Advancing the Implementation of Medication-Assisted Treatment in Residential Treatment Centers

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Abstract

Objective: To assess the attitudes and knowledge of behavioral health technicians (BHTs) towards opioid overdose management and to assess the effect of online training on opioid overdose response on BHTs' attitudes and knowledge, and the confidence to identify and respond to opioid overdose situations.

Design/Methods: Pre-intervention Opioid Overdose Knowledge Scale (OOKS) and Opioid Overdose Attitude Scale (OOAS) surveys were administered electronically to five BHTs in 2020. Data obtained were de-identified. Comparisons between responses to pre-and post-surveys questions were carried out using the standardized Wilcoxon signed-rank statistical test(z). This study was conducted in a residential treatment center (RTC) with the institutional review board's approval from Arizona State University. BHTs aged 18 years and above, working at this RTC were included in the study.

Interventions: An online training was provided on opioid overdose response (OOR) and naloxone administration and on when to refer patients with opioid use disorder (OUD) for medication-assisted treatment.

Results: Compared to the pre-intervention surveys, the BHTs showed significant improvements in attitudes on the overall score on the OOAS (mean= 26.4 ± 13.1; 95% CI = 10.1 - 42.7; z = 2.02; p = 0.043) and significant improvement in knowledge on the OOKS (mean= 10.6 ± 6.5; 95% CI = 2.5 – 18.7; z =2.02, p = 0.043).

Conclusions and Relevance: Training BHTs working in an RTC on opioid overdose response is effective in increasing attitudes and knowledge related to opioid overdose management. opioid overdose reversal in RTCs.

Keywords: Naloxone, opioid overdose, overdose education, overdose response program

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Between 1999 and 2014, nearly two million people in the United States (US) suffered from prescription opioid use disorder, with approximately 400 000 opioid overdose deaths (Hughes et al., 2015). Opioid use disorder (OUD) is often linked to legal, interpersonal, and work-related issues. The opioid crisis has resulted in unprecedented demand for services and increasing the use of medication-assisted treatment (MAT) is often a successful intervention in combating the rising overdose death rate.

Problem Statement

An opioid overdose is a serious problem not only in the United States, but all over the world. Furthermore, the opioid crisis is expected to cost the US $78 billion a year (Ordeda et al., 2015). The continued underutilization of medication-assisted care, a validated form of opioid addiction treatment, is exacerbating the OUD issue. The US Department of Health and Human Services has made fighting the opioid crisis one of its highest national priorities (United States Department of Health and Human Services, 2016).

Purpose and Rationale

The purpose of this paper is to examine the risk factors for opioid overdose among patients in a residential treatment center, to educate behavioral health technicians on the risk factors of OUDs, pre-lapse behaviors for OUDs, and on when to recommend MAT services. Understanding these factors will help with the identification of high-risk patients, to facilitate the development of policies and procedures to reduce the risk of opioid-related adverse drug events,

and to improve patient outcomes. Also, dissemination of addiction education into a residential treatment center can help in bridging the gap in treatment utilization for MAT.

Background and Significance

Internal Evidence

A residential treatment center located in the Southwestern U.S. has identified the underutilization of MAT services as an area for improvement within their organization. Behavioral health technician's make-up a high percentage of the staff and are front-line staff who care for residents with substance use disorder. Key stakeholders at these residential treatment centers denied providing clinical supervision and education to BHT staff.

Current practice is that peer support specialists are also responsible for referring patients for MAT. BHTs check on residents every two hours, use dogs to detect drugs on property, and distribute Narcan to residents. Overdose deaths impact not only other residents and their relatives, but also the BHT, and the medical and psychiatric providers. Increased opioid use has resulted in an increase in overdose rates (Baker, 2017). Opioid abuse has been linked to an increased risk of infection with the human immunodeficiency virus (HIV) and Hepatitis C. (Ordeda et al., 2015). In British Columbia, the Canadian province most affected by the opioid crisis, the number of deaths attributed to illegal drug overdose rose by 78 percent in 2016 compared to the previous year (British Columbia Coroners Service, 2017).

Medication-Assisted Treatment

Health services have built and tested models to incorporate medication-assisted treatment (MAT), also known as opioid-assisted treatment, into primary care settings over the last 15 years (Lagisetty et al., 2017). To treat patients with OUD, MAT is an evidence-based clinical approach that includes pharmacological therapies as well as psychosocial care (Lagisetty et al., 2017). Family therapy, counseling, and peer support services are examples of behavioral health therapy that can be used in conjunction with MAT. These programs are recommended to go along with MAT medicine and are thought to be the best (Saxon & Ef, 2016). MAT, on the other hand, appears to be underutilized. In 2012, the difference between OUD prevalence and evidence-based MAT capability was nearly one million people (Jones et al., 2015). Just about half of privately funded substance abuse recovery services have MAT, and only about a third of patients with opioid addiction receive it (National Institute on Drug Abuse, 2016). From 35 percent in 2002 to 28 percent in 2012, the proportion of opioid addiction admissions with treatment plans that included taking drugs decreased (National Institute on Drug Abuse, 2016).

Insufficient institutional support is frequently cited as a barrier to implementation (Chou et al., 2016). Also, patients in these residential treatment centers are referred for MAT services by BHTs who have little or no education on when to recommend MAT services. Other reasons for the underutilization of MAT services, as reported by key informants, include inadequate resources and staffing for coordination and integration of care, inadequate provision of nonphysician and nursing staff with expertise in OUDs, in order to implement a team-based approach.

PICOT Question

Among Behavioral Health Technicians taking care of patients diagnosed with opioid use disorder in a residential treatment center, does increase awareness through an online educational intervention on naloxone and opioid overdose response, when to refer patients with opioid use disorders for MAT, and on the screening, brief intervention, and referral for treatment (SBIRT) model, at one-week post-intervention, increase their attitude and knowledge of when to refer patients for MAT services?

Search Strategy

This literature review included an exhaustive search of the most current evidence to answer the PICOT question. Three databases were extensively searched- PsychINFO, Pubmed, and CINAHL. The database searches included a combination of the following keywords: *Barriers to medication-assisted treatment*, *opioid use disorder, peer support, overdose risk assessment, opioid overdose, residential treatment, MAT referral rates*, and *pre-lapse behaviors*.

PsychINFO Search Strategy

The initial search of PyschINFO included the key terms *barriers to MAT*, *improving MAT*, *MAT Treatment*, and *MAT referral rates*. The following is a full electronic search strategy employed for PsychINFO database articles published since 2015: (*Barriers to MAT*) [All Fields] OR (*Improving MAT*) [All Fields] OR (*MAT treatment*) [All Fields] OR (*MAT referral rates*) [All Fields] AND (Opioid use disorder) [All Fields]. The search yielded 86 results. Other filters such as English language, peer-reviewed, qualitative, systematic review, and meta-analysis were applied to lower the article count to 13 results.

Pubmed Search Strategy

A database search of PubMed utilizing key terms *medication-assisted treatment* (MeSH Terms), *opioid overdose*, and *residential treatment* were used. The following is a full electronic search strategy employed for PubMed database articles published since 2015: (*Medication-assisted treatment)* [All Fields] AND (*Opioid overdose*) [All Fields] OR (*Residential treatment)* [All Fields]. The search yielded 123 results. Additional filters such English language, meta-analysis, qualitative, systematic review, and peer-reviewed articles were added to limit the search count to 26 results.

CINAHL Search Strategy

The initial CINAHL search included the key terms *peer support*, *medication-assisted education*, and *overdose risk assessment for opioid use.* The following combination was used for the CINHAL database: (*Peer support*) [All Fields] OR (*medication-assisted education*) [All Fields] AND (*overdose risk assessment for opioid use*) [All Fields]. Boolean terms were used to broaden the search. The search yielded 41 results. Filters applied included date of publication (2015 to 2020), English language, and peer-reviewed journal articles. The search produced 11 results. Also, adding the search terms *overdose risk assessments for opioid use disorders* and *pre-lapse behaviors for opioids* increased the articles to 16.

A gray literature search for unpublished studies, using combinations of search terms and concepts derived from electronic reference database search using Google Scholar was used. The top 30 results were reviewed for articles meeting inclusion criteria. Websites of key medical associations, addiction, and government publications from the United States Department of Health and Human Services and the National Institute on Drug Abuse were also searched and reviewed.

All studies of people aged 18 years old or older, evaluating peer recovery support services and recovery coaching services for substance use disorders were included. Studies evaluating FDA approved MAT for OUD were eligible, regardless of the route of administration. Peer-reviewed articles published in English language from 2015 to present was also included. Also, studies were limited to hospitals(inpatient), and residential rehabilitation settings. However, studies of humans younger than 18 years of age, pregnant women, and studies before 2015 excluded.

Critical Appraisal and Synthesis

The Melnyk and Fineout-Overholt's (2019) rapid critical appraisal was used to evaluate the quality and strength of the ten articles selected for this literature review. All ten studies included were systematic reviews and presented high-level evidence. Nine of the ten systematic reviews included articles that were carried out in both an inpatient and outpatient setting. The systematic review conducted by Maglione et al. (2018) only included articles that were studied in an outpatient setting. Six of the ten articles reported their source of funding, and no bias was recognized in any of the studies. All of the ten studies had an adequate sample size, and the number of articles was greater than or equal to ten in their systematic reviews. The literature review included an intercontinental sampling with all ten of the studies originating in North America (the USA and Canada). Current or previous substance use, past OUD, and a previous mental health diagnosis were listed as risk factors for OUDs in all ten studies. Four of the ten studies identified male sex as a risk factor for OUD. This inconsistency in whether male sex is a risk factor may be due to an interaction between sex and age. Only one of the ten studies conducted a systematic literature search that proved that peer support staff could improve outcomes for patients engaged in inpatient and/or outpatient psychiatric treatment for substance

use disorder and co-occurring mental disorders. Most of the interventions across the studies included recognizing the higher risk of opioid misuse in patients with a previous or concurrent history of substance use and mental health diagnoses and recommending withholding prescribed opioids to patients who fall in this category.

Measurement tools and intervention designs were heterogeneous across all ten studies. However, MAT has shown to reduce overdose rates for OUD in six of ten of the studies. Also, nine of 10 studies were useful to the PICOT since similar concepts were discussed and educating peer support on the risk factors for OUD can increase referral rates for MAT, thereby decreasing mortality and morbidity associated with OUD. Strong reliability and validity can be assumed for all the ten studies due to the priori research designs, a comprehensive search of electronic databases, duplicate study selection, quality assessment of measurement tools, methodology, and results that are statistically significant.

Conclusion

These studies indicate that a successful strategy for delivering OUD treatment and increasing MAT access in primary care necessitates multidisciplinary and organized care delivery models. MAT has shown to reduce illicit opioid use significantly and increasing access to MAT can reduce overdose fatalities. Also, BHT staff have shown to offer unique advantages to engaging difficult-to-engage populations, improving substance-related outcomes, and reducing substance use. Therefore, educating BHT staff on the benefits of MAT can increase the use of MAT in patients with OUD, thereby, decreasing mortality and morbidity associated with OUD. However, despite the recent adoption of BHTs within substance use treatment programs, there are relatively limited studies rigorously evaluating outcomes of their services. Since patients who report current or previous substance use, past OUD, and a previous mental health diagnosis were

common risk factors for OUDs in all ten studies, and alternative pain relief treatments should be prioritized for these at-risk patients.

Conceptual Framework and Evidenced-based Practice Model

The Chronic Care Model (CCM) was selected as the project's conceptual framework (See Figure 1). Despite the fact that patients with OUDs have been mistaken in the past as a bad habit or a moral failure, recent research shows that long-term therapies can be successful in treating patients with substance use disorders. As a result, it's fair to consider an opioid use disorder to be a chronic illness that necessitates long-term treatment. Since OUD is a chronic, relapsing disorder with high medical and psychiatric comorbidity, continuous treatment that includes screening, early intervention, support, and monitoring is crucial (Hser et al., 2017). The CCM is a treatment model that describes the most critical aspects of chronic disease management (Grover & Joshi, 2014). The model emphasizes proactive, patient-centered, multidisciplinary treatment, community resource use, and evidence-based practices (Wagner, 1998). The CCM allows nurses, social workers, and patients to engage in their own care, resulting in a systemic shift in the way people with chronic illnesses are cared for (Hser at al., 2017). The six main elements that interact to facilitate quality treatment for patients with chronic disease are included within this model. Patient protection, cultural competency, care planning, regional policy, and case management are among the other topics covered in the current CCM (Grover & Joshi, 2014). Through offering tools for planning and integration of treatment for patients with OUDs, CCM will ensure a multidisciplinary and team-based approach. The CCM tends to be a valuable framework for achieving evidence-based treatment for OUD with the same care team, deployed in similar ways as for other chronic diseases management.

Methods

Inclusion criteria

- Currently employed in the organization as a behavioral health technician.
- Adults 18 years of age or older.
- Able to speak, write, and understand English language.
- Able to provide informed consent.
- Willing to participate in the study that requires filling out pre- and post-intervention surveys, time commitment for education, and weekly follow-ups.

Exclusion criteria

- Individuals who do not fully meet inclusion criteria.

Study Procedures

- No funding was received for the project.
- IRB approval was initially obtained from ASU on 10/01/2020 but due to a change in the project site, another approval was obtained on 11/23/2020.
- The initial step was the recruitment phase. The student emailed the recruitment invites to the facility administrator for him to disseminate the project information to interested and qualified participants.
- Once potential participants responded to the invite, agreeing to participate in the project, a consent form was emailed along with a request for their availability for a phone call to discuss the project further and go over the consent form to ensure that they understood the purpose of the project and what was required of them. The phone call also provided an opportunity for the student and the participants to go over the consent form and to clarify any questions or concerns that participants they had.

- The student emailed the pre-intervention surveys to assess for knowledge and attitude of opioid overdose management among participants. Participants were expected to return the survey within 7 days or less after receipt. The student had obtained permission from the author of the pre- and post-intervention surveys to use the survey tools. Five participants who met inclusion criteria were recruited to participate in the study.
- A zoom invite was sent to participants. During the meeting, the student went over a 2-hours PowerPoint presentation on naloxone and opioid overdose response, when to refer patients with opioid use disorders for MAT, and on the screening, brief intervention, and referral for treatment (SBIRT) model.
- A recording of the zoom presentation was emailed to participants who could not attend the zoom meeting. A follow-up email was sent to participants after a week of emailing the link to the recorded presentation. This intervention phase lasted for about 7 days.
- All five participants completed a post-intervention survey one week after the intervention to assess participants knowledge and attitudes towards opioid overdose management to evaluate the effectiveness of the intervention to the participants. The student also gathered subjective data regarding participant's experience on participating in the study. This phase took about seven days.
- The timeline for the implementation phase for this EBP project lasted about 4-6 weeks.

Privacy and Confidentiality

- The documents such as recruitment papers, signed consent forms, pre-and post-intervention surveys, and responses received from participants were printed from the student's email for hard copies, filed, and labeled in separate folders.
- The soft copy of the data collected was stored on a server called drop box with the link to the data accessible only to the student and the student's mentor. The student's mentor had to access the data for feedback, guidance, and recommendations.
- An encrypted server, password protection, and antivirus barriers were used to secure access to data.
- The student developed a master list of the participants indicating their participant ID code which was randomly assigned to ensure de-identification.
- An identification code was created and used on all questionnaires to identify participants.
- Participants assigned themselves IDs using the year they were born and the last four digits of their phone number. The IDs were entered on the master list and kept in a folder stored in the locked filing cabinet. The participants were informed not to share their IDs with anyone to ensure the maintenance of confidentiality.
- The identification code was used to link data from questionnaires to maintain confidentiality.
- All personal information about the participants and the organization was de-identified.
- Email addresses were collected to distribute cover letters, distribute pre/post-education questionnaires, and distribute link for zoom meetings.

- During the interaction activity done through zoom, participants were assigned a pseudo name (a name different from their real name). The zoom video of participants was turned off except for the co-investigator(student) video to maintain confidentiality.
- Email addresses were saved and managed in a separate file from other project data stored on a secure computer accessible only to the student and the principal investigator.
- An encrypted server, password protection, and antivirus barriers were used to secure access to data.
- All data collected was deleted and destroyed after data analysis was completed.
- All individuals with direct access to the data were formally trained in protecting human subjects before working with human subjects or collecting any data.
- The risks associated with breaches of confidentiality were minimized by taking the necessary precautions listed above.

Applying Evidence to Practice

Increased morbidity and mortality among patients with OUD, exacerbated by continued underutilization of an evidence-based form of opioid addiction treatment known as MAT, puts pressure on health care providers to find new and creative ways to improve MAT use OUD in a variety of settings. According to the evidence, increasing OUD-related overdose deaths affect not only patients and their families but also staff, researchers, health policy, professional organizations, and federal lawmakers, according to key stakeholders. Because of the challenges of incorporating MAT in residential treatment facilities, effective implementation methods are likely to include multifactor approaches. It could include payer-clinic partnerships that include funding, contracting, policy reform, process development to improve operation, and consumer input to help organizations change. Data on possible barriers to MAT implementation, including

resources necessary and how barriers differ depending on the environment, should be collected. Data on how many peer support workers are confident in recognizing patients with pre-lapse habits and withdrawal symptoms for OUD should also be collected. The institutional support through funded preparation, funding, and personnel for planning, alignment of treatment, and provision of non-provider staff with experience in OUD to adopt a team-based approach may all be used to improve MAT referral rates. Another initiative would be to educate peer support personnel to recognize patients with OUD and refer them to the appropriate care settings to initiate treatment. It is consistent with the evidence that peer-delivered rehabilitation support programs are a valuable addition to care for people suffering from drug use disorders (Tracy and Wallace, 2016). Staff awareness of when to refer patients to MAT services and referral rates for MAT services was calculated as outcomes.

Potential Outcomes

Patients with OUD, their families, and the national healthcare system will all benefit from the implementation of initiatives aimed at increasing MAT use. MAT reduces opioid use, overdose deaths caused by opioids, drug activity, and the spread of infectious diseases (National Institute on Drug Abuse, 2016). MAT improves social functioning and care adherence. Methadone or buprenorphine treatment for opioid-dependent pregnant women improves their babies' outcomes (National Institute on Drug Abuse, 2016). The 21st Century Cures Act of 2016 provides states with a one-billion-dollar grant over two years to expand MAT and develop health-care professional capability. By training BHTs, the aim is to increase referrals for MAT services while lowering mortality, morbidity, and OUD-related costs.

Results

Two surveys were administered to five BHTs before and after the educational intervention, including the Opioid Overdose Knowledge (OOKS) and Attitudes (OOAS) Scales. Three subscales and an overall score were calculated for the OOAS and four subscales and an overall score were calculated for the OOKS. In addition, a six-item Overdose Training Evaluation Form was administered at the end of the study. Wilcoxon signed-rank tests were used to determine the significance of improvement in the BHTs' knowledge of and attitudes towards opioid overdose. The results for the OOAS are shown in Table 1. The BHTs showed significant improvements on the overall score and on all three subscales of the OOAS ($p < .05$).

Table 1
Pre- to post-intervention improvement in attitudes towards opioid overdose

	Pre-intervention		Post-intervention			
	Mean	*SD*	*Mean*	*SD*	*z**	*p*
Opioid Overdose Attitude Scale (OOAS)						
Competence	32.60	8.71	41.80	3.90	2.03	0.042
Concerns	21.00	7.62	31.20	4.09	2.03	0.042
Readiness	39.40	5.64	46.40	2.51	2.02	0.043
Total	93.00	19.04	119.40	8.17	2.02	0.043

* standardized Wilcoxon signed rank test

The results are further displayed in Figure 1.

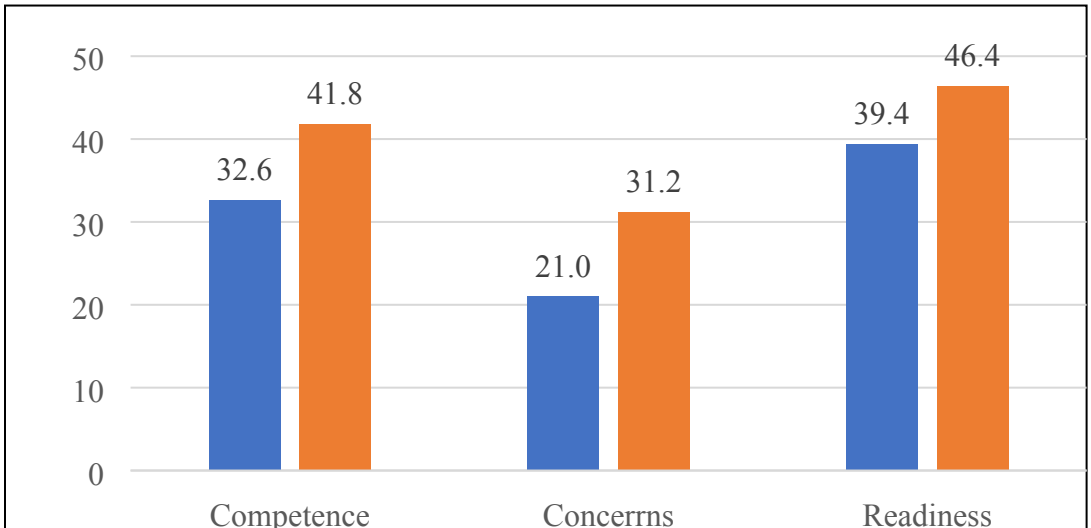

Figure 1. Pre- to post-intervention improvement in attitudes towards opioid overdose

The results of the pre- to post-intervention comparison of knowledge concerning opioid overdose are summarized in Table 2. As shown, the BHTs displayed a significant improvement in knowledge overall (z =2.02, p = 0.043), and on two of the four subscales, including Signs and Naloxone Use (z = 2.03, p = 0.042).

Table 2

Pre- to post-intervention improvement knowledge of opioid overdose

	Pre-intervention		Post-intervention			
	Mean	*SD*	*Mean*	*SD*	*z**	*p*
Opioid Overdose Knowledge Scale (OOKS)						
Risk	6.00	2.00	6.20	1.10	0.14	0.892
Signs	5.20	2.17	8.80	0.45	2.03	0.042
Action	9.20	1.48	9.80	0.84	0.82	0.414
Naloxone Use	7.40	2.07	13.60	0.89	2.03	0.042
Total	27.80	6.30	38.40	1.82	2.02	0.043

* standardized Wilcoxon signed rank test

These results are illustrated in Figure 2.

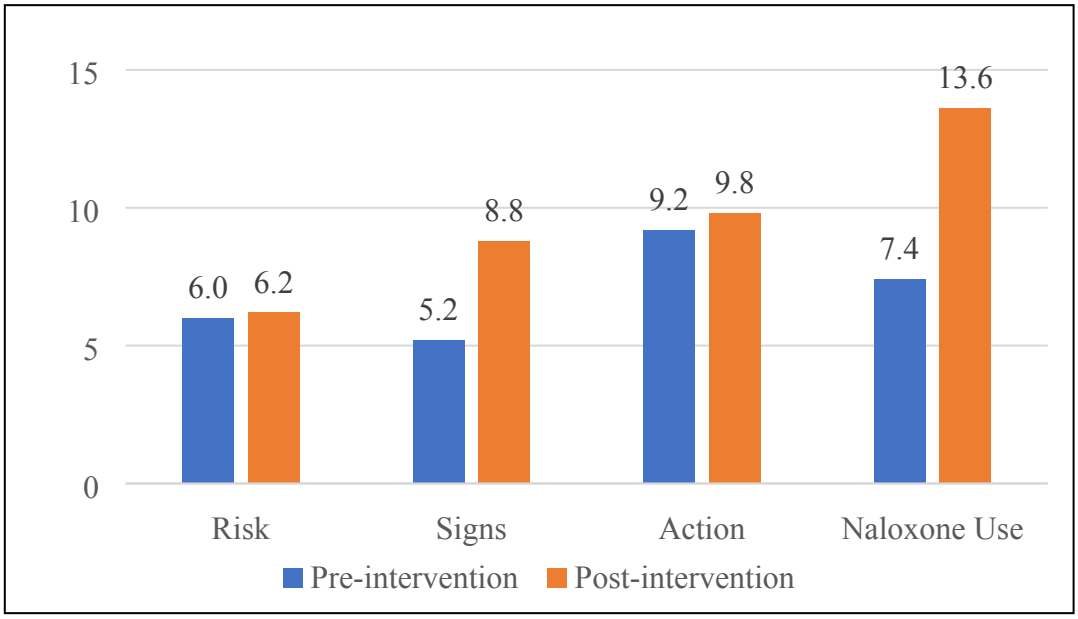

Figure 2. Pre- to post-intervention improvement in knowledge of opioid overdose

The six-item Overdose Training Evaluation Form that was administered at the end of the study indicated a high level of positive responses from the BHTs. (See Figure 3.)

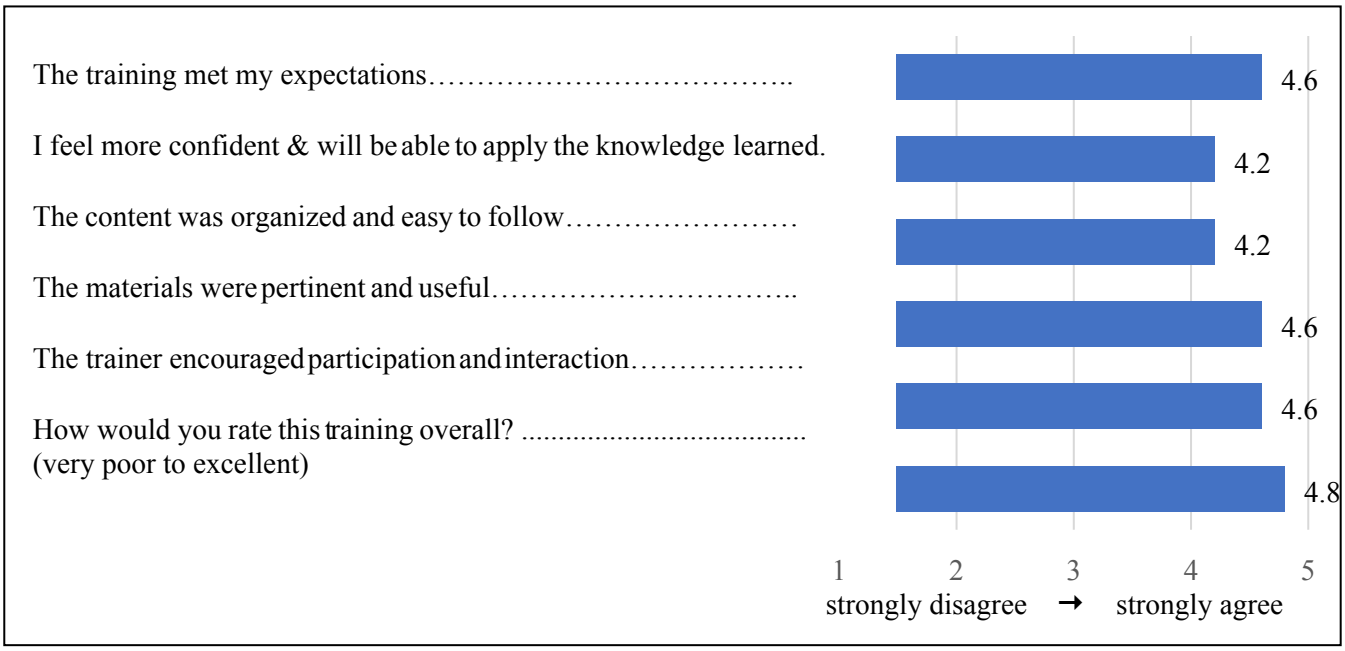

Figure 3: Overdose Training Evaluation

Discussion

The results from the study indicate that training BHTs working in a residential treatment center on opioid overdose response is effective in increasing attitudes and knowledge related to opioid overdose management. The OOKS and the OOAS assessment tools were used to measure knowledge and attitudes respectively. These assessment tools have been validated and used in previous research for similar evaluations. Following the educational session, the overall cumulative scores on the OOKS and OOAS increased, suggesting that awareness and knowledge regarding opioid overdose had improved. Two of the OOKS subscores, Signs and Naloxone Use,

improved significantly after the educational session. According to previous studies, general practitioners (GPs) have a negative attitude about dealing with patients with SUDs. This conclusion was contradicted by the current research, which found that BHTs provided positive support to patients with SUDs. Although some GPs believed community naloxone coverage was more suitable for specialist drug services, research from Scotland showed that some GPs demonstrated tentative willingness to participate (Leece et al., 2015). The study's results indicate that BHTs might have clear information gaps when it comes to naloxone use. Such particular knowledge gaps may indicate wider deficiencies in opioid overdose response in clinical practice. The results of the study back up previous studies by Binswanger et al. (2015), who discovered that clinical staff sometimes lacks information about how to use naloxone rescue kits in outpatient settings. Brief naloxone preparation and education will improve awareness and attitudes about overdose prevention (Behar et al., 2015).

The small sample size, single geographic area, convenience sampling, unique demographics of the patients, and unique clinical environment of a residential treatment center, are all limitations of this study. As a result, the results may not apply to other situations. Also, the interval between follow-ups was extremely variable. This was partly due to the fact that the follow-up interviews were delayed due to a lack of response from participants. Longer follow-up periods could have minimized information retention from the intervention and bias findings away from the observed effect. Despite these shortcomings, the study does point to important research directions for the future, including evaluating the impact of educating all health care workers on opioid overdose response in reducing opioid overdose fatalities.

In conclusion, the efficacy of an educational initiative in enhancing patient awareness of opioid overdose and naloxone was demonstrated in this study. Training BHTs working in an

RTC on opioid overdose response is effective in increasing attitudes and knowledge related to opioid overdose management. Overdose education have been shown to minimize overdose deaths in the past, and this research adds to the evidence for making this a compulsory part of care for health care workers taking care of patients with OUDs.

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Appendix A

Evaluation and Synthesis Tables

Table 1
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
Cragg et al., (2019). Risk factors for misuse of prescribed opioids: A systematic review and	Inferred to be theory of Self-Transcendence	**Design:** Systematic review of literature and meta-analysis of observational studies.	Distinct records identified (N= 9,629) Full text reviewed (n=1114) Final sample (n=65 studies)	**IV1**: Any current or previous substance use and its link to opioid misuse	Two independent reviewers screened publications for inclusion. Outcome ascertainment methods	ORs synthesized from individual studies by using inverse-variance weighted	**IV1** (OR 3.55; 95%CI 2.62 to 4.82), **IV2** (OR 2.45; 95% CI 1.91 to 3.15), **IV3** (OR 2.19; 95% CI 1.81 to	**LOE: 1** **Conclusion:** The findings of the study depicted that younger victims are at twice the risk of opioid

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meta-analysis **Funding:** Canadian Institutes of Health Research Foundation Grant **Bias:** None **Countries**: USA and Canada		**Purpose:** To synthesize the available evidence about patient-, prescriber-, medication-, and system-level risk factors for developing misuse among patients	**Sample Demographics:** a systematic literature review which adhered to PRISR and MAG, as well as the Meta-analysis of Observational Studies in Epidemiology Guidelines, for the reporting of systematic reviews.	**IV2:** any mental health diagnosis and its link to opioid misuse **IV3:** younger age and its link to opioid misuse **IV4:** male sex and its link to	included clinical opinion, use of chart or administrative records, urine toxicology screening, patient self-report, family or clinic staff report, opioid agreement violation, or enrollment in a rehabilitation	random-effects meta-analysis. I-squared statistic Chi-square test.	2.64), **IV4** (OR 1.23; 95% CI 1.10 to 1.36).	misuse than the older victims. Younger-opioids naïve victims are five-times vulnerable to misuse of opioids compared to older ones. **Grade:** Strong recommendation. Recognizing the higher risk of opioid

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		prescribed opioids for noncancer pain.	**Setting**: Inpatient and outpatient studies in Canada and USA. Nine electronic sources were searched: MEDLINE, EMBASE, Cochrane, Central Register of Controlled	opioid misuse	program. Two reviewers independently appraised each included study for potential sources of bias. Reviewers used versions of the NIHCE tool, for sources of cofounding and selection and			misuse associated with a previous or concurrent history of substance use and mental health diagnosis, guidelines should recommend careful prescription of opioids to these

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			Trials, Database of Abstracts of Reviews of Effects, the Cumulative Index to Nursing and Allied Health Literature, the Science Citation Index (Web of Science Core Collection), PsycINFO, Social Sciences Citation Index (Web of Science		measurement bias.			group of patients. **Strengths:** Removal of studies with the narrowest CIs in each meta-analysis reduced heterogeneity. **Weaknesses:** All studies included in the quantitative synthesis were observational,

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			Core Collection), and the Sociology Collection. **Inclusion Criteria:** Studies in which adults or children were first exposed to an opioid through a prescription. **Exclusion criteria:** Studies in which all patients					therefore the findings have the potential to be affected by residual and controlled confounding. **Application to patient population:** Providers can consider prioritizing alternative pain management strategies by

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			reported first being exposed to illicit opioids, were prescribed opioids for cancer pain, or were receiving palliative care were excluded. **Attrition:** None					identifying high-risk patients thereby decreasing the risk of opioid misuse. **Utility to PICOT**: Educating peer support on the risk factors for OUD can increase referral rates for MAT, thereby

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								decreasing mortality and morbidity associated with OUD. **Feasibility**: One eight-hour education session on the risk factors for MAT is feasible. **Harm:** None identified

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Eddie et al., (2019). Lived experiences in new models of care for substance use disorder: A systematic review of peer recovery support services	Inferred to be the theoretical framework of phenomenography	**Design:** Systematic review of literature. **Purpose:** To report the most up to date research on PRSS.	Distinct records identified N=158 PubMed (n=14) EMBASE (n=26) CINAHL (n=55) PsychINFO (n=63) Final sample (n=24 studies) **Demographics:** A systematic	**DV1:** Effects of peer referral on patient's participation in a 12-step meeting on decreasing the risks associated with OUDs. **DV2:** Effects of peer support referral on patient's	Title screen removed 101 duplicate records, and 11 records on non-relevant topics. An abstract review removed 17 records. All studies were checked for accuracy by project leads. Quality	I-squared test	**DV1:** participants receiving intensive referral were more likely over the past year have attended at least one meeting per week (OR= 1.38) and had greater 12 - Step group involvement	**LOE: 1** **Conclusion:** PRSS is beneficial in substance detoxification units, since successfully connecting individuals to care following detoxification is a persistent and vexing problem for providers.

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and recovery coaching. **Funding:** No grants **Bias:** None **Country:** USA			review of literature of humans of all age ranges. **Setting:** PubMed, EMBASE, CINAHL, and PsychInfo data bases were searched. **Inclusion criteria:** Studies were limited to RCTs, quasi-	initiations of substance abuse treatment and completion	assessment form was used. Sources of bias for each study were evaluated with the QUADAS tool.		(d= 0.23) and abstinence rates (OR= 1.61). 12 - Step involvement mediated the association between referral group and alcohol and drug outcomes and was associated with better	**Grade:** High because the quality of evidence supporting significant differences is high. **Strengths:** Priori research design, comprehensive search of electronic data bases duplicate study selection

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			experimental studies, single and multi-group prospective and retrospective studies, and cross-sectional/descriptive studies related to SUD. Available outcomes were included **Exclusion criteria:** Non peer reviewed				outcomes above and beyond group. **DV2:** PRSS was associated with faster outreach, and shorter latency to initial clinical assessment (d= 0.16), and higher rates of any	and data abstraction of study. **Weaknesses:** Review did not distinguish between paid peer support workers such as recovery coaches, who are expected to have formal training and certification, and untrained,

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			items such as book chapters and dissertations were excluded **Attrition:** None				treatment service initiation. Those receiving PRSS were less likely to complete treatment.	volunteer peer support who may facilitate brief interventions akin to 1-step calls. **Application to patient population:** Peer support could be a cost-effective way to bridge the gap between detoxification

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								and longer-term SUD by helping patients enter residential programs and/or engage with recovery programs in the community. **Utility to PICOT:** Since patients at CR are referred for MAT by peer support staff,

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								educating peer support staff on the importance of MAT could increase utilization rates for MAT services thereby decreasing OUD-related deaths. **Feasibility:** Three 8-hours education session on

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								MAT is feasible. **Harm:** None identified

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Klimas et al., (2019). Strategies to identify patient risks of prescription opioid addiction when initiating opioids for pain: A systematic review **Funding:**	Inferred to be the theory of Caregiving Dynamics	**Design:** Systematic review and meta-analysis of literature. **Purpose:** To review the evidence examining factors associated with opioid addiction. and screening	Distinct records identified (N=1287) Full text reviewed (n=102) Final sample (n=10 studies) **Sample demographic:** Studies of adult humans that evaluated	**DV1:** Identifying risk factors associated with opioid addiction. **DV2:** Examining screening tools for identifying adult patients at high Vs low risks of developing	Two investigators independently assessed quality to exclude biased or unreliable study designs and extracted data from higher quality studies. The PRISMA-DTA and STARD reporting	Population incidence of prescription OUD after opioid prescription was estimated by collating data on opioid dependence and abuse from previous reviews on	**DV1:** A history of opioid use disorder (LR range, 17-22) or other substance use disorder (LR range, 4.2-17),	**LOE: 1 Conclusion:** While a history of substance use disorder, certain mental health diagnoses, and concomitant

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CIHR and European commission grant **Bias:** None **Country:** North America **Bias:** None **Countries:** Australia, Canada, Northern Europe, Middle Eastern		tools for identifying adult patients at high Vs low risk of developing symptoms of prescription opioid addiction when initiating prescription opioids for pain**.**	prescription characteristics, patient characteristics, and screening tools assessing symptoms of prescription opioid addiction in the context of pain management **Setting:** MEDLINE and Embase records from January 1946 to	symptoms of prescription opioid addiction.	guideline was followed.	the topic Incidence of OUD prescription was calculated using random effects estimate from the included studies and performed via comprehensi	certain mental health diagnoses (e.g, personality disorder: LR, 27; 95% CI, 18-41), and	prescription of certain psychiatric medications appeared useful for identifying patients at higher risk, few quality

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Europe, USA			November 2018 were systematically searched. **Inclusion criteria:** Original studies that were included compared symptoms, signs, risk factors, and screening tool among patients who developed prescription			ve meta-analysis software version 3. Data was entered into Microsoft Excel spreadsheets predesigned to calculate the sensitivity, Specificity, LRs, and	concomitant prescription of certain psychiatric medications (eg, atypical antipsychotics: LR, 17; 95% CI, 15-18)	studies were available and no symptoms, signs, or screening tools were particularly useful for identifying

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			opioid addiction and those who did not. **Exclusion Criteria:** Studies of opioid-naïve patients newly starting opioid medications for pain and studies assessing for a diagnosis of OUD among patients already			their 95% CI.	appeared useful for identifying patients at high risk of opioid addiction. Among individual findings,	those at lower risk. **Grade:** low grade. few quality studies available to help health care professionals determine which patients are likely to develop OUD

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			receiving opioid medications. **Attrition:** None				only the absence of a mood disorder (negative LR, 0.50; 95% CI, 0.45-0.52) was associated	**Strengths: Priori** research design, risk of bias assessments, and quality assessment tools used. **Weaknesses:** Few studies were included in the systematic review and meta-analysis

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							with a lower risk of opioid addiction. **DV2:** Most screening tools involving combinations of questions	**Application to patient population:** This review found that a history of opioid or nonopioid substance use disorder, concomitant prescription of certain psychiatric medications, prolonged

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							were based on low-quality studies or, when diagnostic performance was assessed among high-	duration of opioid prescriptions (≥30 days), higher daily opioid doses, and a history of certain mental health disorders may be useful for identifying patients at high risk for prescription OUD.

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							quality studies, demonstrated poor performance in helping to identify patients at high vs low risk.	**Utility to PICOT:** Educating peer support on the risk factors for can increase referral rates for MAT, thereby decreasing mortality and morbidity associated with OUD. **Feasibility**: One eight-hour

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Lagisetty et al., (2017). Primary care models for treating opioid use disorders: What actually works? A systematic review **Funding:** No grants	Systems Engineering Initiative for Patient Safety	**Design:** Systematic review and meta-analyses OF RCTs or quasi experimental trials and observational studies **Purpose:** To systematically analyze current	Records identified through database searching (N=1844) Full-text articles Assessed for eligibility (n=104) Final sample (n=41 studies) **Demographics:** Studies of adults 18 years old or older with OUD	**DV1-** Effect of MAT on patient outcomes (health outcomes for the patient).	Two authors independently screened titles and abstracts for eligibility. The PRISMA recommendation was followed in conducting the SR. Two authors used a standardized form adapted from the Cochrane	I-squared statistic Tau-squared statistic SMD		education session on the risk factors for MAT is feasible. **Harm:** None identified

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Bias: None **Countries:** North America, Europe, and Australia.		evidence-based, primary care OUD MAT interventions and identify program structures and processes associated with improved patient outcomes in order to	**Setting:** PubMed, CINAHL, EMBASE, and PsychInfo data bases were searched. **Inclusion:** Articles were included if the intervention: (1) evaluated a primary care-based health delivery model where primary		Collaboration to extract data from the included studies, independently and in duplicate. Two authors independently assessed risk of bias via the validated Downs and Black tool.			**LOE: 1** **Conclusion:** By evaluating not only patient efficacy, but also structural characteristics of primary care models for delivering MAT, this review provides key insights for PCPs and researchers

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		guide future policy and implementation in primary care settings.	care was defined as care delivered in a general practice setting (i.e. private practice, academic primary care clinic) by a general medical internist and/or family medicine physician only, (2) targeted adults (18 years or older) with				**DV1:** Treatment on buprenorphine was positively associated with	about ways to build upon existing resources and personnel to more effectively deliver OUD treatment **Grade:** Strong recommendation. With the need to rapidly disseminate primary care-based models

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			OUD defined as patients engaged in care to treat their opioid addiction, (3) evaluated patient-level outcomes (e.g. patient retention, urine toxicology screens, satisfaction, effect on health screening for comorbidities, etc.), and (4)				achieving a recommended QHI score[(AOR) = 2.19;95 % CI=1.18-4.04].	to provide MAT, this study highlights that policy makers and health care professionals should strive to provide and pragmatically evaluate at the very least, the provision of some coordinated care.

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			evaluated the care model using qualitative or quantitative methods. **Exclusion criteria:** Studies that did not include a description of the care delivery model evaluated, focused exclusively on comparing intervention					**Strengths**: By using the SEIPS framework, systems design elements within each intervention were described rather than focusing only on the broad organizational framework of the intervention;

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			settings without a detailed description of the primary care intervention/program design, and concentrated on specialty based primary care outside of a PCP led primary care practice were excluded. **Attrition:** None					Comprehensive search of electronic data bases; Risk of bias assessments. **Weaknesses:** Only studies that were published in peer-reviewed literature were included. Therefore, interventions that may be in

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								the pilot phase or have outcomes presented via other grey literature such as websites/forums were not captured. **Application to patient population:** With the need to rapidly disseminate

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								primary care-based models to provide MAT, this study highlights that policy makers and health care professionals should strive to provide and pragmatically evaluate at the very least, the provision of some

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								coordinated care thereby decreasing mortality and morbidity associated with not using MAT. **Utility to Picot:** Educating peer support at CR on the positive outcomes of using MAT for OUD can

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Maclean et al., (2018). Attentional bias in opioid users: A systematic review and meta-analysis. **Funding:** No grants **Bias:** None **Countries:** UK, USA, Iran,	Inferred to be the theory of Self-Transcendence	Systematic review of literature and meta-analyses in accordance with PRISMA standards **Purpose:** To conduct a systematic review and meta-analysis of attentional	N=1199 studies Full text articles assessed for eligibility (n=40) Final sample (n=21 studies) **Demographics:** All adult participants who were opioid addicted or in treatment for opioid use were identified as "participants with OUD".	**IV1:** Attention bias in participants with OUD, non-dependent prescription opioid users, and healthy control. **IV2:** Attentional bias in participants	Lead author performed an initial screening and then potentially relevant manuscripts were discussed and evaluated with other authors. Data extracted from eligible studies included study	Egger's test, Begg's test, I-squared test, Cochrane's Q test, and Contour-enhanced funnel plots. Meta-analysis was conducted using a random effects model using		increase referral rates for MAT and increase patient outcomes. **Feasibility:** Three 8hours education session on MAT is feasible. **Harm:** None identified

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Netherlands, China		bias studies for OUD.	**Setting:** Database searches in Google Scholar, PubMed, and PsychINFO of studies published between 200 and 2017. **Inclusion criteria:** Studies were included if they (a) evaluated attentional bias in opioid users, (b)	with OUD versus healthy controls. Attentional bias refers to the cognitive processes in which attention is automatically captured by drug cues and maintained	population, sample size of group(s), biological sex distribution in group(s), category of opioid use, treatment setting, attentional bias task type, stimuli used, experimental setting, use of attentional bias	Comprehensive Meta-Analysis 3.0 software.		**LOE:1** The results of this systematic review and meta-analysis suggest that individuals with OUD exhibit robust attentional bias to opioid cues when engaging in MAT. **Grade:** Strong recommendation. If attentional

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			used a task to evaluate attentional bias that included active response to study stimuli, (c) were peer-reviewed, (d) calculated attention bias by comparing response to drug and neutral stimuli, and (e) could isolate attentional bias	on drug cues.	modification, primary attentional bias findings, and association of attentional bias with clinically relevant findings. To ensure accuracy, two authors in-dependently extracted data and inconsistencies		**IV1:** There was significant attentional bias, i.e., attentional	bias precedes opioids use and relapse, interventions that reduce attentional bias may be useful. **Strengths:** Priori research design, risk of bias assessment, and comprehensive search of

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			specific to opioid versus neutral stimuli from bias to other salient stimuli. **Exclusion criteria** Studies that were not peer-reviewed, studies of humans younger than 18 years old, and studies of pregnant females. **Attrition:** None		were discussed until full agreement was reached.		bias differed significantly from zero (M= 35.53ms, 95% CIs = 23.45, 47.61, p< 0.001). There was evidence of heterogeneity in attentional bias across studies, Q (df= 12) = 91.29, p<	electronic databases. **Weaknesses:** There were a relatively small number of studies that assessed attentional bias between OUD and healthy controls, and even fewer that assessed attentional bias in low-risk

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							0.001; I2= 86.86%. **IV2:** There was a significant between-group difference in attentional bias (d= 0.72, 95%CIs = 0.46, 0.98, p< 0.001). There was no evidence of heterogeneity	prescription opioid users. Assessment differed across studies, with different researchers using different tasks, parameters**,** and stimuli, which can complicate comparisons across studies.

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							in effect sizes across studies, $Q(df=6) = 8.713$, $p= 0.19$; $I^2= 31.14\%$. Egger's test for intercept provided no evidence for publication bias (intercept = 0.25, p= 0.91), and	**Application to patient population:** Patient intervention that reduce attentional bias can be a useful adjunct to MAT. **Utility to PICOT:** Educating peer support on interventions to reduce

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Maglione et al., (2018). Effects of medication -assisted treatment for opioid use disorder on functional outcomes: A systematic review. **Funding:**	Inferred to be the Cognitive-Behavioral Frame of Reference	Meta-analysis of RCTs using the Hartung-Knapp method for random-effects models. A priori research design **Purpose:** To synthesize evidence on	N=6877 Full text articles assessed for eligibility (n=1411) Final sample(n=40) **Demographic:** Studies of adult humans, 18 years of age or older. **Setting:** PubMed, PsychINFO, EMBASE CINAHL,	**DV1:** Effect of MAT on cognitive processing. **DV2:** Effect of MAT on Physical function. **DV3:** Effect of MAT on social behavioral function **DV4:** Effect of MAT on	Two independent reviewers screened abstracts and full texts using predetermined eligibility criteria. The Cochrane Risk of Bias tool was used for controlled trials. For observational studies,	I-squared statistic Tau-squared statistic SMD	neither did Begg's test (p= 0.65). The funnel plot exhibited little evidence of publication bias.	attentional bias can increase outcomes of patient on MAT. **Feasibility:** A two-hours class on some of the interventions to reduce attentional bias is feasible. **Harm:** None identified

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DCEPHTI and USDD **Bias:** None **Countries:** North America and Europe		the effects of MAT for OUD on functional outcomes, including cognitive, physical, occupation, social/ behavioral and, neurological function.	Cochrane Central, and CDSR databases were searched. **Inclusion criteria:** Studies were limited to outpatient settings, studies were limited to controlled trials, with or without random assignment, and	neurological function.	representativeness of the MAT patients and baseline similarity of compared groups were assessed.			**LOE: 1 Conclusion:** The weaknesses in the body of evidence prevent any strong conclusions about the effects of MAT on functional outcomes or difference among medication

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			observational studies. **Exclusion criteria:** Pregnant women, studies carried-out in inpatient hospitals and residential rehabilitation facilities, cross-sectional studies. **Attrition:** None				**DV1:** Compared with matched controls with no history of opioid use,	types. Some studies that compared MAT patients to persons with OUD who did not receive MAT reported significant beneficial effects regarding criminal activity. **Grade:** Low because the

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							methadone patients in shorter RCT had higher verbal memory scores (SMD 0.81; 95CI 0.25, 1.36). **DV2:** Fewer methadone patients (50%) reported fatigue than did the	quality of evidence supporting significant differences is low. **Strengths:** Priori research design, duplicate study selection and data abstraction of study information, comprehensive search of

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Malta et al., (2019). Opioid-related treatment, interventions, and outcomes among incarcerated persons: A systematic review.	Inferred to be the theory of self-efficacy	Systematic review of peer-reviewed literature and meta-analyses in accordance with PRISMA 2019 checklist. **Purpose:** To assess opioid-related	Distinct records identified through database searching N=2356 Full text reviewed (n=186) Final sample (n=46 studies) **Sample Demographics:** Studies of incarcerated adult humans of age 18 or older.	**IV1:** Opioid use interventions during incarceration. **IV2:** Opioid use intervention s post-incarceration.	Two reviewers independently screened all articles in a two-step screening process-first screening the titles/abstracts followed by the full-text articles. When consensus could not be reached among	*t*-test	untreated opioid users (RR 0.78; CI 0.56,1.09) **DV3:** No significant difference found at four weeks (SMD 0.69; CI-0.05, 1.42) **DV4:** The difference in mean score were not statistically	electronic databases, and risk of bias assessments. **Weaknesses:** None noted Not applicable to patient due to weakness in the body of the evidence. Study will not be used due to limited evidence.

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Funding: Support from CIHR, The Chair in Addiction (University of Toronto) And from the HGFCAR, University of Auckland. **Bias:** None		interventions delivered during and after incarceration among adult population correctional populations.	**Setting:** The search included the following scientific literature databases: Criminal Justice Abstracts, Embase, MEDLINE, National Criminal Justice Reference Service (NCJRS),		reviewers, a third reviewer became involved to resolve standing conflicts. Relevant information was extracted and inputted into a standardized form. All eligible studies		significant (SMD 0.12; CI-0.46, 0.69).	**LOE: 1** **Conclusion:** This review highlights the need to implement and scale up evidence-based strategies to ensure incarcerated individuals with OUD are able to access adequate treatment and

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Country: North America, Australia, Asia, and Europe.			PsycINFO, Scopus, and Web of Science. Articles reviewed were published between 2008-2019. **Inclusion criteria:** The review included studies conducted among adult participants who (1) were opioid users at the time of the		were assessed for quality using the Joanna Briggs Institute Critical Appraisal Tools		**IV1:** 76.9% received OAT while incarcerated, mortality of opioid-dependent	care during and post-incarceration. **Grade:** Strong recommendation. Health professionals, policy makers, researchers, and legislators can work together to build a system that helps with identifying

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			study and/or had been diagnosed with OUD prior to or during incarceration and (2) were incarcerated or recently released into the community (≤90 days post-incarceration). **Exclusion criteria:** Studies were excluded if				incarcerated persons was significantly lower among those receiving OAT in prison, hazard of all-cause death was 74% lower among those receiving OAT in prison vs. those opioid-	incarcerated persons with OUD, who can from OAT, and reach similar levels of treatment adherence, health and social improvements as persons with OUD without incarceration history

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			participants were (1) not opioid users, (2) using opioids for medical purposes (not including for OUD), (3) released from incarceration for more than 90 days, (4) on probation or parole at the time of the study, or (5) involved in drug treatment				dependent not in OAT (AHR = 0.26, 95% CI 0.13–0.50). **IV2:** Incarcerated persons who continued MMT post-release had a 36% lower risk of recidivism vs. non-MMT-treated group	**Strengths:** Comprehensive search of electronic database search. First study to systematically review the literature to assess the effects of both treatment-based and preventive opioid-related

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			court or other diversion programs. **Attrition:** None				(AHR = 0.64, 95% CI 0.47–0.88, p < 0.01).	interventions delivered during and after incarceration among adult correctional populations. **Weaknesses:** The determination of whether there was a meaningful effect for each study outcome

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								was based on statistical significance, which does not necessarily represent clinical or population-level significance. **Application to patient population:** This study reinforces the positive impact

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								of providing OAT in correctional settings. OAT decreases mortality rates, reduces opioid use, and improves addiction treatment intake and retention post-incarceration. **Utility to Picot:** Since

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								most of the patients at CR are incarcerated educating peer support on the importance of OAT can increase referral rate for OAT, thereby decreasing mortality and morbidity associated with OUD **Feasibility:**

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Murphy & Polsky, (2016). Economic evaluations of opioid use disorder intervention: A systematic review. **Funding:**	Inferred to be the theory of Caregiving	Systematic review and meta-analysis of literature. A decision analytic model. **Purpose:** To review the literature on economic evaluations of opioid use	Articles identified through database searches N=98 Final sample (n=49 articles) **Demographics:** Studies of adult humans of age 18 years old and above. **Setting:** Searched databases included:	**IV1:** Economic evaluation of MMT	A sensitive approach was used to ensure a comprehensive list of relevant articles. The Drummond checklist was used to evaluate and categorize studies according to their quality.	Cost benefit analysis.		A three, eight-hours class on some of the interventions to reduce attentional bias is feasible. **Harm:** None identified

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No funding received. **Bias:** None **Country:** North America, Asia, Europe, and Australia		disorder intervention.	PubMed/MEDLINE, Cochrane Library, Cost-Effectiveness Analysis Registry, Web of Science, JSTOR, ScienceDirect and Google Scholar, UK NHS Economic Evaluation Library Database, EconLit, PsycINFO,					**LOE: 1 Conclusion:** The evidence on MMT supports previous findings that MMT is an economically advantageous opioid-use-disorder therapy. **Grade:** Low because the literature

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			SciELO Citation Index, Social Science Citation Index, and the Derwent Innovations Index. **Inclusion criteria:** Articles that focused on opioid-use disorders and the treatment of opioid use				**IV1:** Studies of beneficiaries who received MMT had the lowest costs ($7,163 [2004	comparing MMT to other OUD pharmacotherapies is still quite limited. **Strengths:** Quality assessment of studies and comprehensive electronic search.

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			disorders as an outcome were included. **Exclusion criteria:** Articles were excluded for not containing sufficient information on costs or other pertinent economic variables; articles that focused				USD]), followed by studies of members with 2 or more outpatient addiction treatment visits and no methadone ($14,157), and members with 1 or 0 outpatient addiction	**Weaknesses:** Among those studies that did incorporate effectiveness measures, many were clinical in nature. One problem with clinical outcomes is that they fail to capture many of the consequences

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			solely on identifying the costs of opioid misuse or of providing a service; and articles that were poster abstracts published in conference proceedings; Studies were excluded if they were not an economic evaluation of an				treatment visits and no methadone ($18,694).	associated with opioid misuse, such as changes in quality of life. **Application to patient population:** Not applicable to patient population due to limited evidence comparing MMT to other

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			OUD intervention. **Attrition:** None					forms of OUD treatment. **Utility to PICOT:** Not applicable due to limited evidence.

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Ordeda et al., (2015). Prevalence and economic burden of prescription opioid misuse and abuse. A systematic review. **Funding:** CDC **Bias:** None	Inferred to be the theory of self-efficacy	A systematic review was conducted to update the 2009 results by reviewing literature involving humans published in English from 2009-2014. **Purpose:** To update and synthesize	N=5281 Final sample (n=21) **Demographics:** Studies of adult humans 18 years of age or older. **Setting:** PubMed, Embase, and OpenSIGLE (for gray literature) databases were ere searched with focus on the cost	**IV1:** The prevalence of POMA **IV2:** Cost of POMA	Data from all selected articles were extracted by two independent reviewers, any discrepancies between extractions were verified for accuracy by an independent third reviewer.	Cost benefit analysis		

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Country: USA		all evidence around prevalence and costs of opioid abuse	and prevalence of POMA. **Inclusion criteria:** Studies that assessed abuse of prescription opioids, including OUD, poisoning, and fatal and non-fatal overdose were included. **Exclusion criteria:**		Published checklists were used to assess the relevance and credibility of observational studies, retrospective database analyses, and economic model studies.			**LOE:**1 **Conclusion:** This systematic literature review shows that abuse of prescription opioids is characterized by substantial direct healthcare costs, medical utilization, and related societal costs.

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			Studies that did not provide specific data for the prescription opioid abusing subgroup of a broader population of licit and illicit substance users were excluded. **Attrition:** None				**IV1:** POMA prevalence ranged from 1.6 – 2.66/1000 in US privately insured and	**Grade:** Strong recommendation. An improved understanding of the magnitude of these costs will inform policy making. **Strengths:** Relevance and credibility of

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							5.0 – 8.7/1000 in Medicaid. 5-year VA prevalence was 11.1/1000. Prevalence in the US increased from 1.8/1,000 to 5.0/1,000 in Florida Medicaid and 0.5/1,000 to	studies performed; duplicate study selection. **Weaknesses:** Study designs varied considerably making it difficult to directly compare findings.

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							1.6/1,000 in commercially insured from 1999-2006. Global illicit opioid dependence rate was 2.2/1000. **IV2:** Total US societal costs of POMA were $53.4 -$57.7 billion. Prescription	**Application to patient population:** Due to the increased cost, mortality, and morbidity caused by opioid use, MAT has shown to reduce cost, mortality, and morbidity among people

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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
							opioid poisoning accounted for $15.9 billion. Excess annual medical costs in commercial claims data for patients with diagnosed opioid abuse and dependence	dependent on opioids. **Utility to PICOT:** Educating peers at CR on the importance of MAT for opioids can increase referral rate for MAT, thereby decreasing mortality and morbidity

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Sordo et al., (2017). Mortality risk during and after opioid substitution treatment: Systematic review and meta-analysis of cohort studies.	Inferred to be theory of Caregiving Dynamics	Meta-analysis of RCTs using the Hartung-Knapp method for random-effects models. A priori research design **Purpose:** To compare the risk for all cause and	Distinct records identified N=2033 Medline (n=1215) Embase (n=729) Lilacs(n=729) PsychINFO (n=486) Other searches (n=102) n=20 Retained for review (n=328) Final sample (n=20 studies)	**IV1**: Cause and overdose mortality rates during periods in and out of treatment with methadone and Buprenorphine **IV2:** Evaluate heterogeneit	All abstracted data were checked for accuracy by project leads. Two investigators independently reviewed the titles and abstracts identified in the search, and retrieved articles to determine	*t*-test Poisson distribution for the observed number of deaths and fixed person years at risk. Mortality rates in and out treatment were jointly combined across	was $9,456-$20,546. Similar results were seen in Medicaid and the VA which were ~$15,000. The per event cost for opioid abuse related ED/inpatient care was $18,891	associated with OUD. **Feasibility:** Three 8-hours education session on MAT is feasible. **Harm:** None identified

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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
Funding: ISCIII Network and EMCDDA **Bias:** None **Country:** Australia, Canada, Northern Europe, Middle Eastern Europe, USA		OD mortality in people with opioid dependence during and after substitution treatment with methadone or buprenorphine as well as to characterize	**Demographics:** prospective and retrospective cohort studies in individuals with opioid dependence that reported deaths from all causes or OD during follow-up periods in and out of opioid substitution treatment with	y of mortality rates over time in and out of treatment, particularly within the first few weeks after treatment initiation and cessation.	eligibility, and to extract study data. Quality assessment form based on standardized and extensively used instruments was used: The methodology checklist for cohort studies	methadone and Subutex by using multivariate effects meta-analysis.		**LOE:** I **Conclusion:** Retention in methadone and buprenorphine treatment, is associated with substantial reductions in the risk for all-cause and overdose mortality in people who dependent on opioids.

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		trends in risk of mortality after the initiation and cessation of treatment.	methadone or buprenorphine. **Setting:** Inpatient and outpatient studies in Australia, Canada, Northern Europe, Middle Eastern Europe, and USA. Medline, Embase, PsychINFO, and LILACS databases were searched by		developed by the SIGN. The checklist for drug-related studies developed by the NDARC, Australia.		The pooled all-cause mortality rates in the three buprenorphine cohorts	The induction phase onto methadone and the time immediately after leaving treatment with both drugs are periods of particularly increased mortality risk, which should be dealt with by both public health and

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			using specific index terms linked to the topics of opioid dependence, opioid substitution treatment, mortality, and cohort studies **Inclusion Criteria:** prospective or retrospective cohort studies in people with				were 4.3 and 9.5 deaths per 1000 persons years in and out treatment respectively. All-cause mortality rates varied widely across the 16 methadone cohorts (P<0.001). The pooled	clinical strategies to mitigate such risk. **Grade:** Strong recommendation. Precautions should be taken during and after opioid substitution treatment to increase safety**.**

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			opioid dependence that reported deaths during follow-up periods in and out of opioid substitution treatment with methadone or buprenorphine. **Exclusion criteria:** No data in humans, people in prison or recently released, no all				all-cause mortality rates were 11.3 and 36.1deaths per100 persons years in and out of methadone treatment respectively (unadjusted out-to-in rate ratio of 3.20, 95% confidence	**Strengths:** Synthesized evidence from cohort studies published until 2016, first study that quantified mortality changes overtime during and after methadone treatment.

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			cause or OD mortality as outcome or no deaths over follow-up Study not focused on people with opioid dependence, no original research. **Attrition:** None				interval 2.65 to 3.86). In pooled trend analysis, all-cause mortality dropped sharply over the first four weeks of methadone treatment and decreased gradually two weeks after leaving	**Weaknesses:** Did not include studies in low- and middle-income countries, study included observational studies, the same patients are compared throughout follow-up periods in and out of substitution

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							treatment. All-cause mortality remained stable during induction and remaining time on buprenorphine treatment. Overdose mortality evolved similarly, with pooled overdose	treatment, but these patients leave and re-enter treatment in a non-random way. Also, by the study design, overdose mortality was not captured when opioid substitution was obtained on illicit drug markets.

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							mortality rates of 2.6 and 12.7 per 1000 person years in and out methadone treatment (unadjusted out-to-in rate ratio 4.8, 2.90 to 7.96) and 1.4 and 1.6 in and out of buprenorphine treatment.	**Application to patient population:** Due to the numerous deaths caused by opioid use, Methadone and buprenorphine have shown to reduce mortality among people dependent on opioids.

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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
								Utility to the PICOT: Educating peers at CR on the importance of MAT for opioids can increase referral rate for MAT, thereby decreasing mortality and morbidity associated with OUD. **Feasibility:**

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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
								Ten 8 hours education session on MAT is feasible. **Harm:** None identified.

Key: AHR- Adjusted Hazard Ratio; **AOR-**Adjusted Odds Ratio; **CDC-**Center for Disease Control; **CI**-Confidence interval; **CIHR-**Canadian Institutes of Health Research; **CR-** Crossroads; **DCEPHTI-**Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury; **Df-** Degrees of Freedom; **DTA-** Diagnostic Test Accuracy; **EMCDDA**- European Monitoring center for Drugs and Drug Addiction; **HGFCAR-** Huge Green Foundation Chair in Addiction Research; **ISCIII**- Institute De Salud Carlos III; **LOE**-Level of Evidence; **LR-**Likelihood Ratio; **MAG-** Meta-analysis Guidelines; **MAT-**Medication Assisted Treatment; **M=**Median; **MMT-**Methadone Maintenance Treatment; **NDARC**; National Drug and Alcohol Research Center; **NHS-** National Health Services; **NIHCE-** National Institute for Health and Care Excellence; **OAT-**Opioid Agonist Treatment; **OD-**Overdose; **ORs-**Odds Ratios; **OUD-**Opioid Use Disorder; **PCP-**Primary Care Physician; **POMA-** Prescription Opioid Misuse and Abuse; **PRISR-**Preferred Reporting Items for Systematic Reviews; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **PRSS-**Peer recovery support services; **QUADAS-** Quality Assessment of Diagnostic Accuracy Studies; **QHI-**Quality health care Indicators; **RCTs-** Random Control Trials; **RR-**Random Ratio; **SIGN**- Scottish Intercollegiate Guidelines Network; **SMD-**Standard Mean Differences; **SR-**Systematic Review; **SUD-** Substance Use Disorder; **STARD-**Standards for Reporting Diagnostic Accuracy; **USDD-** United States Department of Defense; **UK-**United Kingdom **USA**-United States of America

Table 2

Synthesis Table

Author	Cragg et al.	Eddie et al.	Klimas et al.	Lagisetty et al.	Maclean et al.	Maglione et al.	Malta et al.	Murphy & Polsky	Ordeda et al.	Sordo et al.
Year	2019	2019	2019	2017	2018	2018	2019	2016	2015	2017
Design	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
LOE	I	I	I	I	I	I	I	I	I	I
Theory/Conceptual Framework										
Theory of Self-Transcendence	X				X					
Theoretical framework of phenomenography		X								
Theory of Caregiving Dynamics			X					X		X
Systems Engineering Initiative for Patient Safety				X						
Cognitive-Behavioral						X				

Key: LOE-Level of Evidence; **MAT**-Medication Assisted Treatment; **NR**-Not Reported; **OUD**-Opioid Use Disorder; **SR-**Systematic Review; **UK-**United Kingdom **USA**-United States of America; ↑-Increased risk of OUD; ↓-Decreased risk of OUD; ↓ *-Decreased mortality and morbidity associated with OUD; %-Percentage

Frame of Reference										
Theory of Self-Efficacy							X		X	
Study Characteristics										
Inpatient										
Outpatient						X				
Inpatient and Outpatient	X	X	X	X	X		X	X	X	X
SR of adults only			X	X	X	X	X	X	X	X
SR of adults and Children	X	X								
Male (%)	72.8	NR	NR	38.32	61.3	NR	82	36.7	43.8	NR
Number of studies Included in the SR	65	24	10	41	21	40	46	49	21	20
Reliability of Instruments	X	X	X	X	X	X	X	X	X	X
Setting										
North America	X	X	X	X	X	X	X	X	X	X
Europe			X	X	X	X	X	X		X
Asia					X		X	X		
Australia			X	X			X	X		X
Independent Variables										
Any current or previous substance use	X	X	X	X	X	X	X	X	X	X

Key: LOE-Level of Evidence; **MAT**-Medication Assisted Treatment; **NR**-Not Reported; **OUD**-Opioid Use Disorder; **SR-**Systematic Review; **UK-**United Kingdom **USA**-United States of America; ↑-Increased risk of OUD; ↓-Decreased risk of OUD; ↓ *-Decreased mortality and morbidity associated with OUD; %-Percentage

Previous Mental health diagnosis	X	X	X	X	X	X	X	X	X	X
Younger age (18-30 years)	X	X	X	X				X		
Male sex	X		X	X		X			X	
Past opioid use disorder	X	X	X	X	X	X	X	X	X	X
Dependent Variables										
Peer support referral		X								
Identifying risk factors associated with opioid addiction			X	X				X		
Examining screening tools for identifying adult patients at high Vs low risks of developing symptoms of prescription opioid addiction			X							
Attentional bias					X					
MAT outcomes on cognitive processing				X		X	X	X		

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MAT on Physical function					X	X		X		
MAT on social behavioral function						X		X		
Effect of MAT on neurological function.						X		X		
Cost of MAT								X	X	
MAT mortality rates										X
Findings										
Effect of younger age on OUDs	↑									
Effects of peer support referral		↓								
History of previous substance use			↑							
MAT treatment				↓ *		↓ *	↓ *	↓ *	↓ *	↓ *
Attentional bias				↑						

Key: LOE-Level of Evidence; **MAT**-Medication Assisted Treatment; **NR**-Not Reported; **OUD**-Opioid Use Disorder; **SR-**Systematic Review; **UK-**United Kingdom **USA**-United States of America; ↑-Increased risk of OUD; ↓-Decreased risk of OUD; ↓ *-Decreased mortality and morbidity associated with OUD; %-Percentage

Appendix C

Models and Frameworks

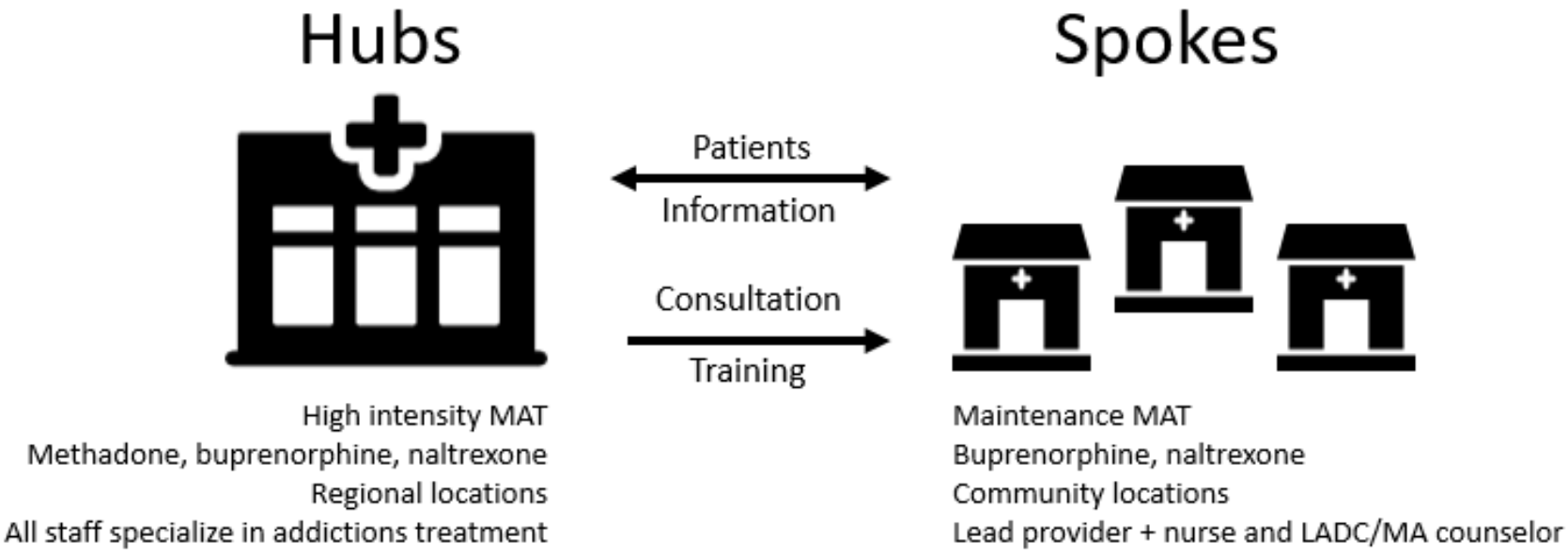
Figure 1

The Chronic Care Model

Wagner (1998).

Figure 2

Hubs and Spokes Model



Department of Vermont Health (2020).