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A Comparison of Prescriber-Based Opioid Addiction Prevention Strategies: An Integrative Literature Review

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Abstract

Background: Opioid addiction causes many preventable deaths across the United States. Many recommendations to prevent opioid addiction have been made, however, many recommendations have not been fully evaluated for efficacy. This has led to a gap in knowledge for providers and healthcare systems to make informed decisions on how to reduce opioid addiction.

Objectives: This study explores different prescriber-based opioid prevention strategies, providing an analysis and ranking for the strategies that most effectively reduce opioid abuse and exposure. Additionally, the analysis provides recommendations for future research.

Methods: An integrative literature review was conducted to investigate three opioid abuse prevention strategies: prescription drug monitoring programs, physician continuing education, and risk assessment screening tools. Information has been organized according to prevention strategy type and presented in a data matrix table.

Results: Most studies (4 out of 5) that examined risk assessment screening tool concluded that their use resulted in statistically significant reductions in opioid abuse. Prescription drug monitoring programs had more mixed results but overall resulted in modest reductions. Physician continuing education resulted in very few statistically significant outcomes.

Discussion: The opioid abuse prevention strategies have the greatest to the least impact in the following order 1) risk assessment screening tools 2) prescription drug monitoring programs, and 3) prescriber continuing education.

Keywords: Opioids, opioid abuse prevention, opioid addiction prevention, prescription drug monitoring programs, physician continuing education, risk assessment screening tool, risk assessment questionnaire, opioid abuse prevention strategies

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Introduction

Opioid addiction can be seen on the streets, in the emergency room and even in pictures posted on social media. In 2017, police officers of East Liverpool, Ohio posted a very graphic and controversial picture on social media as a cry for help (Park, 2017). In the picture, a young boy stares blankly at the camera while his two caregivers are unconscious from a heroin overdose in the front seat of their car. The picture is a haunting representation of the current United States opioid addiction epidemic. According to the Center for Disease Control and Prevention (2016), "deaths from prescription opioids—drugs like oxycodone, hydrocodone, and methadone—have more than quadrupled since 1999" (Understanding the Epidemic section, para. 1). Additionally, the CDC reports that 91 Americans die from opioids every day. The epidemic affects so many people that the use of NARCAN (an opioid antagonist) is now taught at basic provider level CPR classes.

This is an epidemic that affects people throughout the lifespan and across all demographic variables. According to Richter, Kunz, & Foster (2015), since 2010, opioids are the leading cause of death in people between the ages of 12 years old and 50 years old, affecting older adults and adolescents as well. Additionally, the National Center on Addiction and Substance Abuse (NCASA, 2017) reports that "opioid related deaths have risen across virtually all demographic groups and in almost every state in the nation" (pg. 4). Illinois alone has lost over 11,000 people to the opioid epidemic since 2008 with projections of the loss of nearly 3,000 more lives by the year 2020 (State of Illinois, 2017).

In addition to the fact that the opioid epidemic has a profound impact on different demographics and causes many preventable deaths, it also represents a huge cost. The NCASA (2017) estimates that states spend an average of nearly sixteen percent of their budget combating substance abuse and addiction, with that spending being primarily on consequences rather than prevention. Other economists have estimated that paying for one year of costs related to the opioid epidemic exceeds 78.5 billion dollars (Florence, Xu, & Zhou, 2016).

This epidemic carries very meaningful implications for healthcare industry professionals. Healthcare providers have worsened the situation according to many studies. "Opioid addiction can actually begin with a trip to the emergency room. A wide variation in rates of opioid prescribing existed among physicians practicing within the same emergency department, and rates of long-term opioid use were increased among patients who had not previously received opioids and received treatment from high-intensity opioid prescribers" (Barnet, Olenski, & Anupman, 2017, p. 663). In fact, some studies estimate that almost sixty percent of opioids being abused come from a physician prescription, either directly or indirectly (Lembke, 2016). Furthermore, it is important to note that increasing addiction rates correspond to an increase in pharmaceutical opioid *sales* (Hahn, 2011). This information demonstrates that as providers write more opioid prescriptions, rates of opioid abuse increase. Finally, we must note that, the majority of heroin users today began by misusing prescription opioids (NCASA, 2017).

This problem is exacerbated by a few factors. First, many providers recognize addiction but do not know how to treat it (Lembke, 2016). Second, many providers underutilize current prevention strategies. For example, while nurse practitioners wrote over 4,000,000 prescriptions for opioids in 2013 (Chen, Humphrey, Shah, & Lembke, 2015), only about 20.9% of family

nurse practitioners utilized formal screening devices for opioid abuse in their patients

(Chaudhary, & Compton, 2017).

Many recommendations for dealing with the opioid epidemic have been proposed. While

numerous patient/user based initiatives exist, this paper will focus on behavioral changes on the

part of prescribers of opioids due to the fact that "the misuse of *prescription* opioids precedes the

use of heroin and other illicit opioids in the majority of cases" (NCASA, 2017, p.17). Some of

the most widely recommended prescriber-centered strategies include: the use of prescription

drug monitoring programs, changes in prescribing guidelines, prescriber continuing education,

and substance abuse screening tools.

With so many recommendations for combating the opioid crisis, providers and healthcare

systems might not know where to start. According to Hahn (2011), many of the recommended

strategies have not been fully evaluated for efficacy nor broadly implemented. This has caused a

knowledge gap regarding best practice. An integrative literature review could gather and analyze

data with the intention of recommending one or two strategies that have higher efficacy rates.

This data could then be used to help providers and healthcare systems invest resources in

evidence-based strategies to reduce opioid addiction.

This integrative literature review aims to better understand different prescriber-based

opioid prevention strategies, providing an analysis and ranking for the strategies that most

effectively reduce opioid abuse and exposure. Additionally, the analysis will provide

recommendations for future research.

To better understand which opioid prevention strategy has the most efficacy, the

following research question will guide this integrative literature review: Which prescriber-based

opioid prevention strategy most effectively reduces opioid abuse? For the purposes of this study, effective reduction in opioid abuse is defined as a decrease in: "significant negative consequences of using opioids recurrently" (Hahn & Cataldo, 2012, p.1).

Conceptual Framework

This study draws on Nola Pender's health promotion conceptual framework for guidance. Nola Pender's health promotion model explores "the complex biopsychosocial processes that motivate individuals to engage in behaviors directed toward the enhancement of health" (Murdaugh, Parsons, & Pender, 2002, p. 60). Pender's framework maintains two theoretical foundations: 1.) behavior is rational and economical, and 2.) the environment, personal factors and behavior all shape one another (Murdaugh, Parsons, & Pender, 2002, p. 62). There are various assumptions that Pender states in her conceptual framework, but there are three assumptions particularly relevant to this integrative literature review. First, people want to express their full health potential. Second, people are highly affected by healthcare professionals. Finally, people change their environment and their environment changes them.

Pender's assumption that patients want to express their full health potential gives researchers a starting point. If we assume that patients want to express their full health potential, we can assume they want to prevent opioid addiction, as this would diminish health potential. Then the question "how?" may be asked. Drawing from the model for further guidance, we know that people are both affected by their environment and by healthcare professionals. This moves us to study prescriber-based prevention strategies because we know that providers not only form part of the patient's environment, but affect the patients directly. Thus, prescriber-based prevention strategies and health promotion have the potential to reduce opioid addiction.

Finally, researchers can use Nola Pender's Health Promotion model "to provide a coherent and

organized framework for intervening with clients to increase health promoting behaviors"

(Murdaugh, Parsons, & Pender, 2002, p.75).

Figure 1 Visual Depiction of Nola Pender's Health Promotion model
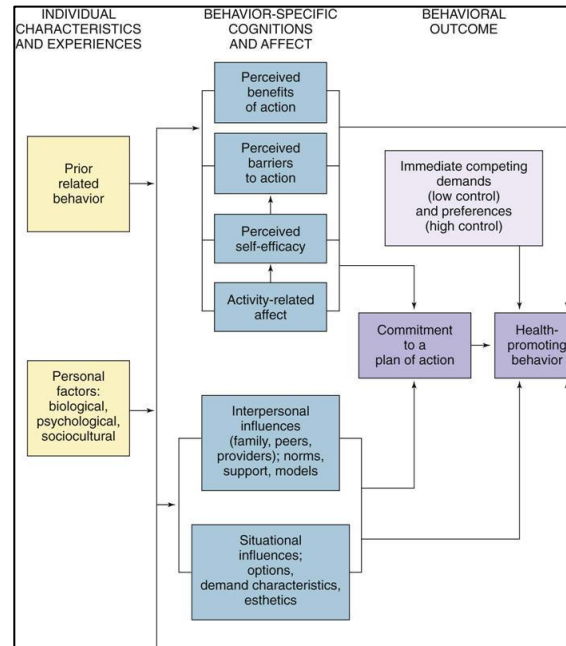
Methods

Design

This research utilized an integrative literature review design for various reasons. First,

integrative literature reviews, among many things, help identify gaps in knowledge, bridge

related areas of work and help determine relevant areas for future research (Russell, 2016). This

particularly relates to prescriber-based opioid prevention strategies because information about

each individual prevention strategy is available, but current research lacks a comparison to

determine best practice. This integrative literature review synthesized information about three

prescriber-based opioid addiction prevention strategies: prescription drug monitoring programs,

risk assessment screening tools, and prescriber continuing education. Prescription drug

monitoring programs store information about patients, providers, prescriptions, pharmacies and

other information such as medication date dispensed, type and strength (Ringwalt et al., 2015).

Risk assessment screening tools vary depending on the type. Generally, patients provide

information that will in turn indicate how many risk factors they have that predispose them to

opioid addiction. Providers then use this information to guide their prescribing practices.

Prescriber continuing education includes any workshops or training aimed to educate providers

on opioids and risks associated with opioid prescriptions. Using a side-by-side comparison of

each strategy enabled interested parties to determine the best strategy and identify areas that

require further research.

Literature Search Strategies

Multiple databases contributed information to this integrative literature review. A

separate search was conducted for each prevention strategy, utilizing two databases to gather

results for each strategy. For prescriber continuing education, queries were completed in PubMed

and Cumulative Index to Nursing and Allied Health Literature (CINAHL) complete. PubMed

and CINAHL were used to obtain information on prescription drug monitoring programs.

Finally, PubMed, and ProQuest Nursing, and Allied Health Database were searched to find

information about risk assessment screening tools.

Search terms varied for each separate prevention strategy. Search terms for prescriber

continuing education included: opioid abuse prevention OR opioid addiction prevention AND

prescriber education OR continuing education OR physician training OR physician education.

For the risk assessment screening tool search, terms included: opioid addiction prevention OR

opioid abuse prevention AND risk assessment screening tool OR risk assessment questionnaire.

For the inquiry on prescription drug monitoring programs, the following were terms included in

the search: opioid abuse prevention OR opioid addiction prevention, AND prescription drug

monitoring program OR prescription drug program OR pdmp AND effectiveness OR efficacy

OR result.

Literature Inclusion/Exclusion Criteria and Data Screening

For this integrative literature review, the main inclusion criteria were: 1) the primary

focus of the abstract related to opioid addiction prevention, 2) the article focused on one of the

three aforementioned prevention strategies, and 3) the article was a primary source. Additionally,

articles must have been published in the last five years, be peer reviewed, be published in

English, and have human subjects. Research was excluded based on information in the abstract

or title if it: 1) did not conduct an intervention with measurable results, and 2) presented an

intervention for addiction to substances other than opioids (see figure 1, figure 2, & figure 3).

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Data Analysis

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Information extracted from the selected studies in this integrative literature review

included: author information, purpose statement, research question, information about the sample

(including demographics and sample size), method, prevention strategy and results of the study.

The selected studies were organized into separate tables according to the specific prescriber-

based prevention strategy. Table 1 summarizes information about the studies involving

prescription drug monitoring programs. Table 2 summarizes information about the studies

involving risk assessment screening tools and table 3 summarizes information from the studies

involving prescriber continuing education.

The data summarized in the tables provides information about each individual strategy, allowing for a side by side comparison. As such, strategies were assessed for efficacy and ultimately, ranked, providing information about which method is most effective in preventing opioid addiction.

Results

This integrative literature review includes thirteen articles, each selected to help determine which prescriber-based opioid prevention strategy most effectively reduces opioid abuse. Of the thirteen articles included in this review, five articles assessed the efficacy of prescription drug monitoring programs, four articles measured the results of risk assessment screening tools and four articles evaluated the efficacy of prescriber continuing education.

Prescription Drug Monitoring Programs

Prescription drug monitoring programs (PDMPs) have four effects on the opioid epidemic. First and foremost, prescription drug monitoring programs result in a statistically significant reduction in prescribing and overall use of opioids. Alexander et al. (2016) showed that the implementation of a PDMP in the state of Florida (as compared to the control state of Georgia) decreased opioid prescriptions by 1.4%, decreased opioid volume by 2.5% and decreased the morphine milligram equivalent by 5.6%. The Reisman, Shenoy, Atherly, & Flowers (2009) research yielded similar results. They looked at states with active and stable PDMPs between the years 1997-2003. Because oxycodone use correlates highly with opioid abuse (compared to morphine or hydrocodone) they focused on rates of oxycodone prescription. Their research showed that states with PDMPs saw lower rates of oxycodone prescription and lower correlating rates of prescription opioid abuse admissions to hospitals.

Second, PDMPs impact prescribing/dispensing behaviors. Norwood & Wright (2016) used a cross sectional study to analyze whether the use of a PDMP would impact pharmacist dispensing patterns. Their paper demonstrated that consistent use of PDMPs made a change in dispensation practice 6.4 times more likely and refusal of dispensation 3.3 times more likely. Additionally, the Indiana state annual rate of refused dispensation increased from 7 to 25. Furthermore, Alexander et al. (2016) showed that the providers most impacted by using PDMPs were those with the highest baseline prescribing patterns.

Third, PDMPs can be used to assess addiction in patients and better understand which patients run the risk of high exposure to prescription opioids. Individuals with mental health issues often have a dual diagnosis (of substance abuse and a mental health disorder), thus, the opioid epidemic affects these individuals disproportionately. Using a PDMP, Hackman et al. (2015) found that 57% of patients receiving care at a mental health clinic in Indiana received a prescription for opioids. This number far exceeds the average number of individuals receiving opioid prescriptions nationwide. Additionally, they found that a higher number of prescriptions per patient significantly increased the odds of an opioid dependence diagnosis.

Finally, PDMPs have successfully demonstrated a correlation between high risk prescribers and patient overdoses. Ringwalt et. al (2015) utilized death records in conjunction with a PDMP to establish a connection between aberrant prescribing practices and opioid overdoses. Their research showed that overdoses often resulted from providers who prescribed: "(1)benzodiazepines in conjunction with high levels (100 MMEs) of opioids, (2) opioids regardless of dose, (3) high level opioids, and (4) benzodiazepines" (Ringwalt et. al, 2015, pg.293).

Risk Assessment Screening Tools

All four articles that evaluated risk assessment screening tools concluded that they

demonstrate a strong ability to predict, identify and potentially mitigate the risk of opioid abuse.

Aldridge, Linford, & Bray (2017) showed that using the Screening, Brief Intervention Referral to

Treatment (SBIRT) tool reduced illicit drug use by 78.5%. While the tool used in the article by

Barclay, Owens, & Blackhall (2014) differed from the SBIRT, it demonstrated similarly striking

results. Barclay, Owens, & Blackhall (2014) analyzed the Opioid Risk Tool (ORT). The ORT

showed that high risk scores from the screening tool strongly predicted abnormal urine drug

screens. For example, only 7% of people who scored low on the ORT had abnormal drug tests

as compared to the 62.5% of people who scored high on the ORT with abnormal drug test. Olivia

et al. (2017) found that using applied informatics, STORM (a screening tool) could predict 50%

of the patients that could potentially have an overdose or drug related suicide event in a given

year.

Prescriber Continuing Education

Three of the four articles that evaluated prescriber continuing education concluded that it

yielded little to no statistically significant effect on opioid prescribing rates. Holliday et al.

(2017) showed that some providers demonstrated an initial decrease in opioid prescribing but

that those decreases were not sustained. Kahan et al. (2013) determined that continuing

education had no effect on initial nor long term prescribing rates. The research published by

Osborn, Yu, Vasilyadis, Craig, & Blackmore (2017) was an exception, showing a significant

reduction in prescribing rates. This study combined a mandated department wide policy change

in opioid prescribing (based on the Washington E.D. Opioid Abuse Work Group guidelines) with

a continuing education. Prescribers were taught the new guidelines and researchers then looked

at prescribing rates pre-and post-intervention. Not only did the intervention reduce opioid

prescriptions by 39% but the reductions were sustained long term.

Discussion

Findings

This paper aimed to understand which strategy to decrease opioid addiction would

produce the greatest reduction in opioid prescribing and/or abuse rates. Based on interpretation

of the results, the strategies have the greatest to the least impact in the following order: 1) risk

assessment screening tools 2) prescription drug monitoring programs, and 3) prescriber

continuing education.

Risk assessment screening tools showed the most promise in combating the opioid

epidemic as all four articles that looked at this intervention strategy reported *statistically*

significant outcomes. One study showed reductions as high as 78.5% in substance abuse.

Another study showed a *significant* correlation between high risk scores on an opioid risk

screening tool and subsequent abnormal drug screens. Two studies didn't report a direct

reduction in opioid abuse, however, they demonstrated a strong ability to predict which patients

were susceptible to opioid abuse. With this knowledge, providers could alter prescribing

practices and make treatment referrals accordingly, ultimately reducing opioid abuse.

One limitation to drawing definitive conclusions regarding the efficacy of risk assessment

screening tools is that each study used different screening tools. At least three different risk

assessment screening tools (STORM, ORT, and SBIRT) were used by the researchers. Each of

these screening tools produced different results, so while overall, we know that screening tools

have produced successful outcomes, we do not know what accounts for the differences between the outcomes. Did STORM as a screening tool outperform the ORT or was the study that utilized STORM designed better? Using a standardized screening tool could strengthen this research and allow for easy replication.

Prescription drug monitoring programs showed a smaller direct impact on opioid abuse than risk assessment screening tools. Decreases in opioid use were more modest using PDMPs, with some figures only as high as about 5%. However, PDMPs can help indicate which providers have risky prescribing practices. Providers with risky prescribing practices can greatly increase the risk of opioid dependence and overdose. Ringwalt et. al (2015) demonstrated that between 30-45% of providers with the riskiest prescribing patterns had prescribed an opioid analgesic to a patient within 30 days of his or her death. Additionally, PDMPs can be used to flag patient at risk for multiple opioid prescriptions. While PDMPs suggest more modest outcomes in relation to direct opioid abuse reduction, their other benefits probably indirectly reduce opioid abuse substantially.

PDMP results had limitations as well. Studies did not use consistent subjects in their interventions. Looking at the five articles examining PDMPs, two articles used states as their subjects. One article examined multiple states pre-and post-implementation of a PDMP, and the other examined one state using a PDMP (Florida) against a control state (Georgia). The other articles evaluated the efficacy of using a PDMP but varied their subjects (pharmacists, patients with dual diagnoses, etc).

Prescriber education, although seeming to have little impact on opioid addiction, can be effective when combined with a mandated policy change. Osborn, Yu, Vasilyadis, Craig, &

Blackmore (2017) showed that by using recommended guidelines to mandate a policy change

department wide in an E.D., they reduced opioid prescriptions by 39% in that E.D. The state of

Ohio saw similar results after creating policy changes surrounding opioid prescribing. According

to Penm et al. (2017), the governor of Ohio created the Governor's Cabinet Opiate Action Team

(GCOAT) in 2011, which had three goals: 1) to promote the responsible use of opioids, 2) to

reduce the supply of opioids, and 3) to support overdose prevention and expand access to

naloxone. In order to achieve this goal, they released prescribing guidelines encouraging

practitioners to consider non-opioid therapies first. In 2015, four years after implementing these

guidelines, the state of Ohio saw 81 million fewer doses of opioids dispensed than in 2011

(Penm et al., 2017).

Limitations

The lack of evidence based research on opioid prevention strategies limited the scope of

this paper substantially and represents the largest barrier to formulating concrete solutions to the

opioid epidemic. Even finding thirteen articles that fit within the search criteria proved to be

difficult. A larger pool of relevant literature would strengthen this integrative literature review.

As discussed in the findings section, another barrier of this integrative literature review

was the lack of consistency in subjects and study design. This was further complicated by the

fact that within each category of prevention strategy, interventions varied significantly. This

made standardizing the results into an average percentage for each overall strategy impossible.

Nursing Implications

This integrative literature review identifies a critical knowledge gap that needs to be

researched in order to effectively combat the opioid crisis. Emergency department nurses and

psychiatric nurses occupy a particularly relevant position in that they have the most contact with

patients who abuse opioids. This gives these nurses specialized knowledge and the ability to

conduct research on the topic given the frequency of their contact with this population. As nurses

strive to increase their participation in research, this presents an opportunity for nurses to

conduct research in an urgently needed area.

This research also carries the implication of advocacy. Based on the finding of this

integrative literature review, utilizing PDMPs, screening tools, and mandated policy changes

surrounding the prescribing of opioids all suggest the ability to decrease opioid abuse. To best

support patients, nurses must advocate for policies that will decrease negative outcomes, such as

those listed above.

Recommendations for Future Research

At this point, people understand the gravity of the opioid epidemic but don't seem to have

concrete solutions to combat it. In conducting research for this paper, it became clear that

evidence based research to support the use of a specific strategy to combat the opioid epidemic is

lacking. Considering that risk assessment screening tools and using mandated prescribing policy

changes showed promising results, these strategies require further investigation on a larger scale.

Osborn, Yu, Vasilyadis, Craig, & Blackmore (2017) saw great outcomes from their study on

prescriber continuing education combined with mandated policy change. That study used only a

single hospital emergency department. Replicating this study on a larger scale, by using two

cities of comparable size and demographics, could substantiate the use of that specific strategy.

For example, San Antonio and Austin have very similar demographics and a relatively similar

population size. San Antonio could implement a policy city-wide that all prescribers must use a

screening tool before prescribing opioids to all patients and implement guidelines on prescribing such as those used in the aforementioned study. Pre-and post-policy prescribing for both cities could then be compared to analyze this strategy on a larger scale.

Conclusion

This paper operates within the framework of Nola Pender's Health Promotion, specifically under the assumption that health professionals can greatly affect their patients. As such, recommendations to combat the opioid crisis are directed toward changes in prescriber behavior as opposed to patient behavior. Opioid risk assessment screening tools and mandated policy changes for opioid prescribing practices show great promise to decrease the epidemic of opioid abuse sweeping across the U.S.

References

Aldridge, A., Linford, R., & Bray, J. (2017). Substance use outcomes of patients served by a

large US implementation of Screening, Brief Intervention and Referral to Treatment

(SBIRT). *Addiction*, *112*, 43-53. doi:10.1111/add.13651

Alexander, G., Change, H., Daubresse, M., Faul, M., Lyapustina, T., Richey, M., & Stuart, E.

(2016). Impact of prescription drug monitoring programs and pill mill laws on high-

risk opioid prescribers: A comparative interrupted time series analysis. *Drug and Alcohol*

Dependency, 165, 1-8. doi: 10.1016/j.drugalcdep.2016.04.033

Alford, D., Zisblatt, L., Hayes, S., Peloquin, S., Hardesty, I. & White, J. (2015), *SCOPE of Pain*:

An Evaluation of an Opioid Risk Evaluation and Mitigation Strategy Continuing

Education Program. Pain Med. doi:10.1111/pme.12878

Barclay, J., Owens, J., & Blackhall, L. (2014). Screening for substance abuse risk in

cancer patients using the Opioid Risk Tool and urine drug screen. *Supportive Care In*

Cancer, *22*(7), 1883-1888. doi:10.1007/s00520-014-2167-6

Barnett, M., Olenski, A., & Anupman, J. (2017) Opioid-Prescribing Patterns of Emergency

Physicians and Risk of Long-Term Use. *New England Journal of Medicine, 376.*

Retrieved from: http://www.nejm.org/doi/full/10.1056/NEJMsa1610524#t=abstract

Bogdanowicz, K., Stewart, R., Chang, C., Downs, J., Khondoker, M., Shetty, H., Strang, J., ...

Hayes, R. (2016). Identifying mortality risks in patients with opioid use disorder using

brief screening assessment: Secondary mental health clinical records analysis. *Drug and*

Alcohol Dependence, 164(3), 82-88. doi: 10.1016/j.drugalcdep.2016.04.036

Center for Disease Control and Prevention. (2016). *Understanding the epidemic* [Data file].

Retrieved from: https://www.cdc.gov/drugoverdose/epidemic/index.html

Chaudhary, S., & Compton, P. (2017). Use of risk mitigation practices by family nurse

practitioners prescribing opioids for the management of chronic nonmalignant

pain. *Substance Abuse*, *38*(1), 95-104. doi:10.1080/08897077.2016.1265038

Chen, J., Humphrey, K., Shah, N., & Lembke, A. (2015) Distribution of opioids by different

types of Medicare providers. *JAMA Intern Med, 176.* Retrieved from:

doi:*10.1001/jamainternmed.2015.6662*.

Florence, C., Xu, L., & Zhou, C. (2016). The economic burden of prescription opioid overdose,

abuse and dependence in the United States, 2013. *Med Care, 54,* 901-906. doi:

10.1097/MLR.0000000000000625

Hackman, D., Chambers, R., Greene, M., Wright, E., Fernandes, T., & Brown, A. (2014).

Prescription drug monitoring program inquiry in psychiatric assessment: Detection of

high rates of opioid prescribing to a dual diagnosis population. *Journal of Clinical*

*Psychiatry, 75(*7), 750-756. doi: 10.1111/ajad.12441

Hahn, K. L. (2011). Strategies to Prevent Opioid Misuse, Abuse, and Diversion That May Also

Reduce the Associated Costs. *American Health & Drug Benefits*, *4*(2), 107–114.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4106581/

Hahn, J., & Cataldo, L. (2012). Opioids and Related Disorders. In K. Key (Ed.), *The Gale*

Encyclopedia of Mental Health (3rd ed., Vol. 2, pp. 1077-1082). Detroit: Gale. Retrieved

from http://link.galegroup.com.ezproxy.depaul.edu/apps/doc/CX4013200331/GVRL?u=depau&sid=GVRL&xid=c18bf8c8

Holliday, S., Hayes, C., Dunlop, A., Morgan, S., Tapley, A., Henderson, K.,...Magin, P. (2017).

Does brief chronic pain management education change opioid prescribing rates? A

pragmatic trial in Australian early-career general practitioners. *Pain, 158(2*), 278-288.

Kahan, M., Gomes, T., Juurlink, D. N., Manno, M., Wilson, L., Mailis-Gagnon, A., Srivastava,

A., ... Mamdani, M. (2013). Effect of a course-based intervention and effect of medical

regulation on physicians' opioid prescribing. *Canadian Family Physician, 59(*5), 231-239.

Retrieved from: http://depaul.worldcat.org.ezproxy.depaul.edu/oclc/19415534322126

Lembke, A. (2016). *Drug dealer, MD*. Baltimore: Johns Hopkins University Press.

Murdaugh, C., Parsons, M., & Pender, N. (2002). *Health promotion in nursing practice*.

Upper Saddle River, NJ: Pearson Education, Inc.

Norwood, C., & Wright, E. (2016). Integration of prescription drug monitoring programs

(PDMP) in pharmacy practice: Improving clinical decision-making and supporting a

pharmacist's professional judgment. *Research in Social & Administrative Pharmacy,

12(2), 257-66*. doi: 10.1016/j.sapharm.2015.05.008.

Oliva, E., Bowe, T., Tavakoli, S., Martins, S., Lewis, E., Paik, M., &Trafton, J. (2017).

Development and applications of the Veterans Health Administration's Stratification

Tool for Opioid Risk Mitigation (STORM) to improve opioid safety and prevent

overdose and suicide. *Psychological Services*, *14*(1), 34-49. doi:10.1037/ser0000099

Osborn, S., Yu, J., Williams, B., Vasilyadis, M., & Blackmore, C. (2017). Changes in

provider prescribing patterns after implementation of an emergency department

prescription opioid policy. *Journal of Emergency Medicine, 5(*4), 538-546. doi:

https://doi.org/10.1016/j.jemermed.2016.07.120

Park, A. (2017, Jan 24). Opioids: The story behind the viral photo of an overdose. *Time*

Magazine. Retrieved from: http://time.com/4634809/photo-opioid-addiction/

Penm, J., MacKinnon, N. J., Boone, J. M., Ciaccia, A., McNamee, C., & Winstanley, E. L.

 (2017). Strategies and policies to address the opioid epidemic: A case study of

 Ohio. *Journal of the American Pharmacists Association : JAPhA*, *57*(2), S148–S153.

 http://doi.org/10.1016/j.japh.2017.01.001

Reisman, R., Shenoy, P., Atherly, A., & Flowers, C. (2009). Prescription Opioid

 Usage and Abuse Relationships: An Evaluation of State Prescription Drug Monitoring

 Program Efficacy. *Substance Abuse: Research & Treatment,* 3, 41-51. Retrieved from

 http://depaul.worldcat.org.ezproxy.depaul.edu/oclc/4592348167

Richter, L., Kunz, K., & Foster, S. (2015). A public health approach to prevention: The health

 professional's role. *Principles of Addiction Medicine: The Essentials, 2, 1-7.*

 Philadelphia: American Society of Addiction Medicine.

Ringwalt, C., Schiro, S., Shanahan, M., Proescholdbell, S., Meder, H., Austin, A., & Sachdeva,

 N. (2015). The use of a prescription drug monitoring program to develop algorithms to

 identify providers with unusual prescribing practices for controlled substances. *The*

 Journal of Primary Prevention, 36 (5), 287-299.

Russell, C. (2016). An Overview of the Integrative Research Review. *Progress in*

 Transplantation, 15, 1, 8-13. Retrieved from

 http://depaul.worldcat.org.ezproxy.depaul.edu/oclc/6925842007

State of Illinois, Advisory Council on the Illinois Opioid Crisis Response. (2017). State of

Illinois Opioid Action Plan. Retrieved from

http://dph.illinois.gov/sites/default/files/publications/Illinois-Opioid-Action-Plan-Sept-6-

2017-FINAL.pdf

The National Center on Addiction and Substance Abuse. (2017). *Ending the opioid crisis: A*

practical guide for state policymakers. Retrieved from

https://www.centeronaddiction.org/addiction-research/articles/public-health-approach-

prevention-health-professional%E2%80%99s-role

Appendix

Figure 1. Flow chart of study selection for prescriber continuing education.

Number of studies found using keywords

PubMed N= 208

CINAHL N= 222

Number of studies meeting inclusion criteria

101

63

Number of studies after excluding duplicates

93

55

Number of studies after using exclusion criteria

2

2

Number of studies selected based on total content

4
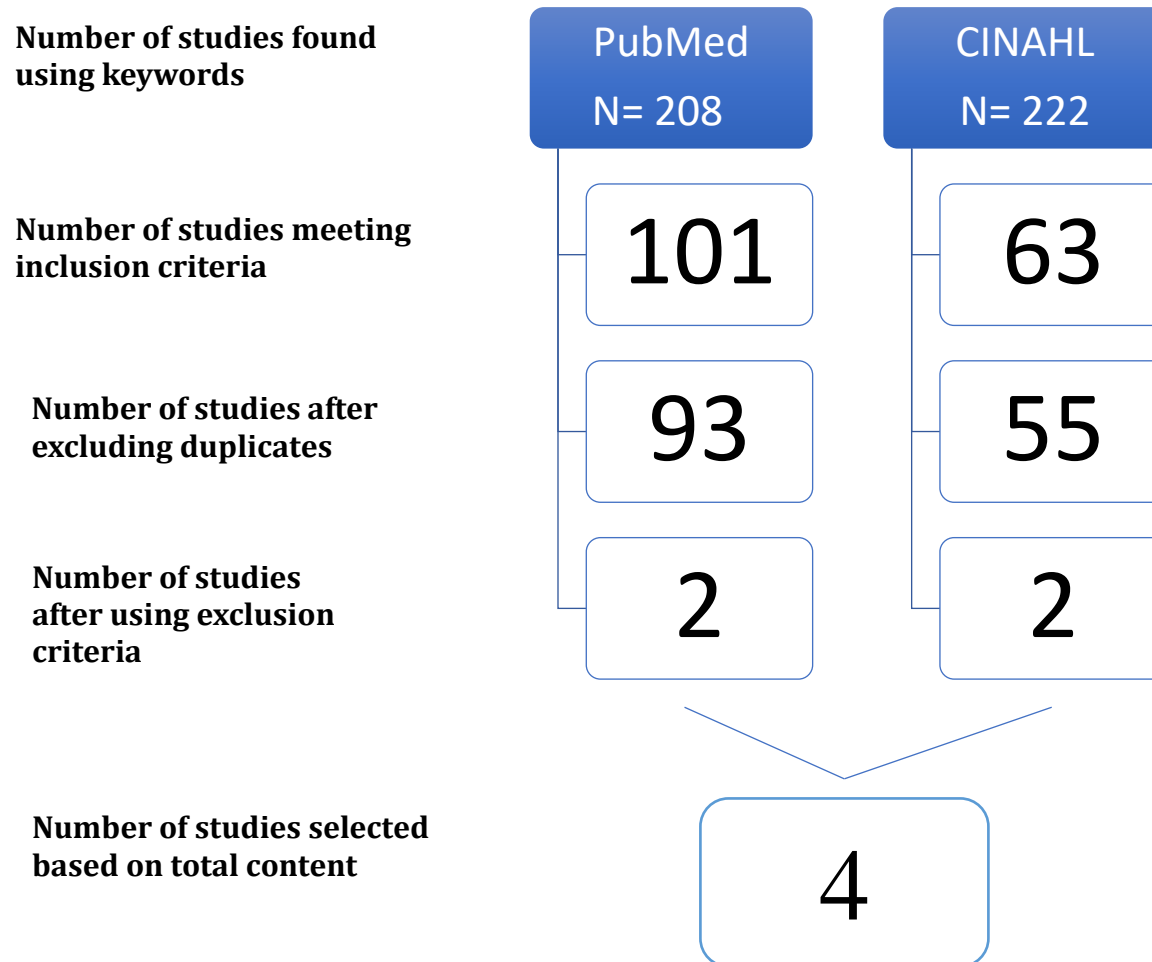
Figure 2. Flow chart of study selection for prescription drug monitoring programs.

Number of studies found
using keywords

Number of studies meeting
inclusion criteria

Number of studies after
excluding duplicates

Number of studies
after using exclusion
criteria

Number of studies selected
based on total content

PubMed N= 156	CINAHL N= 13
99	12
92	5
4	1

5
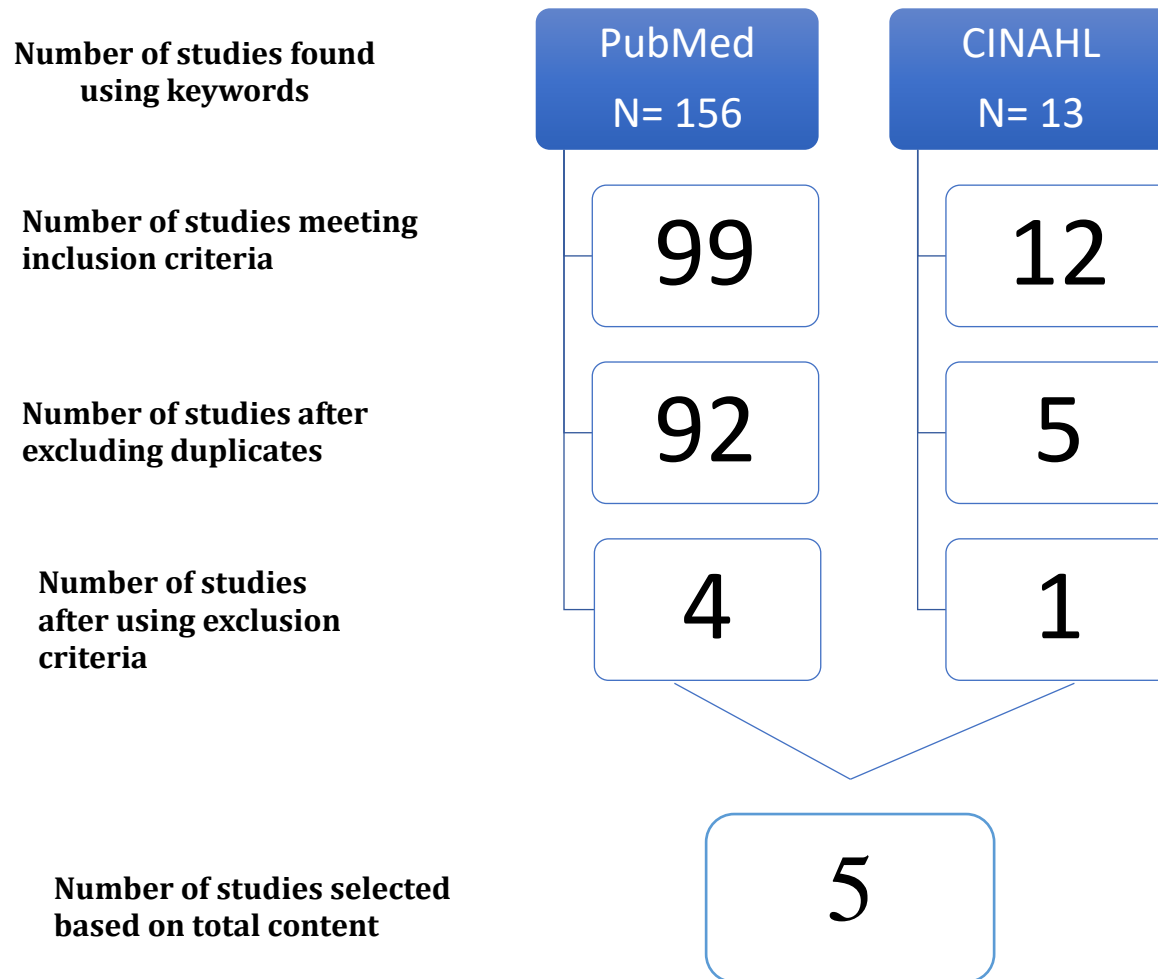
Figure 3. Flow chart of study selection for risk assessment screening tools.

Number of studies found using keywords

Number of studies meeting inclusion criteria

Number of studies after excluding duplicates

Number of studies after using exclusion criteria

Number of studies selected based on total content

PubMed N= 98	ProQuest N= 20
49	15
47	13
4	0

4
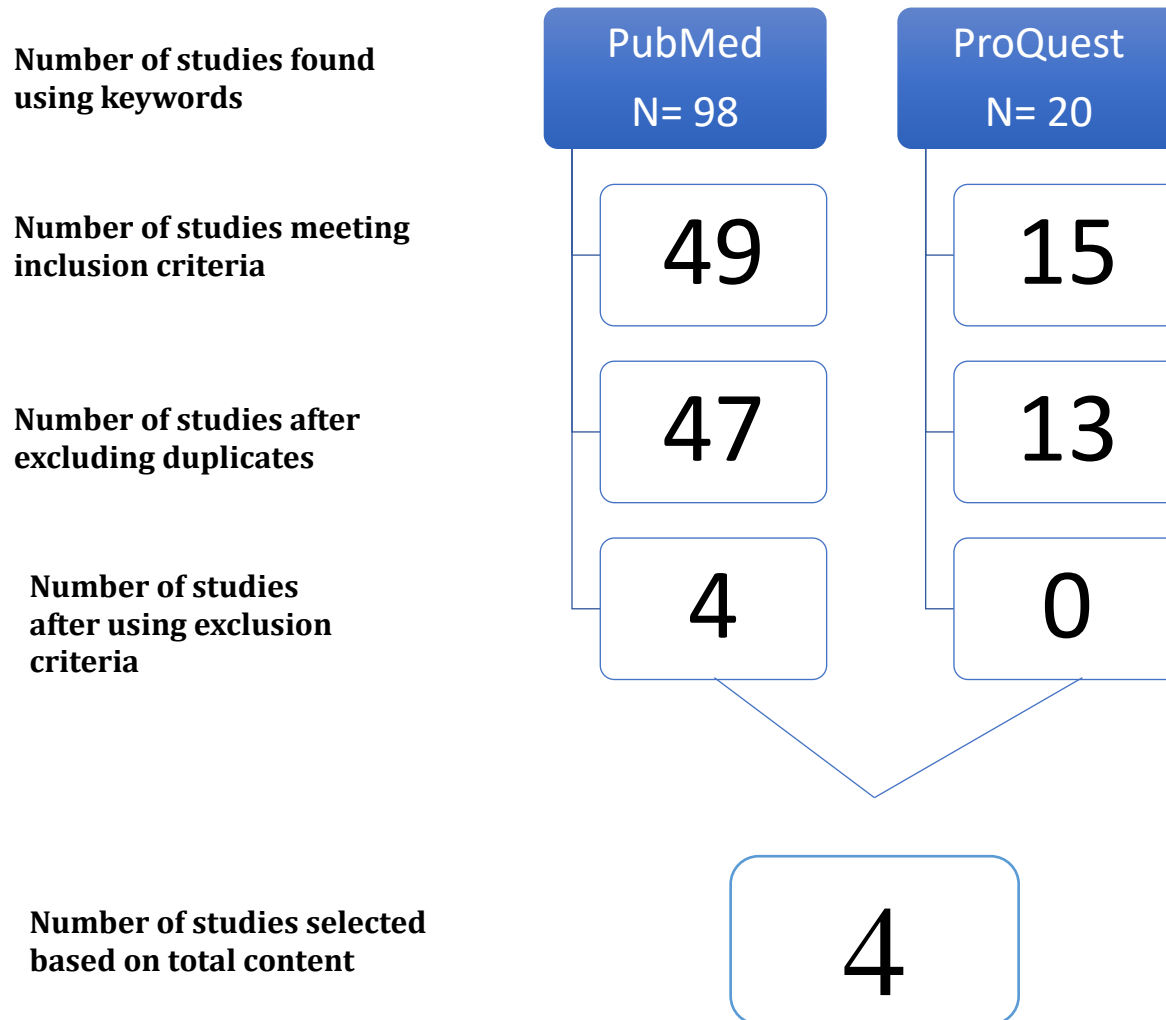
Data Tables

Table 1
Summary of studies on the efficacy of prescription drug monitoring programs.

Reference	Purpose	Research Question	Sample	Method	Prevention Strategy	Results
Alexander et al. (2016)	To quantify the effect of Florida's PDMP and pill mill laws on overall and high-risk opioid prescribing and use.	Will the use of a PDMP decrease opioid prescribing and/ or use?	Cohort of prescribers, retail pharmacies and patients in Florida (compared to control state Georgia)	Measured total opioid volume, mean morphine milligram equivalent (MME) per transaction and mean days' supply per transaction	Prescription drug monitoring program	Resulted in a modest decrease in prescribing and use. Largest decrease in prescribers and users with highest baseline prescribing and use. 1.4% decrease in opioid prescriptions, 2.5% decrease in opioid volume, 5.6% in MME per transaction
Hackman et al. (2014)	To better understand the link between patients receiving dual diagnosis (mental health and substance abuse) treatment and prior opioid prescriptions using a PDMP.	Do patients receiving treatment for a dual diagnosis have a history of receiving opioid prescriptions within the last year?	Patients in an Indiana-based community mental health center, receiving treatment for a dual diagnosis. N= 201	Double blind evaluation compiling information for a 12-month period. Researchers gathered data from the mental health clinic's electronic records while also gathering data from the Indiana PDMP.	Prescription drug monitoring program	PDMPs can be used to assess high exposure to prescription opioids. Especially considering most patients in the study had been prescribed opioids within the last year, many with a benzo simultaneously prescribed.
Norwood & Wright (2016)	Examine how the integration and consistent use of a PDMP in pharmacy practice impacts pharmacists' dispensing practices related to CSPs.	Will the integration of PDMPs in pharmacy practice improve a pharmacist's ability to make informed clinical decisions and exercise sound professional judgment?	Pharmacists in the state of Indiana. The sample accurately represents the pharmacist workforce with regards to age, experience and gender. N= 1,582	Cross sectional study conducted through a study sent to over 10,000 pharmacists in Indiana state. The study measured three outcome variables: (1) dispensation change, (2) refused dispensations, (3) and annual refusals.	Prescription drug monitoring program	May improve a pharmacist's ability to make informed clinical decisions and exercise sound professional judgment. Dispensation change was 6.4 times more likely. Refused dispensations were 3.3 more likely with use of PDMP. Annual refusals for providers using PDMP were about 25 compared to 7.

Reisman, Shenoy, Atherly, & Flowers (2009)	Examine the link between state medical shipments of prescription opioids and prescription opioid abuse admissions. Evaluate efficacy of PDMPs.	Do PDMP decrease amount of oxycodone shipment and/or prescription opioid abuse admissions?	States with active and stable PDMPs during the years 1997-2003. These states included: CA, HI, IL, IND, MA, MI, NY, OK, TX, ID, KY, NV, RI, & UT.	Retrospective ecological cohort study that compares state prescription opioid shipments for medical use and abuse admissions for prescription opioids.	Prescription drug monitoring program	States with PDMPs saw lower rates of opioid (oxycodone) shipments and prescription opioid abuse admissions. Furthermore, patients admitted to drug rehab in PDMP states were usually not there for prescription opioids.
Ringwalt et al. (2015)	Use metrics and PDMP to identify prescribers with unusual or uncustomary prescribing practices	Do providers who over-prescribe controlled substances contribute to the opioid epidemic?	Providers registered in the North Carolina Prescription Drug Monitoring Program.	Researchers used death records from the state's vital records database and linked them with providers who wrote prescriptions to patients who then died of a medication or drug overdose within 30 days	Prescription drug monitoring program	High correlation between prescribers of controlled substances, who co-prescribed benzodiazepines and high levels of opioid analgesics to their patients and patient overdose/ death.

Table 2
Summary of studies on the efficacy of risk assessment screening tools.

Reference	Purpose	Research Question	Sample	Method	Prevention Strategy	Results
Aldrige, Linford, & Bray (2017)	Compare substance use behaviors before completing a screening tool and after to assess for differences. Also to provide some criticism for a previously conducted study about screening tools.	Will utilizing a Screening, Brief Intervention Referral to Treatment (SBIRT) tool change substance use behaviors when analyzed before and after completion?	Patients utilizing providers who received the US Substance Abuse and Mental Health Services Administration (SAMHSA) grant to implement SBIRT in practice. N= 17,575 patients with	Organizations using the SBIRT provided data for patients with substance abuse. Pre-SBIRT and 6-months post-SBIRT data was collected and compared for 17,575 patients.	Risk Assessment Screening Tool	Significant decreases in substance abuse were found in post-SBIRT patient data. Illicit drug use decreased by 75.8%. Furthermore, the intensity of the intervention has a proportionate relationship with success of substance abuse prevention.

			substance abuse.			
Barclay, Owens, & Blackhall (2014)	To assess whether risk factors for substance abuse could predict abnormal urinalysis results.	Do risk factors indicated in the Opioid Risk Tool predict subsequent abnormalities in drug urine panels amongst cancer patients receiving palliative care?	Cancer patients at the University of Virginia palliative care clinic, receiving care in the month of September, 2012. N=114	Electronic medical records of patients were analyzed to compute an Opioid Risk Tool (ORT) score and scores were recorded. OPT scores were then compared to results of urine drug screens to examine any correlation between a predicted high risk and abnormal drug screen.	Risk Assessment Screening Tool	High risk scores from the OPT strongly predicted abnormal urine drug screens. Only 7% of people who scored low-risk on the OPT had abnormal drug test results. However, 62.5% percent of people who received medium-high risk scores had abnormalities in their drug screen.
Bogdanowicz et al. (2016)	To examine the efficacy of addiction-specific risk screenings in predicting high mortality risk groups.	Do addiction specific brief risk screening tools effectively identify high mortality risk groups?	Inhabitants of South London and Maudsley, that were identified as having an opioid use disorder (OUD). Patients were identified during the time period between April, 2008 to 31st March, 2014. N=4,488	Patient with an OUD were identified in the case register database. Information for each patient was used to complete a risk assessment on them. After completing this data, death certificates were searched in the Office for National Statistics General Records Office to see if any of these patients had died of an overdose.	Risk Assessment Screening Tool	"Diagnosis-specific brief risk screening can identify OUD patient subgroups at increased risk of all-cause and overdose mortality."
Oliva et al. (2017)	To analyze opioid abuse risk factors and mitigation practices by using the Stratification Tool for Opioid Mitigation Risk (STORM)	Does STORM accurately indicate and prioritize patients that display opioid abuse risk factors?	Patients utilizing the VHA who received a prescription for opioids during the 2010 fiscal year. N= 1,135,601	Use electronic medical records from the VHA to estimate risk. STORM risk factors include: demographics, previous overdose/suicide information, prescription strength and concurrent sedative medications, substance abuse and mental health disorders. This information was used	Risk Assessment Screening Tool	STORM analysis results indicate that informatics can be successfully used to identify and mitigate the risk of opioid abuse and/or overdose. "For example, the mean risk score among the 1,000 patients with the highest risk scores was 57.9 with 53.7% (approximately 1 out of

				to calculate patient scores.		every 2 patients in this group having an overdose or suicide related event)"

Table 3

Summary of studies on the efficacy of prescriber continuing education.

Reference	Purpose	Research Question	Sample	Method	Prevention Strategy	Results
Holliday et al. (2017)	To fill current knowledge gap: objectively analyze the effect of education for pain management on opioid prescribing rates.	Will providing education about pain management to physicians affect "real-world practice behavior" of prescribing opioids?	Registrars (the Australian equivalent to medical residents) in 5 regional training providers (RTP). One RTP was the experimental group that received the training and the other 4 RTPs were the control. N=849. Of the 849, 42 received the training.	A nonequivalent control group design nested within an ongoing cohort study was used. A training workshop was provided to all registrars in a single regional training center. After the training, opioid prescriptions were monitored to assess for changes as compared to the control group. The control group was comprised of registrars at different regional training centers that did not receive the educational training.	Prescriber continuing education	No significant effect on opioid prescribing rates after providers completed continuing education compared to control groups. There was a slight decrease in *initial* opioid prescriptions after the training but the training failed to increase overall opioid cessation.
Kahan et al. (2013)	To evaluate whether a two-day intensive course on opioid prescribing effectively reduces the amount of opioid prescriptions written by providers.	Will a statistically significant effect on opioid prescribing patterns by observed after providers complete a two-day intensive training on opioid prescribing?	Physicians based in Ontario that complete the two-day intensive training course between the years 2000-2008. 61% self-referred, 39% referred by the College of Physicians and Surgeons in Ontario (CPSO). N =138.	Population-based retrospective cohort study. Physicians who took the course were matched with a control group of physicians who did not take the course. The course covered information on chronic pain, interviewing techniques, prescribing, and addiction. Using broken-line longitudinal regression, total amounts of opioids dispensed were calculated for both the	Prescriber continuing education	There was not an immediate (1 year) nor long term (2 years) reduction in opioid prescribing rate when comparing the experimental group to the control group. One exception to this was with the physicians referred by the CPSO. This subgroup demonstrated a decline in opioid prescribing rate to young patients in both the immediate and long term categories.

				experimental and control group.		
Alford, Hayes, Zisblatt, Peloquin, Hardesty, & White (2015)	To assess the efficacy of the Safe and Competent Opioid Prescribing Education (*SCOPE of Pain*) program on prescriber knowledge, attitudes, confidence, and self-reported clinical practice in safe opioid prescribing.	Will undergoing *SCOPE of Pain* training alter provider's knowledge, attitude, confidence and self-reported safe opioid prescribing patterns?	Participants who completed the *SCOPE of Pain* training between the years 2013-2014. This study focused on providers who manage chronic pain such as physicians, physician assistants, and nurse practitioners. N=2,850 (complete first two surveys) N=476 (completed all 3 surveys)	Participants included in the survey completed the *Scope of Pain* training. They completed pre, immediate post program, and 2 month post program self-reported quantitative assessment surveys. Surveys included questions about knowledge, confidence, attitude, and clinical performance (prescribing). Paired *t*-tests were used to establish change in clinical practice two months after participation.	Prescriber continuing education	The SCOPE "Improved clinician-level safe opioid prescribing outcomes, however, its impact on mitigating opioid misuse risk and harm while maintaining access to opioids for those that are or would benefit remains an unanswered question."
Osborn, Yu, Williams, Vasilyadis, Craig, & Blackmore (2017)	To determine how the implementation of a prescription policy for opioids effects overall opioid prescribing patterns in an emergency department (ED) .	Will a collaborative staff educational initiative to train ED providers on new opioid prescribing policies have a statistically significant effect on overall opioid prescribing patterns in the hospital ED?	Patients at an urban, non-university, teaching hospital in the Pacific Northwest. Participants were age 18 and older between 2007 and 2014. N= 116,676	Pre-intervention and post-intervention time series study in which the ED opioid prescribing rate was analyzed before the education on policy change and then after using. Policy changes were based on the Washington ED opioid abuse Work Group guidelines. Information about prescribing patterns was retrieved retrospectively from electronic medical records. The years 2007-2010 comprised the pre-intervention time frame and 2012-2014 was the post-intervention time frame.	Prescriber continuing education	The intervention resulted in a 39% decrease in patients discharged with an opioid prescription from the ED. Additionally, these changes in prescribing patterns were sustained when analyzed at a 2.5 year follow-up.