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Evaluation and optimization of take-home naloxone in an academic medical center

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Abstract

With the United States in the midst of an opioid overdose epidemic, efforts to reduce overdose deaths have increased. Expanding access to the opioid antagonist naloxone can combat the epidemic. A pilot project in a psychiatric hospital resulted in the development of a screening tool in the electronic medical record (EMR) to help pharmacists identify adult inpatients at high risk of opioid overdose. Pharmacists can facilitate these patients being discharged with take-home naloxone. The purpose of this project was to optimize the screening tool for nonpsychiatric adult inpatient areas. Prior to implementation, a team of pharmacists familiar with the screening tool and take-home naloxone met with stakeholders to assess need for modification of the tool, determine barriers to implementation, and provide insight into the new service. In addition to expanding the tool into nonpsychiatric areas, a morphine-equivalents calculator was developed to identify patients receiving at least 100 mg of morphine equivalents per day to capture an additional at-risk population. Four short educational videos were developed to provide training to pharmacists. Initial performance of the screening tool was evaluated in general medicine patients over a 5-day period. Out of 44 admissions, 8 (18.2%) screened positive. The majority of those patients (5/8, 62.5%) screened positive for morphine equivalents greater than 100 mg. Anecdotally, the educational videos have been well received by pharmacy staff. Opioid overdose risk factors can be applied to nonpsychiatric inpatients for screening purposes in the EMR. Educational videos can be used to disseminate information to pharmacists on take-home naloxone and opioid overdose.

Keywords: opioid overdose, naloxone, drug overdose, opioid analgesics, heroin, pharmacist

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Background

In 2016, there were more than 42 000 overdose deaths involving opioids in the United States, a value 5 times greater than in 1999.[1] Several strategies have been instituted to mitigate the epidemic, including optimizing opioid prescribing, treating patients with opioid use disorder, and expanding access to naloxone.[2,3]

Naloxone is an opioid antagonist that reverses the effects of an opioid overdose.[4] Since 2014, several devices containing naloxone have been approved by the Food and Drug Administration for management by bystanders.[5,6] Efforts have focused on expanding provision of

naloxone through several avenues, such as standing orders at outpatient pharmacies, community organization dissemination, and supply to first responders (eg, law enforcement, emergency medical technicians, paramedics).[7,8] These initiatives are largely outpatient focused, leaving room for increased efforts targeting inpatients prior to their discharge from the hospital.

A systematic review of take-home naloxone programs performed by McDonald and Strang[9] solidified that take-home naloxone reduces heroin overdose mortality in participants. Like several states, South Carolina has taken legislative action to increase access to take-home naloxone as a harm-reduction strategy. In 2015, the South Carolina Overdose Prevention Act[10] was passed, allowing for provision of take-home naloxone without liability for health care professionals. Despite this effort, distribution of take-home naloxone remains low.

Several documented factors that increase the risk of opioid overdose include use of illicit or prescription opioids, history of substance use disorders, comorbid mental illness, daily opioid doses greater than 100 mg of morphine equivalents, prescriptions for methadone, use of benzodiazepines or alcohol in conjunction with opioids, obtaining prescriptions from multiple providers and pharmacies, and recent emergency care related to opioids, among others.[11-16] Patients with recent abstinence from opioids for reasons such as incarceration, opioid detoxification, or abstinence-based programs are at increased risk as well.[11,17]

To characterize current prescribing patterns of naloxone at hospital discharge to patients at highest risk of opioid overdose, a retrospective review of 60 adult inpatients was previously performed at the Institute of Psychiatry, a stand-alone, 100-bed psychiatric hospital within the Medical University of South Carolina, a 700-bed academic medical center. Patients with an opioid use disorder diagnosis per the international classification of diseases, 10th revision, or through documentation in Epic 2017, the electronic medical record (EMR), met criteria for inclusion. Despite 90% of the cohort possessing at least 1 additional risk factor of overdose aside from current opioid use, only 5% of those patients received a prescription for naloxone upon discharge. Nearly 75% of the cohort had at least 2 additional active risk factors, and greater than half of patients had documented opioid use in combination with use of benzodiazepines, alcohol, or cocaine.[18]

Potential drivers of low naloxone prescribing rates include both underidentification of high-risk patients and lack of knowledge regarding take-home naloxone. Utilization of data from this review prompted the creation and implementation of a pharmacist-driven screening tool within the EMR of patients admitted to the psychiatric hospital to facilitate identification of patients at high risk of opioid overdose. This tool aimed to further optimize the prescribing of take-home naloxone at the time of discharge to patients at highest risk of opioid overdose. Although there are several published resources outlining the role of pharmacists in safe opioid prescribing and prevention of opioid overdose, including the Veteran Affairs Opioid Overdose Education and Naloxone Distribution Program, to our knowledge, this is the first pharmacist-driven screening tool to be created for automated use in the inpatient EMR in the non-Veteran Affairs setting.[19-23]

Specific opioid overdose risk factors or surrogate markers (eg, clinical opiate withdrawal scale [COWS] as a marker for opioid detoxification leading to decreased tolerance) that can be retrieved without manual chart review in the EMR were chosen for the initial screening tool. These include an order for COWS, opioid-related diagnoses in the problem list, urine drug screen positive for methadone, a current prescription for methadone or buprenorphine, or prior-to-admission prescriptions for a long-acting opioid formulation. Patients with 1 or more of these risk factors documented in the EMR were considered high risk and automatically screen positive. Pharmacists subsequently review each positive patient through a flag that appears by the patient's name in the electronic patient list. This secondary review focused on those risk factors requiring manual chart review, such as use of alcohol in conjunction with opioids.

In order to further increase access to take-home naloxone to patients with additional risk factors aside from history of substance use disorders and mental illness, the current project was designed to evaluate, optimize, and expand the pharmacist screening tool to nonpsychiatric areas within our institution. Secondarily, this project aimed to provide education to pharmacists previously unfamiliar with take-home naloxone.

Methods

Prior to implementation within nonpsychiatric areas, a team of psychiatric pharmacists familiar with the screening tool and take-home naloxone met with stakeholders to assess need for modification of the tool, determine barriers to implementation, and provide insight into the new service. These stakeholders included clinical pharmacists in specialty areas, such as hematology/oncology, critical care, and internal medicine. Additionally, stakeholders representing the hospital's outpatient pharmacies were included to determine logistics related to the dispensing of take-home naloxone at the time of hospital discharge. Pharmacy department stakeholders identified

TABLE 1: Example positive screen in electronic medical record

Naloxone Screen: 1 point			
The patient received a score of 0: the patient has 0 inpatient and 0 outpatient order(s) for buprenorphine or methadone, 0 urine drug screen positive for methadone, 0 order(s) for clinical opioid withdrawal scale			
Patient has an opioid related diagnosis: 0 points			
MEDD greater than or equal to 100 mg: 1 point			
Total score of 1: the patient has 392 mg daily morphine equivalent dose from prescriptions			
Order Name	**Dose, mg**	**Frequency, h**	**Maximum mg MEDD**
Hydromorphone 4 mg tablet	8	Every 4 (as needed)	192
Morphine extended release 100 mg tablet	100	Every 12 (scheduled)	200

MEDD = morphine equivalent daily dose.

key physician stakeholders to include in the discussion for the tool through email correspondence.

Initial performance of the modified screening tool to determine appropriateness of positive screens was evaluated via manual chart review of patients on 2 general medicine treatment teams over a 5-day period in April 2018. This cohort of patients was identified to represent a typical clinical pharmacist patient load at the institution. In addition to the number and cause for positive screens, sex, age, admitting diagnosis, and length of stay were collected during the review period. Descriptive statistics were used to describe the results.

Four short educational videos were developed by the team of pharmacists using Panopto™ software (version 5.6.0.39548; Seattle, WA) to provide training to the pharmacy department on assessing patient risk factors, recommending naloxone to treatment teams, and providing patient education.

TABLE 2: General medicine patient demographics and positive screen information

Demographic (n = 44)	Value
Male, n (%)	21 (47.7)
Mean age, y (interquartile range)	62.1 (23.5)
Admitting diagnosis, n (%)	
Other	15 (34.1)
Infection	11 (25)
Respiratory	11 (25)
Cardiovascular	7 (15.9)
Median length of stay, d (range)	6 (1-77)
Total positive screens	8
Discrete variable screening positive, n (%)	
Outpatient daily morphine equivalents ≥100 mg	5 (62.5)
Order for clinical opiate withdrawal scale	2 (25)
Order for methadone or buprenorphine	1 (12.5)
Opioid-related diagnosis	1 (12.5)
Urine drug screen positive for methadone	0 (0)

This project was deemed to be quality improvement and, therefore, did not require institutional review board approval.

Results

The preimplementation stakeholder meeting identified needed modifications to the initial screening tool. Optimization of the tool required the addition of a morphine-equivalents calculator to identify patients receiving at least 100 mg of morphine equivalents per day to capture a key additional at-risk population within the medical setting. The discrete variable "long-acting opioid formulation prescriptions" included in the original screening tool was replaced with the morphine-equivalents calculator to provide better assessment of risk and avoid alert fatigue. The final tool implemented at the academic medical center, including the psychiatric hospital, contained the following discrete variables: an order for COWS, opioid-related diagnosis in problem list, urine drug screen positive for methadone, current prescription for methadone or buprenorphine, or outpatient prescription (at discharge or prior to admission) with morphine equivalents of at least 100 mg/d (Table 1).

Of the 44 admissions over a 5-day period, 8 (18.2%) screened positive using the modified screening tool. The majority of those patients (5/8, 62.5%) screened positive for outpatient daily morphine equivalents of at least 100 mg (Table 2).

Four educational videos (less than 8 minutes in length) were created for pharmacists to provide guidance on the screening tool and tips for providing education to patients and caregivers on opioid overdose and take-home naloxone (Table 3). Through use of talking points and

TABLE 3: Video titles and descriptions for pharmacy department educational series

Video	Description
Initial patient review	Reviewing the screening tool in electronic medical record and patient chart following a positive screen
Provider recommendation	Recommending intranasal naloxone to nonpsychiatric providers
Patient risk factor review	Discussing risk factors of opioid overdose with patients
Patient and caregiver education	Providing take-home naloxone and opioid overdose education to patients and caregivers

role play, emphasis was placed on overdose recognition, naloxone administration, and importance of calling 911. The video series was housed in the center's educational website, made accessible through links in the EMR, and anecdotally was well received by the department.

In order to increase awareness of the new screening tool and educational video series, the team of psychiatric pharmacists presented at pharmacy department staff meetings prior to implementation. Additionally, the screening tool implementation was supported by physician stakeholders.

Discussion

Through completion of this project, efforts to increase take-home naloxone have expanded to our nonpsychiatric inpatient setting. To our knowledge, this is the first report outlining a strategy for pharmacists to increase opioid overdose prevention in patients at the point of discharge through an automated screening tool in the EMR. Incorporation of a pharmacist-driven screening tool in the EMR as a part of daily workflow allowed for easy identification of patients potentially at risk with minimal additional steps in the patient review process. Pharmacists can review the screening tool and additional risk factors in the same areas of the patient chart where other clinical activities are performed, such as anticoagulant and antibiotic monitoring. The addition of the morphine equivalents was crucial for capturing a key additional at-risk population relevant to the medical setting. Initial performance evaluation of the screening tool in general medicine patients found that the majority of patients screening positive were those with high morphine equivalents, highlighting those patients who may have gone unidentified prior to tool optimization. Furthermore, take-home naloxone and opioid overdose education can be disseminated to pharmacists to familiarize themselves with overdose risk factors and naloxone administration in order to provide accurate patient counseling. Short video segments can be a favorable way to disseminate information on a new pharmacy service.

Implementation of an opioid overdose screening tool posed several limitations. Given the method in which information was obtained from the EMR, certain risk factors for opioid overdose, such as concurrent benzodiazepine or alcohol use, could not be accounted for in the automated screening tool. To mitigate this, training was provided in the educational series to alert pharmacists to additional risk factors not accounted for by the tool. Additionally, the current tool does not quantify risk. To help pharmacists better understand risk factors for opioid overdose, the educational series reviewed strategies to assist in risk stratification. Discrete variables screened by the tool relied heavily on current documentation in the EMR. Errors or omissions in the record could potentially lead to false positive or negative screenings (eg, diagnoses in the problem list not updated, incorrect dosing information in prior to admission medications, etc). Providing education to pharmacists in a large department unfamiliar with take-home naloxone and opioid overdose provided a challenge. An educational video series was deemed appropriate for disseminating opioid overdose education to ensure access to uniform information. Although steps were taken to incorporate this new pharmacy service into established workflow, an additional limitation of implementation includes unforeseen impact on prescriber workflow (eg, priorities of take-home naloxone compared with other acute medical issues unrelated to use of opioids during short hospitalizations, etc). This limitation can be alleviated through continued education to prescribers on risk factors. Last, initial evaluation of the optimized screening tool in nonpsychiatric patients was limited to a small sample size during a 5-day period. However, this was felt to be reflective of a typical clinical pharmacist workload at the institution and, thus, provided valuable information on implementation into current workflow procedures. Future directions include postimplementation review of naloxone prescribing in both psychiatric and nonpsychiatric patient populations, assessment of pharmacy department knowledge of opioid overdose and naloxone, and review of positive screen volume. Through use of this screening tool, we aim to increase naloxone access to high-risk patients at our institution.

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