3.99$, $p = .002$, $d=1.07$. **Conclusions:** Implementing an online education session is associated with increased knowledge on opioid use, opioid overdose, and opioid overdose response. Implementing community-based education programs may increase knowledge on opioid overdose prevention and community intervention.

Keywords: opioids, opioid overdose, education, naloxone

Opioid Overdose: How to Spot the Signs and Act

Due to an upsurge in the availability of opioids, there has been a significant increase in opioid use and opioid overdoses around the world. World leaders have looked to evidence-based practice to implement community changes in hopes of addressing the opioid crisis. Naloxone is an opioid antagonist that reverses the effects of opioids (Binswanger et al., 2015). Increasing community awareness of opioid overdose and community access to naloxone is a potential solution to addressing the current opioid epidemic.

Problem statement

Globally, there has been a significant increase in opioid use and opioid overdose. In the United States, fatal drug overdoses have increased six-fold since 1990, with the death rate from prescription opioid overdoses increasing four-fold from 1999 to 2013 (Davis, 2016). In Arizona specifically, opioid-involved deaths have risen 76 percent from 2013-2017, with 928 deaths reported in 2017 (NIDA, 2019). The greatest increase in deaths have occurred amongst those using synthetic opioids, such as Fentanyl, as well as heroin and prescription opioids (NIDA, 2019). Opioid use disorder is characterized by a problematic pattern of opioid use, increased tolerance, and withdrawal causing a pattern of significant distress (APA, 2013). In October 2017, President Trump declared the opioid crisis a public health emergency with over 6 billion dollars in funding to address the opioid abuse crisis (HHS, 2018).

Purpose and Rationale

In response to the current opioid crisis, the US Department of Health and Human Services (HHS) implemented evidence-based approaches to examine opioid prescribing practices to reduce drug availability, expand the use of naloxone, and increase medication assisted programs (2018). Rhode Island and Massachusetts implemented opioid overdose and naloxone

education programs resulting in a significant increase in the ability to identify the signs and symptoms of opioid overdose and a significant increase in the perceived value in the training (Pade et al., 2018). Naloxone is an effective opioid antidote that is available in Arizona through standing order to any individual as mandated by Dr. Cara Christ, Director of the Arizona Department of Health Services [ADHS] (2018). While naloxone is available to the community, there is a need for a formal education program to increase the understanding of opioid addiction, the signs of an opioid overdose, and how to respond in the community, including naloxone administration.

Background and Significance

In 1997, the United States implemented changes to their clinical guidelines to increase chronic pain management with the encouragement of opioid pain medications (Hall et al., 2008). The United States enacted new regulations and policy guidelines resulting in the per capita retail purchase of methadone increasing 13-fold, hydrocodone increasing 4-fold, and oxycodone increasing 9-fold (Hall et al., 2008). Following these mandates, from 1999 to 2004 unintentional drug poisoning deaths increased by 68%, with the majority linked to opioid use (Hall et al., 2008). Over the last three decades, the rates of opioid overdoses and deaths have continued to increase.

Due to the alarming increase in opioid overdoses in Arizona, Governor Doug Ducey declared a state of emergency from June 5, 2017- May 29th, 2018 (AZHS, 2020). During this time, Arizona implemented enhanced surveillance of opioid related incidence resulting in the mandated reporting of opioid-related data within 24 hours of an event, post-mortem lab testing, increased behavioral health treatment capacity, changes to opioid prescribing guidelines, and increased access to naloxone (Arizona opioid emergency response, 2018). Since June 2017, the

AHDS has provided 6,316 naloxone kits to law enforcement with 86% of people experiencing non-fatal opioid overdoses receiving naloxone pre-hospitalization (ADHS, 2018). Increasing the community access to naloxone has resulted in a significant increase naloxone administration and improved patient outcomes.

Population

Addressing opioid addiction lies in the extensive biological experiences a person has. According to Bates (2018), heavy use of opioids results in significant downregulation in the body's natural opiate system responsible for sleep, pleasure, and satiety. The down regulation results in the inability to feel pleasure or satiety without opioids, resulting in relapse rates as high as 72 to 88% after 12–36 months (Chalana et al., 2016). In addition, the cessation of opioids, results in significant physical withdrawal including cramping, sweating, anxiety, sleeplessness, and cravings (Bates, 2018). The fear of going into withdrawal mixed with biological cravings makes stopping opioid use incredibly difficult.

In the state of Arizona, high relapse and overdose rates have been observed, with one in five chronic pain patients reporting experiencing opioid-related overdoses (Dunn et al, 2017). According to Pade et al. (2016), patients diagnosed with an opioid use disorder have the highest risk of overdosing as they transition from an inpatient rehabilitation setting to a lower acuity environment. Other risk factors for overdose include chronic mental illness, history of illicit substance abuse (including smoking), and concurrent use of sedatives (Brady et al., 2016). Most opioid overdoses occur in the community or situation where the person is with family or friends. Increasing naloxone availability to the community allows people with Opioid Use Disorder (OUD) to utilize a critical insider knowledge that increases their ability to rapidly assess for the signs and symptoms of an overdose, empathize with the victim, and administer appropriate doses

of naloxone (Neale et al, 2019). By targeting both the patient and their community support for signs and symptoms of opioid overdose, the opportunity of timely administration of naloxone will hopefully increase.

Naloxone Education Intervention

Naloxone's few known adverse effects, limited potential for abuse, and available at a reasonably low cost makes it an ideal intervention in OUD (Giglio et al., 2015). Naloxone education has shown to be effective in increasing naloxone knowledge among treatment seeking OUD patients (Lott & Rhodes, 2016). Pade et al. (2016) found statistically significant improvement in the ability to recognize an opioid overdose and assist in naloxone administration after the implementation of a residential treatment education program. This program was limited by a lack of follow-through in obtaining naloxone post education intervention. Programs implementing education to distinguish signs of opioid overdose and indication for naloxone lead to a significant increase in ability to identify opioid overdose, increased odds of recovery, and better patient outcomes in non-clinical settings where naloxone was indicated (Giglio et al., 2015).

Current Practice

The Arizonan Department of Health Services have current standing orders for naloxone at all Arizona-licensed pharmacies (AHDS, 2020). Under Arizona State Law A. R. S. 36-2267, a person in good faith can administer an opioid antagonist to someone experiencing an opioid overdose without liability for any civil or other damages (Arizona State Legislature, 2020). While naloxone is available, there is a lack of formal education programs in the community on how to access the medication and the new laws surrounding administration protection.

Many providers have expressed hesitations in implementing naloxone education for fear the it enables promotes risk taking behaviors and fails to treat the underlying cause of the addiction (Besser et al., 2019). While most providers did not verbalize concerns regarding naloxone itself, few prescribers have taken advantage of prescribing naloxone to their clients (Green et al., 2013). Additional barriers in education included staff having gaps in knowledge about naloxone and verbalized fears regarding the promotion of risk-taking behaviors (Binswanger et al., 2015).

In most opioid residential treatment facilities in Arizona, residents participate in 4-6 hours of daily health education as well as weekly family groups. The facilities have access to free naloxone kits but lack a standardized educational training program. Intermittent naloxone education is provided, but the depth of education, training, and practices vary significantly across locations.

Outcome

Current research indicates a gap in information regarding risk factors associated with opioid overdose (Dunn et al, 2017). Pade et al. (2016) found significant improved ability to recognize an overdose and increased comfort in managing an overdose post formal naloxone and opioid educational training. Behar et al. (2018) patients with access to naloxone experienced 63% fewer opioid related emergency department visits over one year compared to those who had not received naloxone. The overall goal of this program is to increase awareness of the signs and symptoms of an opioid overdose and increase community access to naloxone.

Background Summary

Providing community education on opioid addiction increases awareness, knowledge, and empowerment to utilize the necessary skills to respond to an opioid overdose. Increasing the

education around the current laws, practices, and resources allows the community to come together to tackle the opioid epidemic in Arizona. The community has already provided all the necessary steps and resources but is lacking a formal education program to streamline the availability of these resources.

Internal Evidence

According to the American Addiction Centers (2020), the city selected for this project is ranked number 2 in the United States for the most significant drug use. The local database on opioid addiction shows a 48% increase in opioid overdose incidents and a 96% increase in opioid overdose deaths since 2017 (ADHS, 2020). In 2020, this community averaged about 125 opioid overdose incidents a month with an average of 55 cases a month dead on arrival with no transportation required. The local police department, healthcare professionals, and community have voiced concerns regarding high rates of opioid overdose deaths.

PICOT Question

This inquiry has led to the following PICOT question: In communities with high prevalence of opioid addiction, how does a WebEx opioid addiction education lecture, compared to no lecture, influence the ability to identify the signs and symptoms of an opioid overdose.

Search Strategy

An exhaustive search of the current evidence was complete to address all aspects of the PICOT questions. CINAHL Plus with Full Text, Pub-Med, PsycINFO, and Cochrane Reviews were chosen due to their relevance, rigor, and ability to filter for peer-reviewed journals. Due to the Cochrane Reviews not directly relating to the PICOT, they were excluded from this project. An extensive grey literature search of current national initiatives, Arizona naloxone use, and health policies surrounding opioids and naloxone was completed.

In the database searches, a wide variety of key terms were used to answer all aspects of the PICOT questions. For the population the following keywords were utilized: *opioid, opioid-related disorders, substance use disorder, opioid dependence disorder, inpatient rehabilitation, opioid epidemic, and opioid crisis.* Due to the wide range of resources available, the search was further limited to the United States. For the intervention, the following terms were utilized: *naloxone, Narcan, opioid education program, relapse prevention, training*. To address the outcome, the following terms were utilized: *overdose, death, relapse, naloxone administration, mortality*. Additional filters applied included peer-review journal article, English language, and publication date from 2015-2020.

An initial search in all 3 databases was conducted using the terms *opioid, naloxone, and education.* CINAHL Plus with Full Text yielded 587 results, PsychINFO yielded 180 results, and PubMed yielded 564 results. Additional combinations of key terms, above-mentioned filters, and abstract reviews were conducted. The final studies included 6 studies from CINAHL Plus, 2 from PsychINFO, and 3 from PubMed. Inclusion criteria included the study being conducted within the last 5 years, having an adult population, focused on opioid addiction and treatment modalities.

Critical Appraisal and Synthesis

This literature review consisted of ten studies evaluated by the Melnyk and Fineout-Overholt's (2011) rapid critical appraisal tool. The studies in Appendix A were selected to answer the PICOT question in terms of opioid addiction, naloxone education, and community perspective on barriers to implementing naloxone interventions. Appendix B highlights important connections among the ten articles.

The overall strength of the evidence was strong with 2 systematic reviews, 3 randomized control trials, 2 non-randomized control trials, and 3 qualitative studies of semi-structured interviews. The quantitative studies demonstrated high quality of evidence through standard deviations, effect sizes, and confidence intervals and the qualitative studies appropriate explained randomization, anonymity, coding process, and standardization of semi-structured interviews. All studies reported no author bias, with 9 out of the 10 being conducted in the United States.

Common sources of funding included the National Institute on Drug Abuse, Department of Health and Human Services, and the National Center for Injury Prevention and Control, with one study receiving funding from a local outpatient clinic. A moderate degree of homogeneity in population demographics was identified with the mean age of all the studies being between 30 and 40 years old. In terms of gender, 8 out of the 10 studies consisted of 20-35% women, with one study having 55% women and another having 0% women. A common weakness of the studies were relatively low sample sizes as well as potential for bias in volunteering in program participation. The most common interventions assessed included naloxone prescribing practices, naloxone acceptance, naloxone education programs, and opioid relapse rates. Common themes amongst opioid barriers included limited knowledge, logistical barriers, and attitude concerns. The 5 studies that examined naloxone education programs all found statistically significant results showing the effectiveness of their intervention.

Conclusion from the Evidence

The evidence presents a compelling case for interventions to address the opioid crisis in the United States. All the articles recognized the extent of the opioid epidemic and discussed the impact opioid overdoses are having throughout the country. The research supports the

effectiveness of naloxone education programs to increase community identification of opioid overdoses and naloxone intervention. While common barriers include fear that naloxone promotes risk taking behavior in OUD, naloxone appears to be a cost-effective community intervention to address the current opioid epidemic.

Theoretical Framework

The goal of the Harm Reduction Theoretical Framework is to decrease adverse health, social, and economic consequences of drug (Cheung et al., 2016). On a practical level, this is done through the implementation of pragmatic, realistic, and low-threshold programs that meets the person struggling with opioid addiction where they are at. On a conceptual level, this is a value-neutral view of the person, meaning personal bias is set aside to examine the current drug use epidemic (Cheung et al., 2016). The Harm Reduction Framework focuses on the problem, does not require abstinence, and understands that active drug use may be a part of the recovery process. Common programs include safe needle exchange, methadone maintenance, outreach programs, law-enforcement cooperation, tolerance zones, etc. (Cheung et al., 2016). This framework can be extended to naloxone education and distribution programs to reduce the harm in accidental community overdose. Harm reduction can influence policy on a middle range and wide spectrum, with the ability to embed into existing policies to reduce harm to those partaking in illicit substance use.

Implementation of Framework

The Iowa Model of Evidence-Based Practice to Promote Quality Care provides a clinical framework to use evidence-based practice to implement an organizational change to practice as

illustrated in Figure 2 (Doody & Doody, 2011). This framework fits intuitively with the nursing academic setting as it helps focus limited fiscal and personnel resources on critical evidence-based practice activities. For this project, naloxone education at an inpatient opioid treatment facility has been identified as the problem focus trigger. This problem is a priority for the organization, as all locations across the Southwest United States have struggled with overdoses as a patient moves from the inpatient setting to a lower level of care. A team of clinical staff, providers, and community partner have come together to adopt this change into practice. The last 16 weeks included a thorough critique and synthesis of the current research surrounding naloxone education supporting the implementation of a pilot program (Doody & Doody, 2011). If successful, naloxone education program will be disseminated to influence policy change and interventions amongst one of the biggest recovery centers in the United States.

Implications for Practice Change

Many research studies have shown the significance of implementing naloxone education programs and naloxone administration in the community. Currently, the community has many questions regarding opioid addiction with limited resources. The goal of this project is to provide education on opioid addiction, the signs and symptoms of an opioid overdose, and how to respond to an opioid overdose. The education class will improve knowledge of current laws, the signs and symptoms of opioid overdose, and naloxone administration. The goal is to have increased identification of opioid overdose and self-reported improved comfortability in the process of administering naloxone. Pending a successful pilot program, the goal is to continue to provide community education on drug abuse and provide a safe space for the community to ask questions of medical professionals and increase community access to naloxone.

Potential Outcomes

Behar et al. (2018) found patients with access to naloxone experienced 63% fewer opioid related emergency department visits over one year compared to those who had not received naloxone. The hope of this program is to increase community awareness of the signs and symptoms of an opioid overdose and increase the availability of naloxone. Recovering from an addiction is rarely a linear process. The overall goal of this program is to increasing community availability of naloxone and hopefully decrease the number of fatal opioid overdoses, giving people a second chance to work towards sobriety.

Methods

Human Subject Protection

Privacy and confidentiality. Prior to the study implementation, privacy and confidentiality rights were provided for each participant. Participants were able to consent to participating in the study or to attend the educational talk without survey permission. The surveys allowed participants to use a specific number ID number to remove any identifying information.

Consent process. Electronic consents were obtained prior to participating in the project. Participants were asked to review a disclosure statement outlining the purpose, significance, and project outline. Participants were able to consent up to 2 weeks prior to the intervention, allowing ample time to review the material and complete the pre-test. Participants were notified of ability to stop participation at any time throughout the process. The study inclusion criteria included adults 18 and older able to read and understand English, and English speaking.

Exclusion criteria included minors under the age of 18, adults unable to consent, and non-English speaking individuals.

Project Description and Recruitment

This project included a convenience sample of 64 adults in the local community. Advertising was done through the local community college, with a registration link the homepage. The educational talk was done through a WebEx event was open to students, staff, and the general community. An email invitation was sent out two weeks before educational talk to the Nursing, Paramedics, Fire Science, and Counseling Departments. Participants were asked to pre-register for the event. By registering, participants were able to revive an email link to a voluntarily consent to participate in the project and complete the pre-test and demographic questionnaire. A reminder email was sent out 24 hours before the event to registered participants. The virtual WebEx event occurred on Wednesday, October 28, 2020 from 3 to 4 pm. Following the event, post-surveys were sent out via email. The program was conducted at a time agreeable to the agency and convenient for participants. Participation was voluntary and no compensation was provided.

Data Collection and Instrument

The initial data collection utilized google forms encrypted through the community college. Participants provided an ID number, the last two digits of their birth year and last two digits of their phone number and answered three brief demographic questions. Participants were then asked to answer 12 pre-test questions from the Brief Opioid Overdose Knowledge (BOOK) questionnaire. The BOOK questionnaire is a dichotomous survey providing options for yes, no,

or I don't know. Permission to use the BOOK questionnaire was obtained from Johns Hopkins Solutions on September 19th, 2020. Following the virtual WebEx event, participants retook the 12 question BOOK questionnaire through google forms.

Data Analysis

All data was analyzed using t-test and to understand knowledge gained with standard deviation, mean, and percentage as appropriate. A two-tailed paired samples *t*-test was conducted to examine whether the mean difference of BOOK Pretest and BOOK Posttest was significantly different from zero.

Budget

No funding was received for this project. As a virtual event, there were minimal costs and overhead related to the project, making it easily replicable.

Results

Demographics

While 64 people participated in the study, only 14 participants completed that pre and posttest. Of the 14 participants who completed their surveys, the average age was between 25-30 years old, 71.42% of participants were female and 85.71% identified as White/Caucasian. It is important to note that of the 64 participants, 96.88% registered with a community college email.

Results

The average score on the pretest was 8.28 out of 12 questions correct or a 69.04%. The average score on the posttest was 10.71 out of 12 questions correct of an 89.25%. Average scores increased by over 20%. The result of the two-tailed paired samples *t*-test were significant based

on an alpha value of 0.05, $t(13) = -3.99$, $p = .002$. Cohen's d was $d=1.07$ indicating a large effect size of this project.

These finding suggests the difference in the mean of BOOK Pretest and the mean of BOOK Posttest was significantly different from zero. The mean of BOOK Pretest was significantly lower than the mean of BOOK Posttest. Implementing a virtual education is associated with increased knowledge regarding opioids, opioid overdose, and opioid overdose response.

Impact

These results are statistically significant indicating increased community knowledge. Increasing community awareness of opioids, opioid overdose, and naloxone availability is essential to increasing community response. This can potentially impact naloxone administration rates pre-hospitalization and reduce the number of fatal opioid overdoses.

Sustainability

This intervention was supported by the nursing department at the community college. Due to the significant value the project brought to the community; the nursing department has started to create an educational series to assist the community with learning on relevant health topics in the community.

Discussion

A virtual WebEx event is effective at increasing community knowledge on opioids. The difference between BOOK pretest and posttest scores were statistically significantly different, with strong effect size and high level of confidence. This intervention was quick to assemble, low in cost, and had high participant engagement. The results of this project are consistent with the literature that educational programs increase community education on naloxone.

Limitations and Recommendations

This project was significantly limited by the number of appropriately coded data. While 64 people attended the online event, 36 completed the pretest, 28 completed the posttest, but only 14 people coded their projects correctly. Implementing frequent email reminders to complete pre and posttest could assist in further participation. A clearer coding criterion could allow for more data to be retained.

Participant sample were homogenous, with the majority being white women between the ages of 25-30. Due to recruitment occurring at the community college, 96.88% of participants registered with their school email. Further advertising at local opioid treatment centers, support groups, and resource centers would assist in reaching the target population.

This project was originally intended to take place in person with access to naloxone kits provided to the community. Virtual events are limited to people with internet access and wifi enabled devices. Future considerations should include partnering with nonprofits to increase community access to naloxone and implementing both in-person and virtual events to encourage participation.

Conclusion

Opioid addiction continues to be a major concern in the United States. Ongoing education and interventions to address the opioid epidemic are needed to prevent unintentional drug overdoses. Implementing virtual educational talks increase participant knowledge on opioids, opioid addiction, and how to respond in the event of a community opioid overdose. Continue outreach and community support are necessary to make a sustainable change in the community.

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Appendix A

Table 1

Critical Appraisal of the Evidence: Evaluation Table

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Behar, E., et al. (2018). Acceptability and feasibility of naloxone prescribing in primary care settings: A systematic review. **Country**: USA **Bias:** None Reported **Funding**: National Institutes of Health grant K24DA042720	Inferred Relapse Prevention Model	**Method: SR** of Descriptive Studies **Purpose**: To assess the acceptability and feasibility of prescribing naloxone to patients in primary care settings.	**N**=17 **Inclusion**: USA, peer-reviewed, full-length articles written in English and based on original research. **Exclusion:** focused on prescribing naloxone outside of a primary care setting USA **Geographic Scope in USA:** Northeast N = 4 Midwest N = 1 Southwest N = 5 West N= 5 National N=2	**IV**: naloxone prescribing in primary care **DV**: accessibility and feasibility of naloxone prescribing	One analyst reviewed the titles of all queried articles One reviewer independently reviewed the remaining 52 abstracts for inclusion Two analysts independently read the full text of eligible articles Collected data on acceptability or feasibility of naloxone prescribing	PRISMA diagram display study selection process Accessibility- evaluated the articles for providers' awareness and willingness to prescribe naloxone, attitudes, and anticipated barriers/concerns. Feasibility- evaluated the articles for descriptions of programmatic implementation	Acceptability- In 2003, 37% acceptance vs. 2016, 90% of respondents willing to prescribe naloxone Feasibility- Inconsistencies in provider training, mixed prescribing practices and concerns of logistics of filling the prescriptions	**LOE**: I **Strength**: systematic review integrating significant information. Naloxone prescribing feasible in primary care setting **Weakness**: Sample size relatively small, limited to USA. Use of descriptive studies limit ability to assess efficacy of naloxone. **Significance**: Provides structured rational for implementing structured naloxone training

Key: **ODD**- opioid dependence disorder; **OEND**- opioid overdose and naloxone distribution; **USA-** United States of America**; DHHS-** Department of Health and Human Services**; THN-** take-home naloxone; **NIDA-** National Institute on Drug Abuse; **NCIPC**- National Center for Injury Prevention and Control**; OR-** odds ratio; **CP-** Chronic Pain; **DV**-dependent variable; **IV**- independent variable; **N**-number of studies; **n-** number of participants; **n**- number of participants; **LOE**- level of evidence; **SR-** systematic review; **MTA**- meta analysis; **RCT**- randomized control trial; **NRCT**- non randomized control trial; **SSI**- Semi-Structured Interview

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Bessen et al. (2019). Barriers to naloxone use and acceptance among opioid users, first responders, and emergency department providers in New Hampshire, USA **Country**: USA **Bias**: None Identified **Funding**: Substance Abuse and Mental Health Services Administration and DHHS	Rhodes' Risk Environment Framework	**Method:** Qualitative study: **SSI** **Purpose**: To understand first responders, emergency department personnel's, and opioid users' experiences with, naloxone use and distribution in NH.	**n**=143 Responders **n**=36 80.6% male 7% female 107 naloxone administrations User **n**=76 Male 48.7% Female 54.3% Received naloxone n=33 Administered naloxone n=3	Interviewed opioid users: asked experiences with naloxone, ease of naloxone access; naloxone locations, and side effects of naloxone. Emergency asked about experiences administering naloxone trends in the use of naloxone in NH; unanticipated side effects of naloxone administration, and perspectives on the use of naloxone	Semi-Structured Interviews Sample= multi-pronged recruitment approach, including snowball sampling Interviews conducted over the phone or in person Interviews recorded for transcription. Average duration= 1.5 hours	Interview transcripts analyzed by ATLAS.ti (v. 8.1) and content analysis Two analysts reviewed all coded text segments within each interview and met weekly to review emerging themes	Total of 112 semi-structured interviews Common theme amongst responders- naloxone allows opioid users to "push the high" and encourages riskier opioid use" Responders and users reported significant increase in community availability of naloxone. Users reported perceptions that only medical professionals can administer naloxone	**LOE**: IV **Strength**: Identified major sources of opposition to naloxone at social level. Concerns that naloxone enables greater and/or riskier opioid use. **Weakness**: Samples consisted of volunteers, higher potential of bias/stronger opinions on topic. **Significance:** Highlights community's perceptions of naloxone, barriers to interventions, and areas in need of further education.

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Binswanger et al. (2015). Overdose education and naloxone for patients prescribed opioids in primary care: A qualitative study of primary care staff. **Country:** United States **Bias**: None Recognized **Funding:** NIDA	Theory of Planned Behavior and the Health Belief Model	**Method**: **SSI** Qualitative Focus Group with clinical staff **Purpose:** To better understand clinical staff's knowledge, attitudes and beliefs about overdose education and naloxone prescribing.	**n**= 56 Ten focus groups with clinical staff from a large public healthcare system, a managed care organization and an academic medical center. All focus groups included at least one prescriber. **Demographics**: Mean age: 40.8 Race: 47 white Years since terminal degree: 12	Created focus groups to understand issues related to naloxone prescribing practices. Four content areas related to overdose education and naloxone prescription: 1) knowledge 2) barriers 3) benefits 4) facilitators.	Created focus group guide with category questions. Focus groups digitally recorded, transcribed and entered into ATLAS.ti software.	Three analysts independently coded two transcripts by assigning predefined codes to text and assigning new codes to emergent findings. A priori template of codes informed by our theoretical models Codes were subsequently categorized into larger groupings, representing themes	**n**= 56 Clinical staff had limited awareness and clinical knowledge about outpatient naloxone prescribing. Participants Identified Different Groups of Patients as Potentially at Risk for Overdose Barriers: Logistical and Systems Barriers, Attitudinal and Contextual Concerns	**LOE**: VI **Strength:** Identified a wide range of risk factors and important knowledge, attitude and contextual barriers that may hinder naloxone prescription **Weakness:** Suggests delicate balance between the potential benefits and drawbacks of naloxone prescription **Conclusion:** Naloxone can prevent death in those prescribed opioids. Identified important knowledge, attitude and contextual barriers that may hinder naloxone prescription and use.

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Chalana,et al. (2016). Predictors of relapse after inpatient opioid detoxification during 1-year follow-up. **Country:** India **Bias:** None identified **Funding:** Not disclosed	Inferred Relapse Prevention Model	**Design:** Case Controlled Study **Purpose:** Relapse rates of patients diagnosed with **ODD** over one year after detoxing in an inpatient rehabilitation setting	**n**: 466 **Inclusion criteria:** patient diagnosis with **ODD**, admitted for detox from 01/01/2014 to 12/31/2014 **Exclusion criteria:** comorbid other drug addictions, psychiatric/medical conditions, age <18 years, and history of adverse reaction with Naltrexone. **Demographic**: Rural, married, employed, low-income. Majority from rural background.	**IV**: Naltrexone on discharge post opioid detoxification **DV**: Relapse rates	Participants identified an attendant/caregiver for medication and noting suspected drug abuse. Random urine drug tests to identify relapse	Chi-square test (comparing relapsed and no-relapse groups) A multivariate logistic regression analysis (identify variables independently associated with opiate abstinence) All tests two-tailed, and a value of $P < 0.05$ was considered statistically significant.	Relapsed **n**= 147 No relapsed **n**= 319 Craving at discharge β = 6.86, p< 0.01 Relapsed length of use: >3 years **n**=90, p <0.01 Relapsed history of previous detox **n**=102, p<0.01	**LOI:** III **Strength:** Greater amount of heroin use, longer duration, history of injecting, and >3 lifetime heroin-quit attempts found to be significant predictors of relapse **Weakness:** limited sample size, conducted in rural India- different cultural norms **Conclusion**: Identified relapse is a significant aspect of opioid addiction recovery. Targeting education during inpatient stay to prevent relapse significant.

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Dunn et al., (2017). Opioid Overdose History, Risk Behaviors, and Knowledge in Patients Taking Prescribed Opioids for Chronic Pain. **Country**: USA **Bias**: None reported **Funding**: NIDA R21DA035327 and T32DA007209	Inferred Relapse Prevention Model	**Method**: **NRCT** Qualitative-Self-report survey **Purpose**: To assessed frequency of overdose, overdose risk behaviors, and overdose knowledge in individuals using opioids for **CP** management	**n**= 502 **CP** patients recruited on Amazon Mechanical Turk (MTurk), **Inclusion**: In USA, 18 or older, **CP** for three months or more, currently taking an opioid for pain management, fluent in English **Demographics:** Male 55.1%, Older than age 30 32.5 %, Caucasian 80.3%, Never married 38.8%, Employed 85.5%, Health Insurance 90.6%	**IV**: Opioids for **CP** **DV:** Overdose history, risk behaviors and knowledge	Opioid and Opioid Overdose Knowledge Brief Pain Inventory (BPI) Screener and Opioid Assessment for Patients with Pain (SOAPP-R) Current Opioid Misuse Measure (COMM)	Logistic regression to evaluate lifetime history of overdose Multiple linear regression to evaluate number of lifetime overdoses Regression models included a priori–hypothesized variables as potential correlates All analyses conducted using SPSS v. 21; alpha values set at 0.05.	3% reported receiving naloxone prescription/ education Higher SOAPP-R score ($\chi2(1) = 6.1$, $P = 0.01$) and endorsing more DSM-5 criteria ($\chi2(1) = 15.3$, $P < 0.001$) both significantly and independently associated with lifetime history of experiencing an overdose	**LOE**: VI **Strengths**: Large sample size, 20% reported unintentional, nonfatal opioid-related overdose during their lifetime showing prevalence and dangers of opioids in the community **Weakness**: homogenous sample, did not differentiate accidental from intentional overdose responses based on self-report **Significance**: Identifies risk taking behaviors, demonstrated sever lack of education and prescription of naloxone in CP patients

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Giglio et al. (2015). Effectiveness of bystander naloxone administration and overdose education programs: A meta-analysis. **Country:** USA **Bias**: None Identified **Funding**: Grants R21 DA029670 from NIDA And R49 CE002096 from NCIPC	Inferred Relapse Prevention Model	**Method**: **SR with MTA** **Purpose**: To synthesize the quantitative findings of available studies to understand the effectiveness of bystander naloxone administration after a naloxone education program	**N**=9 **Inclusion**: studies measuring the impact of overdose prevention program training involving lay people with inclusion on naloxone **Exclusi**on: did not distinguish between naloxone administration by emergency personnel or lay people.	**IV:** naloxone education program **DV**: naloxone administration during overdose	Quality appraisal assessed methods of all studies displayed in PRISMA flow diagram Electronically searched PubMed and additional sources for published studies using the following search terms: use*, using, addict*, disorder*, naloxone*, narcan*, evizo, OEND, OOPP, THN, overdose, overdos*, educat*, train*, untrain*, un-train*, nontrain*, non-train*, and program*	Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for overdose recoveries. Standardized mean difference calculated for test scores of non-medical volunteers who received training in overdose management versus the scores of untrained volunteers	Naloxone administration by bystanders associated with a significantly increased odds of recovery compared with no naloxone administration (OR = 8.58, 95% CI = 3.90 to 13.25) Overdose education resulted in significantly higher overdose response (standardized mean difference = 1.35, 95% CI = 0.92 to 1.77)	**LOE**: V **Strength**: Lay administration of naloxone is increasingly being used and is a safe and effective intervention in the community **Weakness**: High heterogeneity between studies, majority of the participants in these studies were self-identified heroin users or their families and peers, without medical training **Significance**: Findings support overdose education and lay administration of naloxone as a safe and effective community-based approach to controlling the opioid overdose epidemic

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Hall, et al. (2008). Patterns of abuse among unintentional pharmaceutical overdose fatalities. **Country**: USA **Bias**: None reported **Funding**: None Disclosed	Inferred Relapse Prevention Model	**Method: NRCT** Qualitative-Population-based, observational study. **Purpose**: Identify patterns of unintentional pharmaceutical drug overdoses in West Virginia.	Population: all state residents of West Virginia in 2006 who died from intentional pharmaceutical overdose **n**= 295 **Demographics** Men n=198 Women n=97 Age 18-54 Mean age 33.7	**IV:** unintentional pharmaceutical drug overdoses **DV**: patterns of abuse Death involving drug diversion: involving a prescription drug used without documented prescription records. Doctor shopping: receiving prescriptions of controlled substances from 5 or more clinicians during the year prior to death	Census estimates for 2006and 2000 land-area estimates Data from medical examiner, prescription drug monitoring program, and opiate treatment program records	Trends in rates using Mantel Haenszel t-test for trend Associations between diversion, doctor shopping, and demographic factors OR and corresponding 95% Cis Analyses performed using Epi Info version 3.4 with significance set at 95% based on 2-sided testing.	295 unintentional pharmaceutical over Total death men 22.2 and women 10.5 per 100,000 population rate ratio 1 Prevalence of diversion was greatest among ages 18 through 24 years; Opioid analgesics most prevalent class of drugs, contributing to 275 deaths (93.2%); of these, only 122 (44.4%) included evidence of prescription	**LOE:** VII **Significance:** Drug diversion and doctor shopping involved different populations. Opioid analgesics involved in 93% of drug overdoses and psychotherapeutic drugs in 49% **Weakness:** Design leads to possible erroneous information. Difficult to know circumstances of drug use and potential reporting bias from friends and family **Significanc**e: Shows significance of unintentional overdoses of prescription pain medication and opioid use

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Lott, D., & Rhodes, J. (2016). Opioid overdose and naloxone education in a substance use disorder treatment program **Country**: USA **Bias:** None Identified **Funding:** Linden Oaks (inpatient-outpatient behavioral health company)	Inferred Harm Reduction Model	**Method**: Qualitative-Cross-sectional survey **Purpose:** Evaluate overdose education intervention on opioid overdose and naloxone to increase access to community naloxone kits	n= 57 Control= 14 Intervention= 43 Inclusion: adults aged 18-61 admitted to community addiction treatment center for 1 month with ODD Exclusion criteria: moderate to severe cognitive deficits **Intervention Demographics:** Mean age= 30.9 Female= 27.9% Caucasian= 88.4%	**IV:** Naloxone education and distribution **DV**: Patients' knowledge of opioid overdose signs and response strategies post education program resulting in increased access to naloxone.	Opioid Overdose Knowledge Scale (OOKS)	Linear mixed model Demographics compared with unpaired t-tests and x2 tests Dichotomous data on the naloxone questionnaire compared with McNemar's test (Alpha set at .05) (two-tailed) All statistical analysis conducted using SPSS 23 statistical software	Received prior education on opioid overdose signs 37.2% to 100% p <.01 Received education on naloxone use 18.6% to 100% p <.01 Possess naloxone in home 7.0% to 12.5% p= 1.0 Naloxone access at place of use 2.3% to 12.5% p= .5	**LOE**: VI **Strength**: educational group increased opioid overdose and naloxone knowledge among treatment-seeking **ODD** patients **Weakness**: study and questionnaire process itself may have led to some immediate or delayed knowledge acquisition due to control reporting increase in naloxone awareness. **Significance**: showed significant knowledge growth post naloxone education intervention in inpatient and outpatient setting, directly related to project.

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Neale, et al. (2019). How competent are people who use opioids at responding to overdoses? Qualitative analyses of actions and decisions taken during overdose emergencies. **Country**: USA **Bias**: None Identified **Funding**: National Institute on Drug Abuse: R01DA035207	Inferred Relapse Prevention Model	**Method**: Qualitative Analysis- **SSI** **Purpose**: To understand accounts of how opioid users who had recently participated in a THN program responded in an overdose emergency	**Setting**: New York City, USA. **n**= 39 **Demographics** Men- 32 Women- 7 Mean Age- 45 Race: Hispanic- 15 Black- 14 White- 8 Asia 1 Mixed 1 Witnessed overdose 34	**IV**: THN program **DV**: Response to opioid overdose	Interviews audio-recorded, transcribed. Followed structured interview questions regarding overdose: (i) What happened? (ii) How was the overdose recognized? (iii) Who made the decisions? (iv) Was CPR performed? (v) Was naloxone given? (vi) Were the emergency services called? (vii) What happened after the overdose?	Interviews transcribed verbatim by 2 analysts and the encrypted. Entered into MAXQDA version 11 [51] for systematic coded via Iterative Categorization	Core Overdose Response Tasks Identified: (1) overdose identification (2) mobilizing support (3) following basic first aid instructions (4) naloxone administration (5) post-resuscitation management	**LOE**: VI **Strength**: Identified competencies of lay responders during opioid overdose. Identified strength of ODD utilizing 'insider' knowledge to function at higher level during overdose **Weakness:** self-report bias, may have failed to interview program participants who did not demonstrate competency during overdose. Majority of sample male and utilized nasal naloxone kits **Significance**: Assists in identifying important steps in opioid-antagonist intervention and enforces success of naloxone education programs

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Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence
Pade, P., et al. (2016). Opioid overdose prevention in a residential care setting: Naloxone education and distribution. **Country:** USA **Bias:** None reported **Funding:** Not disclosed	Inferred Harm Reduction Model	**Design: NRCT** Quantitative-Quasi-Experiment **(**Pre-Post test) **Purpose**: implementation of an opioid overdose prevention program focused on naloxone to patients and their family members in a residential treatment setting	**n**: 47 family members **n**: 26 female **n**: 21 male **Setting:** private 70 bed residential substance use disorder treatment facility in Colorado **Demographic**: 72% parents 17% spouses 6% siblings 4% offspring	**IV:** Naloxone education and distribution **DV:** recognizing opioid overdose and increased comfort in ability to manage overdose situations	**OEND** training curriculum 5-point Likert scale pre-post test	Paired 2-tailed t test (differences in pre and posttests) Cohen's d (effect size)	Mean ability to recognize overdose increased 2.8 to 4.6, d=0.5 Mean comfort in managing an overdose" increased 3.3 to 4.6, d=0.5 Mean value of learning overdose management 4.8 to 5.0, d=0.2	**LOI:** III **Strength**: Significant improved ability to recognize an overdose and increased comfort in managing an overdose post training. **Weakness:** Small sample size, use of non-validated measures, lack of randomization and control groups **Conclusion**: Like current project, effective naloxone education and distribution program

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Appendix B

Table 2
Synthesis of the Evidence

Author (et al.)										
	Behar	Besser	Binswanger	Chalana	Dunn	Giglio	Hall	Lott	Neale	Pade
Study Characteristics										
Year	2018	2019	2015	2016	2017	2015	2008	2016	2019	2016
Design:										
SR	X									
SR with MTA						X				
RCT				X				X		X
NRCT	X				X		X			
SSI		X	X						X	
Setting:										
Community			X	X	X	X	X	X	X	
Outpatient			X							X
Inpatient		X	X							
Primary Care	X		X							
Sample:										
N	17					9				
n		143	56	466	502		295	57	39	47
Study Characteristics (Continued)										
	Behar	Besser	Binswanger	Chalana	Dunn	Giglio	Hall	Lott	Neale	Pade
Age (mean)	-	38.3	40.8	32.7	32.7	-	33.7	30.9	45.1	37.5
Female Gender (%)	-	36	58.9	0	45	-	33	28	22	55
Male Gender (%)	-	64	41.1	100	55	-	67	72	78	45
Funding										
NIDA	X		X		X	X			X	
DHHS		X								
NCIPC						X				
Outpatient Clinic								X		
None Reported				X			X			X
Study Intervention										
Naloxone Prescribing	X			X						

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Naloxone Acceptance		X								
Naloxone Education			X			X		X	X	X
Opioid Relapse				X	X		X	X		

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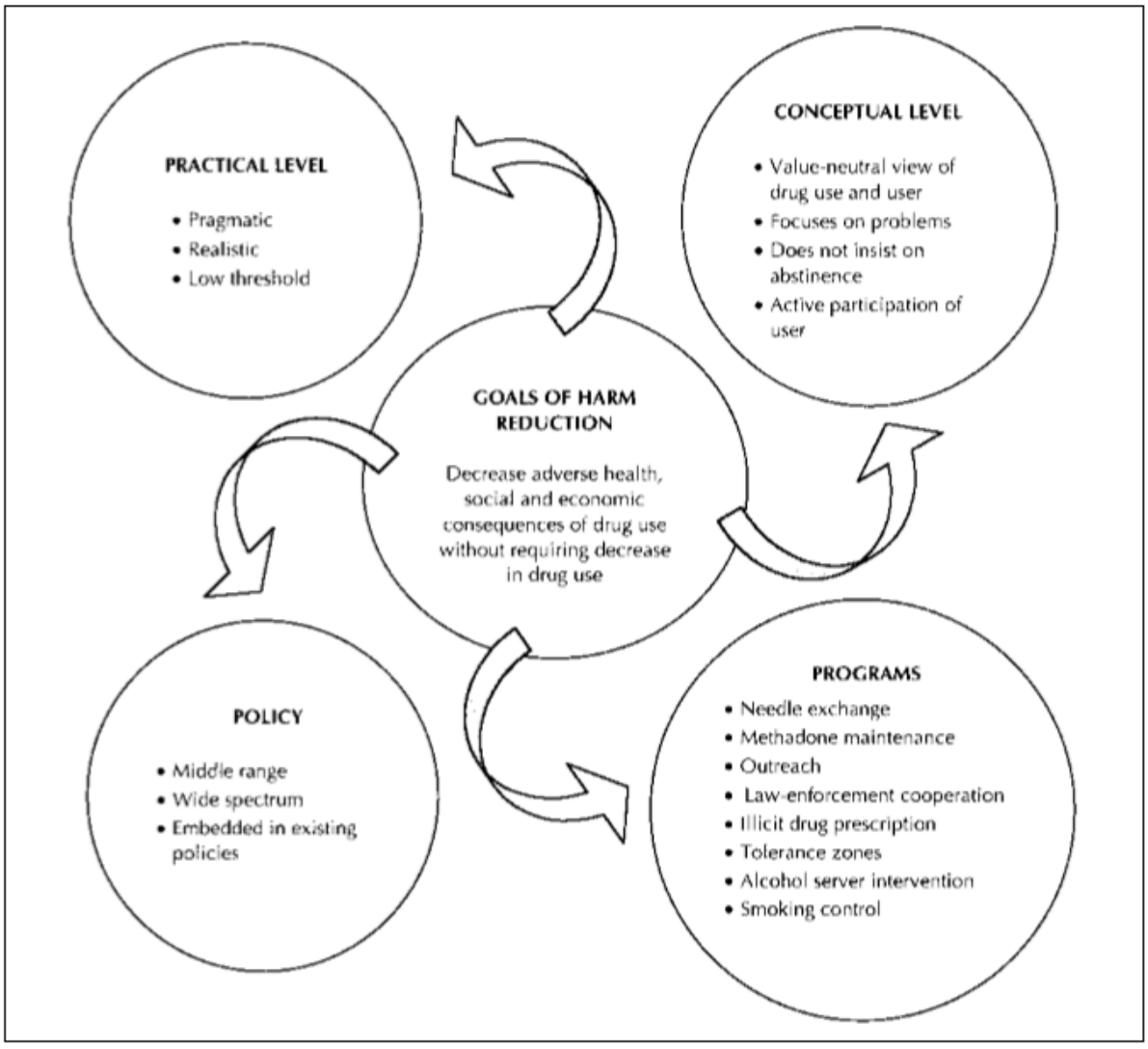
Appendix C

Figure 1
Harm Reduction Model

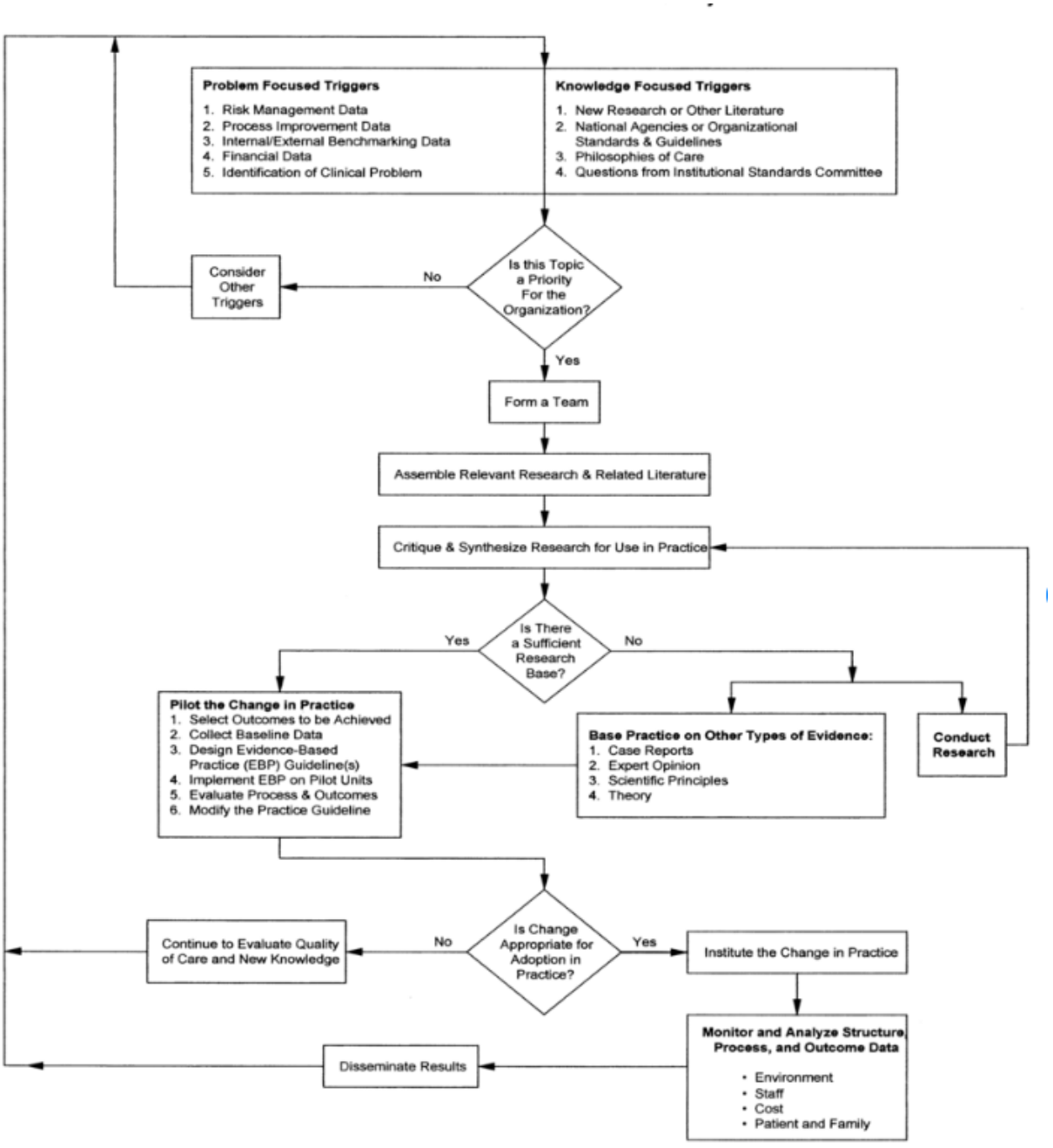


Note: Figure provided by O'Hare & Erickson, 1997.

Appendix D

Figure 2

Iowa Model of Evidence-Based Practice to Promote Quality Care



Note: Figure provided by Titler, 2007.

Appendix E

Figure 3
Budget Plan

Naloxone Education Group Budget

Phase	Activities	Cost	Subtotal	Total
Preparation	Online Advertising through Community College	$0		
	Consent Forms (online)	$0		
	Design Pre-Test Evaluation Tool (online)	$0		
	Design project PowerPoint	$0		
	Design Post Test Evaluation Tools (online)	$0		
Delivery				
	Virtual Delivery of Project Through Google Slides and WebEx	$0		
Evaluation	Post-Test Evaluation (online through Google Forms)	$0	$0	
Total				**$0**
Anticipated Student Cost				**$0**

Appendix F

Table 3

Two-Tailed Paired Samples t-Test for the Difference Between BOOK Pretest and BOOK Posttest

BOOK_Pre_Test		BOOK_Post_Test				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
69.04	18.60	89.25	7.62	-3.99	.002	1.07

Note. N = 14. Degrees of Freedom for the *t*-statistic = 13. *d* represents Cohen's *d.*