

A Health System–Wide Initiative to Decrease Opioid-Related Morbidity and Mortality

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Background: The opioid overdose crisis now claims more than 40,000 lives in the United States every year, and many hospitals and health systems are responding with opioid-related initiatives, but how best to coordinate hospital or health system–wide strategy and approach remains a challenge.

Methods: An organizational opioid stewardship program (OSP) was created to reduce opioid-related morbidity and mortality in order to provide an efficient, comprehensive, multidisciplinary approach to address the epidemic in one health system. An executive committee of hospital leaders was convened to empower and launch the program. To measure progress, metrics related to care of patients on opioids and those with opioid use disorder (OUD) were evaluated.

Results: The OSP created a holistic, health system–wide program that addressed opioid prescribing, treatment of OUD, education, and information technology tools. After implementation, the number of opioid prescriptions decreased (-73.5/month; $p < 0.001$), mean morphine milligram equivalents (MME) per prescription decreased (-0.4/month; $p < 0.001$), the number of unique patients receiving an opioid decreased (-52.6/month; $p < 0.001$), and the number of prescriptions ≥ 90 MME decreased (-48.1/month; $p < 0.001$). Prescriptions and providers for buprenorphine increased (+6.0 prescriptions/month and +0.4 providers/month; both $p < 0.001$). Visits for opioid overdose did not change (-0.2 overdoses/month; $p = 0.29$).

Conclusion: This paper describes a framework for a new health system–wide OSP. Successful implementation required strong executive sponsorship, ensuring that the program is not housed in any one clinical department in the health system, creating an environment that empowers cross-disciplinary collaboration and inclusion, as well as the development of measures to guide efforts.

The United States is in the midst of a nationwide opioid addiction and overdose epidemic.¹ Although opioid prescribing peaked in 2010, the quantity of opioids dispensed is still three times as high as it was in 1999.² Furthermore, the number of opioid-related overdose deaths continues to climb each year, initially driven by misuse of prescription opioids but more recently from illicit use of heroin and synthetic opioids such as fentanyl.^{3,4} No community appears to be immune: From 2006 to 2015, death rates involving heroin increased in every US Census region.³

Now the epidemic has reached the level of “Nationwide Public Health Emergency,”⁵ and a multifaceted approach is necessary to combat the illness of addiction and resulting overdose deaths. The Centers for Disease Control and Prevention (CDC) has developed prescribing guidelines.⁶ Most states have implemented prescription drug monitoring programs (PDMPs) and broader distribution of naloxone, the antidote to overdose.^{7,8} There have also been efforts to close “pill mills” that distribute large amounts of opioids.⁹

An important piece missing from the efforts, however, is the role that health systems play in solving the epidemic. The role of health systems—hospitals and their affiliated outpatient primary care plus specialty clinics—in opioid prescribing is clear. Opioid prescriptions often follow surgical¹⁰ and medical conditions treated in the hospital. One large 2012 study found that emergency departments (EDs) discharged 17% of patients with an opioid prescription.¹¹ Health systems are also the epicenter for treating patients with opioid use disorder (OUD).¹² Patients who experience overdose are brought to the hospital for treatment and stabilization. Hospitals also treat complications for patients with OUD, such as osteomyelitis and endocarditis.^{13,14} There were more than 500,000 hospitalizations related to opioid dependence and OUD in the United States in 2012, at a cost of nearly \$15 billion.¹⁵ As a result, hospitalizations represent an important opportunity to engage patients in addiction treatment.

Further complicating this landscape for health systems is variation in practice patterns. First, differences in postprocedural opioid prescription patterns are high, even among the same surgical team.¹⁶ Second, the prescription of opioids for pain in nonsurgical hospitalized patients is inconsistent.¹⁷ Third, despite the frequent presence of an addiction

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psychiatry consultation service that assists medical teams in managing patients with substance use disorders, many patients with injection drug–related infectious complications were left with limited access to ongoing treatment following discharge. Historically, patients who were treated for opioid overdose in the ED were observed and discharged with no specific intervention or provision of naloxone.

In 2015 our system was faced with the same challenges, and hospital leaders and clinicians knew we had to do better. Modeling our initiative on antibiotic stewardship programs that have been implemented in hospitals,¹⁸ our health system created an organizationwide opioid stewardship program (OSP). In this article, the six primary interventions, results, and lessons learned are described, in the hope that others can reproduce these strategies and activities to advance opioid-related care at their institutions.

METHODS

Setting

Brigham Health consists of 160 ambulatory care clinics, 15 primary care practices, and 2 hospitals—Brigham and Women’s Hospital, a Harvard-affiliated, Level 1 trauma, academic medical center with 777 licensed beds, and Brigham and Women’s Faulkner Hospital, a community hospital with 162 licensed beds. Brigham Health also partners with the Dana-Farber Cancer Institute to operate the Dana-Farber/Brigham and Women’s Cancer Center. The project began in February 2016 and is ongoing.

Intervention 1: Creation of an Organizationwide Opioid Program

Due to the scope of the problem and the work to be done, we realized that the program would require a director who was given protected time to lead the effort and who was empowered by senior leadership to engage critical stakeholders, develop the program initiatives, and closely measure and evaluate the initiatives. Funding for the position, which covered approximately one third of the director’s time for two years, was provided by an internal competitive fellowship that the hospital funded through philanthropic donation. Soon after, additional resources followed from the hospital’s physicians organization and a research fund to hire a project manager and cover operational expenses.

Given the extent of the epidemic, there were multiple individuals in the hospital already working on opioid-related projects. We chose to focus our program on creating an umbrella group to organize projects, encourage collaboration (break down silos), and reduce barriers for individuals or groups to complete projects. We chose a combination of a top-down and grassroots approach.

For the top-down structure, we asked senior leadership in the health system to become members of the executive committee (Sidebar 1), which included three of the authors

[S.A., S.W.A., A.K.]. This structure was necessary to legitimize the program’s work, as well as to provide high-level direction and help prioritize the work. Concurrently, we focused on a grassroots approach that emphasized inclusivity of projects and people. For example, concurrent to the start of the program, two hospitalists began working on a mentored implementation project sponsored by the Society of Hospital Medicine titled RADEO (Reducing Adverse Drug Events Related to Opioids). It was natural to immediately involve the members of that group and empower them to become leaders of inpatient pain management. Their work included creation of an electronic health record (EHR) order set to standardize inpatient pain treatment across our health system. Other key work included projects by our addiction psychiatrists to improve access to care for OUD and efforts surrounding opioids and palliative care by our oncologists.

Sidebar 1. Composition of the Opioid Stewardship Program Executive Committee*

Program Director*
Chair of the Department of Anesthesiology*
Chair of the Department of Psychiatry*
Chief Medical Officers of the main hospital,* community-affiliated hospital,* oncology center, and provider organization
Chief Medical Informatics Officer of Ambulatory Medicine*
Chief Nursing Officer
Chief Physician Assistant*
Chief Quality Officer*
Director of Addiction Psychiatry*
Director of the Division of Pain Medicine*
Director of Graduate Medical Education*
Director of Pharmacy*
Director of Primary Care*
Vice President of Community Health
Vice President of Strategy
* Clinically active.

As mentioned, many groups are required to develop a successful OSP, and this will vary by health system. For example, our system has an active employee assistance program that offers confidential assessments, short-term counseling, referrals, and follow-up services to employees who have substance use disorder and other problems. Our health system also has a series of Patient and Family Advisory Councils comprised of patients, family members of patients, and patient care advocates. These groups provide important insights about the OSP interventions and review any patient-oriented educational materials. Social workers and case managers are also integral to the care of patients with OUD and provide the valuable connection to community programs and facilities for post-acute care, and should be included early on. Finally, the role of nursing is paramount, as nurses assess various risk factors, administer opioids, perform counseling, and educate patients.

Compliance with state and local laws must also be an important part of this work.¹⁹ In our state (Massachusetts), a comprehensive opioid law was passed in March 2016 with several provisions that were important for our system to ad-

dress, including (a) first-time opioid prescriptions can be for a maximum of only seven days unless an exception is documented, (b) all opioid prescriptions must denote the partial fill option in which a patient can opt to fill less than the prescribed amount at the pharmacy, (c) the state PDMP database needs to be checked prior to every opioid prescription, (d) a discussion with the patient about opioid-associated risks needs to be documented in the medical record, and (e) all patients with opioid overdose who present to the ED need to be offered an evaluation by a social worker.²⁰ The system was faced with training clinicians and reinforcing these requirements, and the OSP provided a natural home for that work.

Intervention 2: Creation of a Prescribing Task Force

The Prescribing Task Force was given the charge of creating safe prescribing guidelines for the health system's clinicians and is cochaired by a pain physician and a primary care physician. To ensure adequate acceptance of clinical recommendations throughout the organization, one representative from every specialty that prescribed opioids was nominated by those specialties' chairs. Representation from our pharmacists was also critical. The group met monthly for several months to create two guideline documents that apply to both the inpatient and outpatient settings, one for managing acute pain and one for managing chronic pain (Appendices 1 and 2). The process involved starting with guidelines from another local hospital, updating them with guidelines from the Massachusetts Health & Hospital Association²¹ and the CDC,⁶ and then ensuring that requirements of the Massachusetts opioid law were addressed.

More recently, we have created a peer-review committee for high-frequency opioid prescribers. Throughout the specialties, we discovered large variability in the prescription of opioids for pain, and we are identifying high-frequency prescribers (normalized to patient panel size, procedures performed, or patient visits). We review, in a standardized and nonjudgmental fashion, prescribing patterns with individual clinicians, and then work to safely decrease the number or strength of opioid prescriptions, when possible.

Intervention 3: Creation of an Addiction Task Force

The Addiction Task Force leads efforts on improving the care for patients with OUD and is cochaired by an addiction psychiatrist and a primary care physician. This group is comprised of representatives from specialties that prescribe opioids, pharmacists, social workers, and physicians from our affiliated community health centers who had experience prescribing buprenorphine for OUD. In our system, OUD patients utilize acute care settings at a disproportionately high rate, incur more costs when admitted, and are more likely to be readmitted after discharge. Linkage to outpa-

tient addiction treatment directly from the hospital proves to be difficult for many patients. Without considerable assistance, the fragmented and uncoordinated nature of community addiction treatment programs means that patients and families rarely continue treatment seamlessly after hospital discharge. Considering that OUD patients must juggle their medical symptoms with maintaining their sobriety, a more robust intervention that provides support to OUD patients during this critical time is needed. Despite having expanded our own addiction treatment programs considerably in the prior years, immediate access to these services remained challenging due to long wait times. A consensus among the key stakeholders was the need for rapid access to treatment for more OUD patients who presented to the hospital and the ED.²²

To address this issue, the Addiction Task Force proposed the creation of a "bridge clinic" that provides intensive, low-threshold, multidisciplinary treatment (including pharmacotherapy and psychosocial interventions) to OUD patients being discharged from the hospital or the ED. Ultimately, these patients are "bridged" to a more longitudinal recovery program in our health system or the community. The proposal was approved by the health system and opened in April 2018. The clinic has prescribers that can write for buprenorphine, a recovery coach with experience counseling patients, and a resource specialist knowledgeable about the various local programs that fit the needs of individual patients.

For addiction services to work, it is necessary to have a critical mass of physicians with their Drug Enforcement Administration (DEA) X-waiver—the special license that permits them to prescribe buprenorphine for OUD. Physicians can obtain this waiver after completing an eight-hour course. In our experience, there are three key groups that should be trained: (1) primary care physicians, who will continue treatment with buprenorphine after the patient is stable on his or her treatment plan and no longer needs the intervention of the Bridge Clinic; (2) hospitalists, who discharge patients after injection drug-related problems such as endocarditis and who may, in consultation with the addiction team, start buprenorphine in the hospital; and (3) emergency physicians, who can provide a brief prescription for buprenorphine from the ED for patients experiencing opioid withdrawal before they can present to the Bridge Clinic.²²

Another significant challenge is the care of inpatients with medical problems resulting from OUD. Caretakers have expressed considerable difficulties with addressing ongoing use of injection drugs even after heart valve replacement for endocarditis, difficulties sending patients home on peripherally inserted central catheter (PICC) lines for long-term antibiotics resulting in the need for extended stays in the hospital that reduce inpatient access for other patients, frequent against medical advice discharges, and ongoing substance use in the hospital. We have assembled

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task forces to discuss these issues, revised out-of-date health system policies (for example, search of patient belongings and visitors), and created protocols leveraging a multidisciplinary team—including surgeons, nurses, social workers, addiction psychiatrists, and others—to help treat these patients effectively.

Intervention 4: Education Initiatives and Creation of an Education Task Force

From the outset, our OSP acknowledged that patient and provider education is a key function of the program. Thus, we created an “Opioid Grand Rounds” program that was convened approximately every two months. These grand rounds were different than typical grand rounds, which are departmentally based, as the OSP was sponsored by the health system. The inaugural speaker was the commissioner of the Massachusetts Department of Public Health. Having a high-profile speaker was beneficial in many ways. It enabled the health system to showcase for government the work it is doing in the opioid space. Second, the health system could generate excitement about the program internally to a broad audience, as the program addressed an important unmet need. Subsequent speakers have included a health care worker who developed OUD while working at the hospital, a toxicologist sharing his innovative opioid-related research, and the director of our pain medicine service discussing chronic opioid use. The final session showcased opioid-related initiatives in several departments, giving the speakers the opportunity to share their work outside of their departments.

Patient-oriented education is also important. On public-oriented screens around the campus, we advertise a medication take-back program, in which patients can bring unused medications (including opioids) to our outpatient pharmacy for safe disposal. We also have a standing order in place at the hospital outpatient pharmacy so patients can obtain naloxone without a prescription from their provider. The OSP has also been involved with naloxone training for the lay public.

Finally, an Education Task Force was recently convened, chaired by an anesthesiologist expert in hospital-based pain control. Although we had plans to convene this task force from the outset, we quickly realized that it would be futile until other tasks were complete. For example, our OSP needed to create guidelines before we could educate staff about them. Also, we are working to educate providers about the use of buprenorphine for OUD, but we first needed to create the Bridge Clinic and structure the necessary support from our addiction specialists before providing the education. The Education Task Force is focusing on training about the Clinical Opiate Withdrawal Scale (COWS)—creating a curriculum, documents, and on-demand videos that staff can access from our website.²³ In addition, the task force is developing

an anti-stigma document that is designed to educate staff and patients on stigmatizing language and discriminatory behavior.

Intervention 5: Engage Information Technology (IT) Resources to Aid in Prescriber Decision Support

Leveraging IT is a key to helping clinicians provide better care and is an essential role of the OSP. Several major IT initiatives were undertaken. The first is creation of an opioid prescribing “SmartForm” for outpatients on chronic opioids (Sidebar 2). This form documents a patient’s primary opioid prescriber, the indication for opioids, appropriate risk assessments, and other key prescribing information. The tool enables the EHR to automatically track and alert providers on best practices with each opioid prescription, and it auto-populates an electronic registry that can be used to track safe opioid prescribing at a clinic or within a department.

Sidebar 2. Content of Opioid “SmartForm”

- Designated opioid prescriber
- Medication agreement filed
- Last prescription drug monitoring program review
- Opioid name & dose and instructions
- Opioid #2 name & dose and instructions
- Beginning date of opioid therapy
- Anticipated end date of opioid therapy
- Presence of high-risk features (these auto-populate from elsewhere in the record, if present)
 - History of substance use disorder, no active use
 - Active substance use disorder
 - Methadone on active med list
 - History of opioid overdose
 - Benzodiazepine on active med list
 - Opioid risk tool score of 8 or greater
 - Buprenorphine or naltrexone on active med list
 - Opioid morphine equivalent of > 50 mg/day
- Pain history
- Current additional interventions
- Current or past pain clinic/specialist care
- Evaluation frequency (weekly, every 2 weeks, monthly, every 2 months, every 4 months)
- Toxicology screening frequency (weekly, every 2 weeks, monthly, every 4 months, annually)
- Naloxone on active med list
- Additional comments

The second initiative is working with the state government and hospital association to integrate the state PDMP into our EHR so that a single click can bring up a patient’s information. Previously providers laboriously logged on to a separate, state-sponsored, password-protected website, but we have recently launched single-click EHR integration that relies on the health system’s user authentication technology and securely pushes patient identifiers so that prescribers do not need to go to the state website. This integration functionality is made possible by the state’s PDMP vendor (Appriss Inc., Louisville, Kentucky), currently used in 43 states.

Sidebar 3. Opioid Stewardship Program Measures			
Task	Numerator	Denominator	Goal
Overall Goals			
Reduce # fatal overdoses	# fatal overdoses	health system “covered lives”	50% reduction
Reduce # nonfatal overdoses	# nonfatal overdoses	health system “covered lives”	50% reduction
State Opioid Law Metrics			
Pain treatment agreements for pts taking opioids > 90 days	# signed pain treatment agreements in EHR	# pts on opioids > 90 days	100% performance
Utilization of a screening tool for risk assessment	# risk assessments documented in EHR	# pts on opioids of any length or dose	100% performance
Review of state prescription drug monitoring program	# documented lookups	# pts on opioids of any length or dose	100% performance
Safe Prescribing Task Force Metrics			
Urine toxicology screening for chronic opioid pts	# urine toxicology screens ordered	# pts on opioids > 90 days	100% performance
Concurrent naloxone for pts on > 50 MME per day	# naloxone prescriptions	# pts on opioid doses of > 50 MME per day	100% performance
Visits every 4 months for pts on chronic opioids	# pts on chronic opioids with visits in the past 4 months	# pts on opioids > 90 days	90% performance
RADEO (Inpatient) Metrics			
Major adverse drug events (ADEs)	# major ADEs after first dose of opioids (for example, death, transfer to ICU, code blue)	Total # patient-days	50% reduction
Minor ADEs	# minor ADEs after first dose of opioids (for example, pruritus, delirium, excessive sedation)	Total # patient-days	25% reduction
Addiction Task Force Metrics			
Naloxone Rx at ED discharge after overdose	# naloxone kits or prescriptions dispensed	# pts presenting to ED with OD	100% performance
Increase # of pts receiving medication-assisted substance use treatment (MAT)	# pts prescribed MAT	# high-risk pts on opioid registry	N/A
Increase number of providers waived to prescribe MAT	# providers waived	# primary care providers	40% of all PCPs
Increase proportion of providers that prescribe	# providers who have written > 1 MAT Rx	# primary care providers	50% of PCPs waived
# pts offered SUD evaluation within 24 hours of OD in the ED	# SUD evaluations offered in 24 hours	# pts presenting to ED with OD	100% performance
pts, patients; EHR, electronic health record; MME, morphine milligram equivalents; RADEO, Reducing Adverse Drug Events Related to Opioids; ED, emergency department; OD, overdose; N/A, not applicable; PCP, primary care provider; SUD, substance use disorder.			

The third initiative is to join and integrate with a statewide ED information exchange (PreManage; Collective Medical Technologies Inc., Draper, Utah) that will report ED visit histories of patients seen regardless of where they have been seen in the state, which helps detect patients presenting to multiple hospitals with painful conditions or if patients have previously suffered overdose and would be at high risk if they receive a subsequent opioid prescription.

For inpatients, as part of the RADEO project led by our hospitalists, we created an acute noncancer pain order set designed to standardize pain management, starting first with nonopioids then introducing opioids in a slow, standardized fashion, taking risk factors for adverse effects (for example, advanced age, presence of renal impairment, history of obstructive sleep apnea, concurrent use of benzodi-

azepines) into account for dosing (Appendix 3). The inpatient team also integrated opioid safety criteria into a patient safety “dashboard” that inpatient teams can use to minimize opioid-related adverse events.

Other IT projects include the creation of individual prescriber “benchmarking reports,” which enable providers to see their opioid prescribing compared to a de-identified list of peers in their same practice. We auto-populate opioid-specific teaching information in discharge instructions of patients who are being prescribed an opioid. We have also set a small default pill count (12 pills) for frequently prescribed opioids, although providers can still manually change the number of pills prescribed from this default number. Because of the extensive number of IT-related projects that are expected in the OSP, having the chief in-

formation officer informed and engaged in the process is essential.

Intervention 6: Create Opioid-Related Metrics to Determine Successes and Need for Improvement

Demonstrating improvement is necessary for a successful intervention. In addition to reducing the total number of opioid prescriptions overall, our OSP’s executive committee created initial metrics that were then refined by the Prescribing and Addiction Task Forces (Sidebar 3). Our overall goal is to reduce the number of fatal and nonfatal overdoses in the patients receiving opioids by our prescribers.

This is a difficult metric to measure, as patients may have providers outside of our system, and patients who suffer overdose may not be treated at one of our hospitals. As a target population, we defined our patients as those who had a primary care prescriber within our system, were included in one of our insurance risk contracts (allowing us to access insurance claims for medications, ED visits, and hospital visits outside of our hospital system), or had received at least three opioid prescriptions from one of our providers in the past year. The third inclusion criterion was intended for patients who may have a primary care physician outside of our system but receive opioids from a pain medicine,

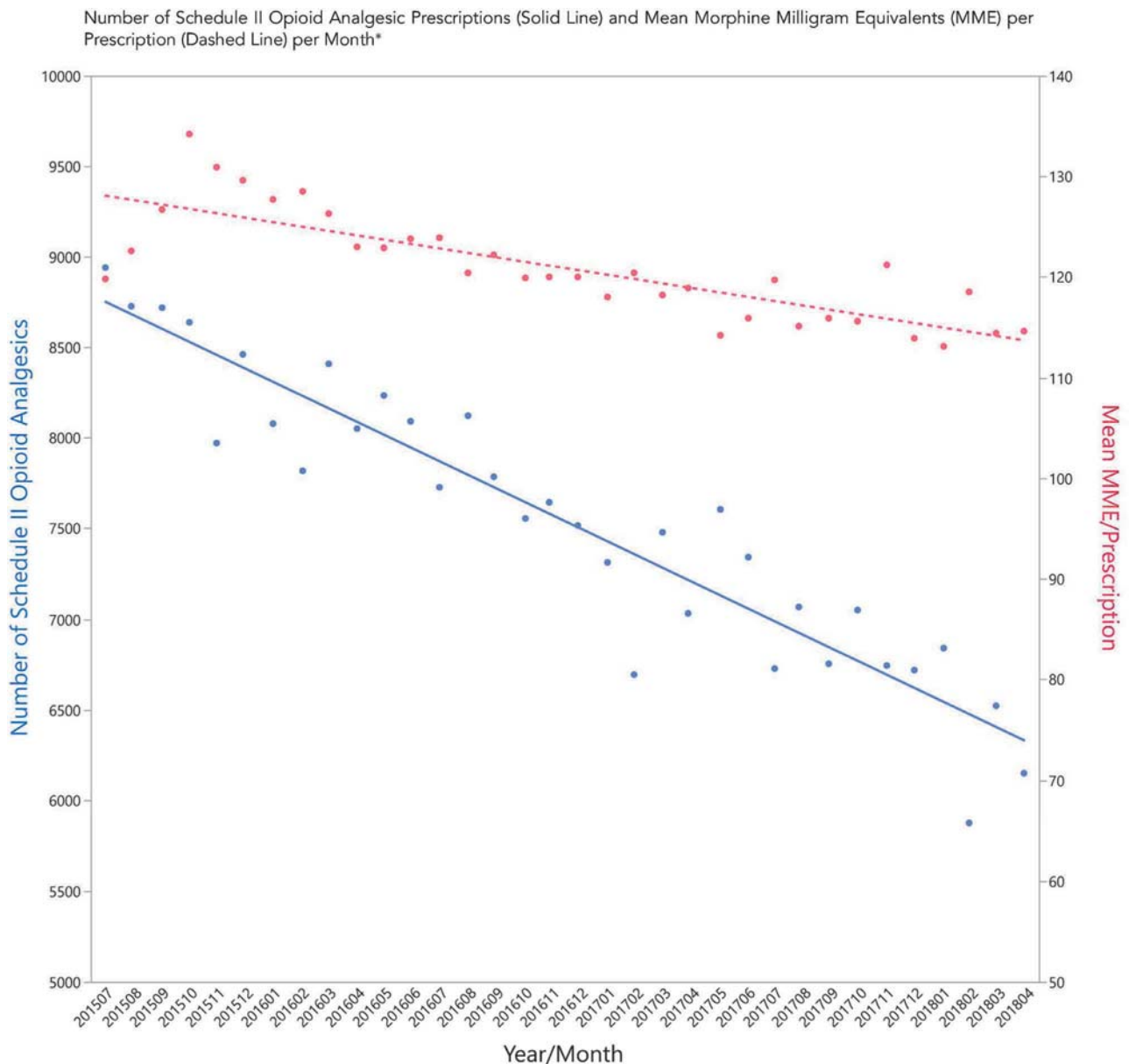


Figure 1: There was a downward trend in both the numbers of Schedule II opioid analgesic prescriptions written and the opioid content of each prescription. Over this time period, the health system decreased the monthly prescriptions from around 9,000 to 6,500. The opioid content, standardized in MME, also dropped slightly.

* $P < 0.001$ for the linear trend line fit for both measures.

rheumatologist, or other specialist within our system, for whom our guidelines and interventions should have an effect.

Other metrics were categorized as those that gauged compliance with the state opioid laws and regulations, those concerning safe prescribing, those related to inpatient opioids (for example, adverse outcomes related to opioids), and those regarding opioid overdose, such as distribution of naloxone to ED patients who survive an OUD or increasing the number of buprenorphine waived prescribers in our system. These were metrics that worked well for our hospital, but there are other examples in the literature.²⁴

Data Analysis

Select metrics were collected and were analyzed using JMP Pro 12.0.1 (SAS Institute Inc., Cary, North Carolina) to produce descriptive statistics. Prescription quantities were obtained by creating a Clarity report within the Epic system (Epic Systems Corporation, Verona, Wisconsin), and extracting Schedule II opioid analgesic prescriptions (for example, oxycodone, morphine, hydromorphone). Morphine milligram equivalents (MME) calculations were based on Von Korff, et al.²⁵ Overdose encounters were identified by International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes related to opioid overdose (Appendix 4). Linear regression was used to

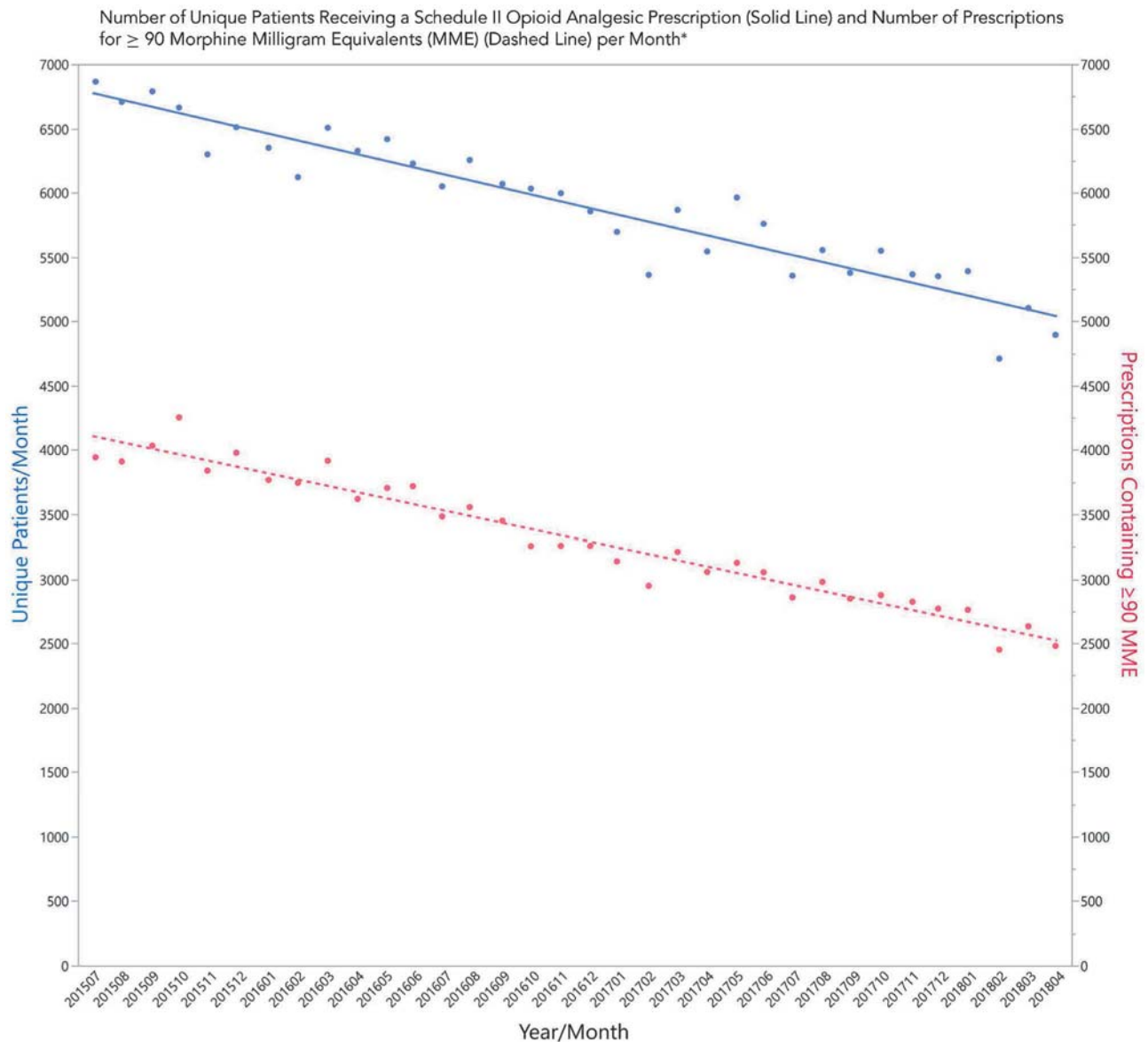


Figure 2: Two findings are demonstrated: The number of unique patients receiving a Schedule II opioid prescription in the health system has dropped from around 7,000 patients per month to 5,000 patients per month; and there was a decrease in the number of higher opioid-containing prescriptions—those with ≥ 90 MME total in the prescription. The value of 90 MME is equivalent to twelve 5 mg oxycodone pills and was chosen as a cutoff for high vs. low opioid content prescriptions. * $P < 0.001$ for the linear trend line fit for both measures.

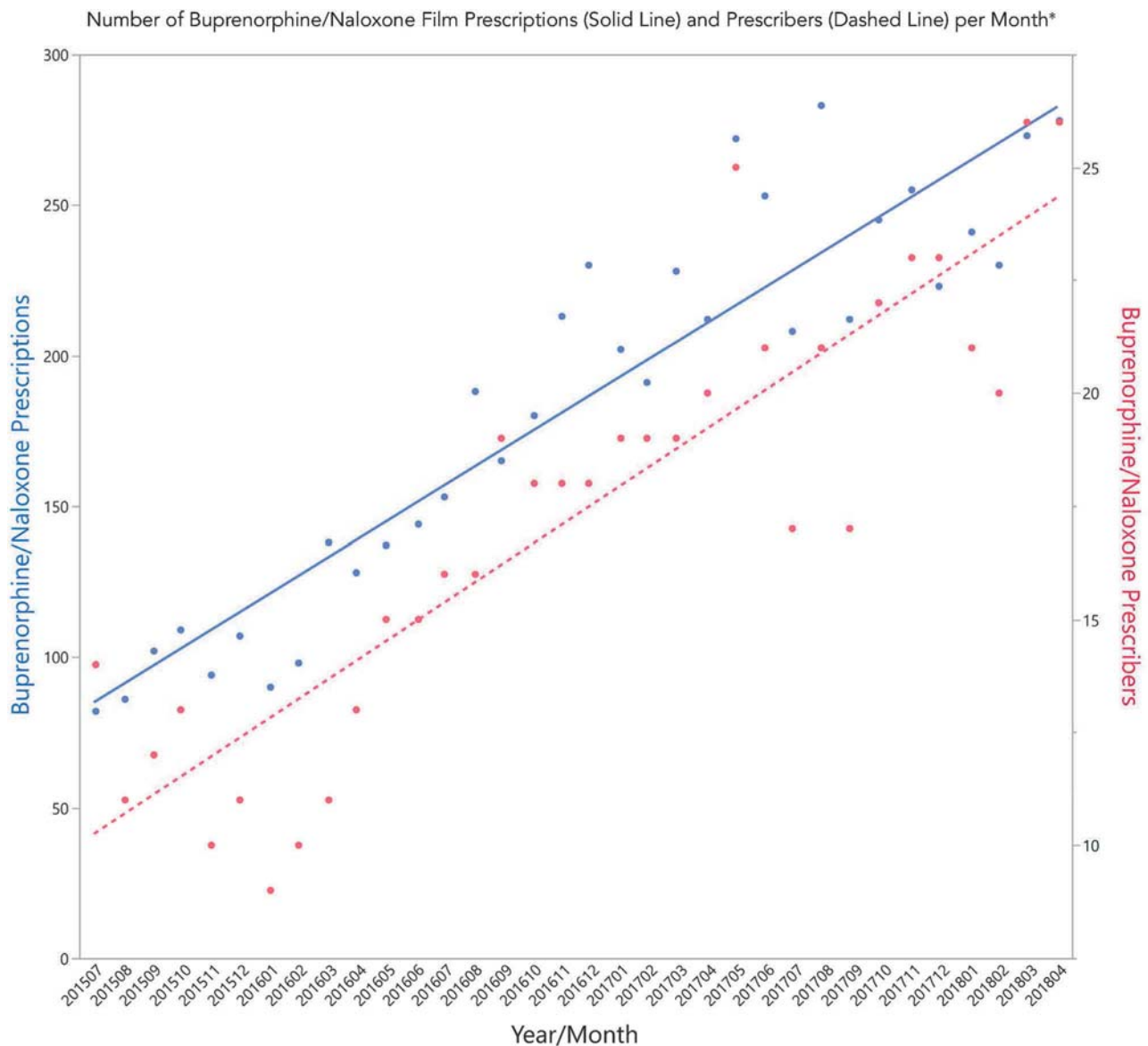


Figure 3: This figure indicates progress on treatment of opioid use disorder. The combination buprenorphine/naloxone film preparation is used exclusively for treatment of opioid use disorder and was chosen as a marker. The monthly number of prescriptions written increased from around 100 to 275 over this time period. The number of providers writing these prescriptions also increased, indicating expanded access to opioid use disorder treatment.

* $P < 0.001$ for the linear trend line fit for both measures.

test for temporal trends. The slope of the regression line was used to test whether the linear trend was statistically different than zero.

RESULTS

As demonstrated in [Figure 1](#), overall Schedule II opioid prescribing decreased from 8,941 prescriptions in July 2015 (the first year for which data are available) to 6,148 in April 2018 (-73.5 prescriptions per month; $p < 0.001$). Mean MME per prescription (-0.4 MME per month; $p < 0.001$) is also shown in [Figure 1](#). The number of unique patients receiving an opioid prescription each month also decreased, from 6,863 in July 2015 to 4,894 in April 2018, a 28.7%

decrease (-52.6 patients per month; $p < 0.001$). Prescriptions containing a total of ≥ 90 MME also decreased (-48.1 prescriptions/month; $p < 0.001$) ([Figure 2](#)). Meanwhile, the number of prescriptions (+6.0 prescriptions/month; $p < 0.001$) and prescribers (+0.4 providers/month; $p < 0.001$) for the film version of buprenorphine/naloxone, indicated for treatment of OUD, increased ([Figure 3](#)). Our overall goal metric, the total number of overdoses, is demonstrated in [Figure 4](#). The number of overdoses fluctuates markedly by month, and although the overall linear trend is downward it does not reach statistical significance (-0.2 overdoses/month; $p = 0.29$). Other metrics, such as inpatient opioid-related adverse events, overdoses for patients covered by our primary care physicians as opposed

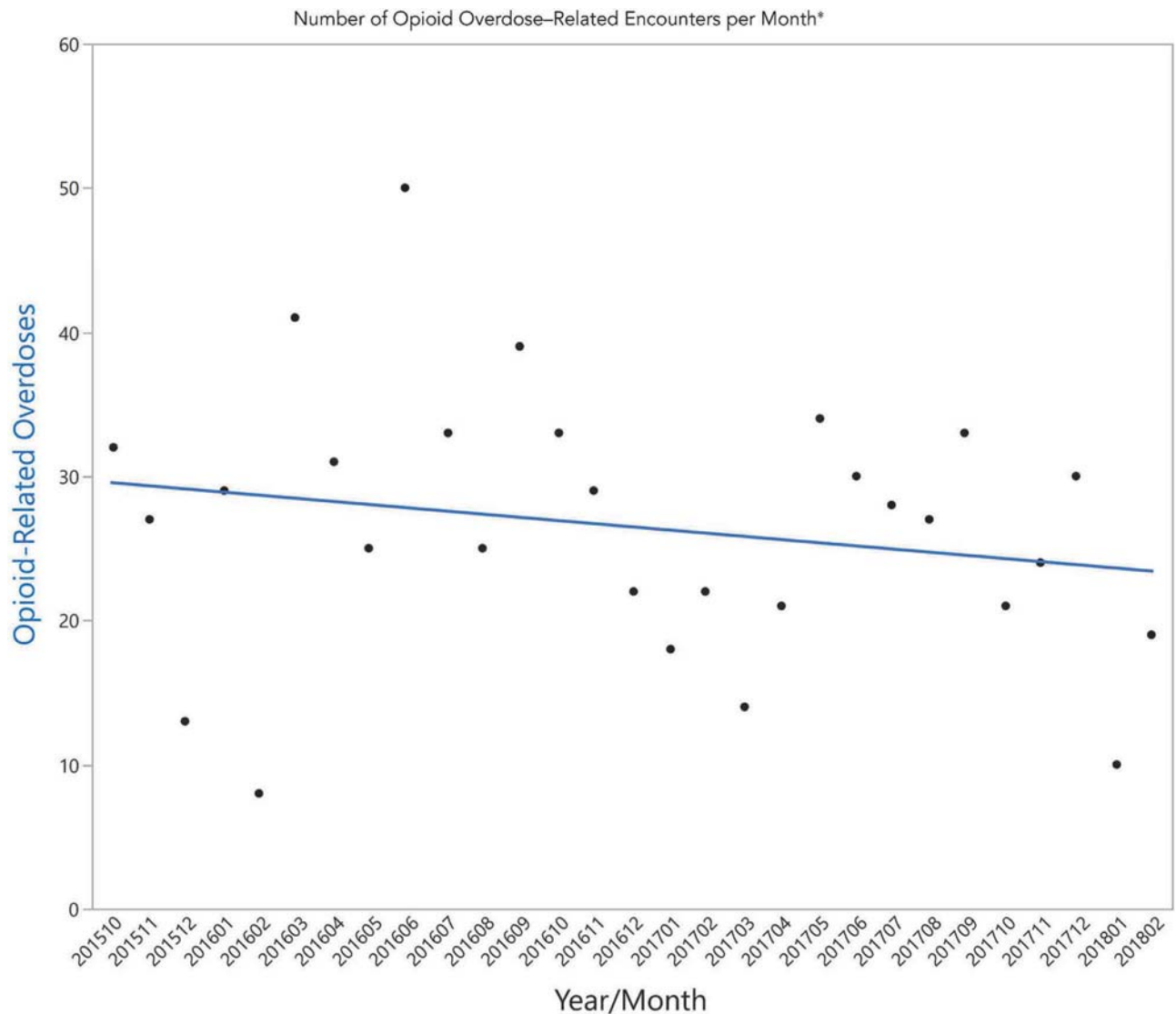


Figure 4: This figure demonstrates the monthly number of opioid overdose encounters in the health system. Although the trend is slightly downward, it does not reach statistical significance. There is also considerable variation month to month. * $P = 0.29$ for the linear trend line fit.

to all overdoses, characteristics of postoperative opioid prescriptions, compliance with PDMP queries, and best practices for patients on chronic opioids, are in development.

DISCUSSION

Our OSP is now an integral part of our strategy to coordinate this and other care redesign efforts to support all substance use disorders, reporting to both the chief medical officer and chief quality officer. We have released the opioid-related guidelines, encouraged compliance with state and federal regulations, and built IT resources to help our clinicians. There is a commitment from the health system leadership to continue the program.

In the era of the opioid epidemic, the critical role of the health system cannot be overemphasized. The hospital remains the home for acute medical problems of all types,

whether it be an acute injury or a procedure in which an opioid-naive patient receives his or her first opioid prescription, a patient hospitalized for an opioid-related illness, or a patient presenting after opioid overdose or seeking help for his or her OUD. The problem was emphasized in a recent report from the Healthcare Cost and Utilization Project, which determined that, between 2005 and 2014, the rate of opioid-related hospital inpatient admissions increased more than 64%, and opioid-related ED visits increased nearly 100%.¹⁴ Health systems—both hospitals and affiliated outpatient clinics—must step up to the challenge if we are to turn the tide against this crisis.

The concept of creating OSPs in hospitals is gaining traction. In fact, new Joint Commission standards effective January 2018 require hospitals to implement processes to help ensure safe and judicious use of opioids, including (a) identifying a leader or leadership team that is responsible for

pain management and safe opioid prescribing, (b) conducting and monitoring performance improvement activities for opioid use, (c) implementing nonpharmacologic pain treatment modalities and educating staff about the safe use of opioids, (d) identifying sites of referral for patients in need of opioid treatment programs, and (e) monitoring the use of opioids to determine if they are being deployed safely (specifically mentioning the examples of tracking opioid-related respiratory depression, use of naloxone, and opioid prescription doses).²⁶ By meeting these new standards, accredited hospitals will create the foundation for an OSP.

In building our OSP, we learned several lessons in the process. One of the most important was determining metrics early and gaining access to data to guide efforts. We resisted the urge simply to “get going” and determined that without this information we were “flying blind.” Given the competing needs to IT staff, creating reports can take a significant amount of time. Another lesson was that we should have included nursing to a greater degree from the outset. Our program initially focused on prescribers but did not adequately evaluate the important role of nurses to assess patients for OUD, monitor for withdrawal, perform counseling, and educate patients.

We also learned that there were tensions between certain groups that needed to be addressed. For example, some primary care physicians referred their patients to our pain clinic with the expectation that the pain physicians would be prescribing opioids. The pain specialists preferred to use nonopioid modalities such as injections, and they recommended opioid regimens that the primary care physicians could then use instead of becoming the patient’s primary opioid prescriber. This scenario created a mismatch in expectations for both providers and patients and needed to be considered. Another example is that although we increased access to substance use disorder treatment at our hospitals, some of our affiliated outpatient primary care practices believed they had inadequate access. These issues were solved by convening meetings with key stakeholders, allowing everyone to express their opinions and experiences, and then determining a collaborative pathway forward.

CONCLUSION

We view the role of a stewardship program to be threefold. The first intervention is to do whatever is possible to keep opioid-naïve patients from receiving opioids for the first time if not necessary. The meaning of this is not to avoid adequate and compassionate pain control; rather, the intention is to encourage nonopioid medications as a first-line treatment of pain, recognizing that opioids are high-risk medications. The second aim is to encourage safe use and monitoring of opioids when indicated, paying close attention to guidelines from the local health system, society, and governing bodies (for example, the CDC). Finally, there needs to be comprehensive and compassionate care for

patients with OUD, including creation of resources to treat patients with this disease. For this third aim, the Project SHOUT (Support for Hospital Opioid Use Treatment) webinar series is a helpful resource for establishing an OUD program for inpatients.²⁷

Development of a comprehensive OSP at the level of the health system can be done. We hope that other health systems will build on our approach to help tackle the opioid crisis.

Conflicts of Interest. All authors report no conflicts of interest.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jcjq.2018.07.003](https://doi.org/10.1016/j.jcjq.2018.07.003).

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REFERENCES

1. Rudd RA, et al. Increases in drug and opioid-involved overdose deaths—United States, 2010–2015. *MMWR Morb Mortal Wkly Rep*. 2016 Dec 30;65:1445–1452.
2. Guy GP Jr, et al. Vital Signs: Changes in opioid prescribing in the United States, 2006–2015. *MMWR Morb Mortal Wkly Rep*. 2017 Jul 7;66:697–704.
3. O’Donnell JK, Gladden RM, Seth P. Trends in deaths involving heroin and synthetic opioids excluding methadone, and law enforcement drug product reports, by Census region—United States, 2006–2015. *MMWR Morb Mortal Wkly Rep*. 2017 Sep 1;66:897–903.
4. Seth P, et al. Overdose deaths involving opioids, cocaine, and psychostimulants—United States, 2015–2016. *MMWR Morb Mortal Wkly Rep*. 2018 Mar 30;67:349–358.
5. The White House. President Donald J. Trump Is Taking Action on Drug Addiction and the Opioid Crisis. 2017 Oct 26. Accessed Jul 25, 2018. <https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-taking-action-drug-addiction-opioid-crisis/>.

6. Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain—United States, 2016. *JAMA*. 2016 Apr 19;315:1624–1645.
7. Manasco AT, et al. Characteristics of state prescription drug monitoring programs: a state-by-state survey. *Pharmacoepidemiol Drug Saf*. 2016;25:847–851.
8. Walley AY, et al. Opioid overdose rates and implementation of overdose education and nasal naloxone distribution in Massachusetts: interrupted time series analysis. *BMJ*. 2013 Jan 30;346:f174.
9. Rutkow L, et al. Effect of Florida's prescription drug monitoring program and pill mill laws on opioid prescribing and use. *JAMA Intern Med*. 2015;175:1642–1649.
10. Chen EY, Marcantonio A, Torretta P 3rd. Correlation between 24-hour predischARGE opioid use and amount of opioids prescribed at hospital discharge. *JAMA Surg*. 2018 Feb 21;153:e174859.
11. Hoppe JA, et al. Opioid prescribing in a cross section of US emergency departments. *Ann Emerg Med*. 2015;66:253–259 e1.
12. Walley AY, et al. Acute care hospital utilization among medical inpatients discharged with a substance use disorder diagnosis. *J Addict Med*. 2012;6:50–56.
13. Agency for Healthcare Research and Quality. HCUP Fast Stats—Opioid-Related Hospital Use. Jun 2018. Accessed Jul 25, 2018. <https://www.hcup-us.ahrq.gov/faststats/OpioidUseServlet>.
14. Agency for Healthcare Research and Quality. HCUP Statistical Brief 219. 2016. Opioid-Related Inpatient Stays and Emergency Department Visits by State, 2009–2014. Weiss AJ, et al. Dec 2016. (Updated: Jan 2017.) Accessed Jul 25, 2018. <https://hcup-us.ahrq.gov/reports/statbriefs/sb219-Opioid-Hospital-Stays-ED-Visits-by-State.pdf>.
15. Ronan MV, Herzig SJ. Hospitalizations related to opioid abuse/dependence and associated serious infections increased sharply, 2002–12. *Health Aff (Millwood)*. 2016 May 1;35:832–837.
16. Blay E Jr, et al. Variation in post-discharge opioid prescriptions among members of a surgical team. *Am J Surg*. 2018;216:25–30.
17. Herzig SJ, et al. Opioid utilization and opioid-related adverse events in nonsurgical patients in US hospitals. *J Hosp Med*. 2014;9:73–81.
18. Goff DA, et al. Eight habits of highly effective antimicrobial stewardship programs to meet the Joint Commission standards for hospitals. *Clin Infect Dis*. 2017 Apr 15;64:1134–1139.
19. Webster LR, Grabois M. Current regulations related to opioid prescribing. *PM R*. 2015;7(11 Suppl):S236–S247.
20. Commonwealth of Massachusetts. An act relevant to substance use, treatment, education and prevention. Mar 14, 2016. Accessed Jul 25, 2018. <https://malegislature.gov/Laws/SessionLaws/Acts/2016/Chapter52>.
21. Massachusetts Health & Hospital Association, Substance Use Disorder Prevention and Treatment Task Force. MHA SUDPTTF Guidelines for Prescription Opioid Management Within Hospitals. 2016. Accessed Jul 25, 2018. <http://patientcarelink.org/wp-content/uploads/2017/06/SUDPTTFGuidelinesforPrescriptionOpioidManagementwithinHospitals.pdf>.
22. D'Onofrio G, et al. Emergency department-initiated buprenorphine/naloxone treatment for opioid dependence: a randomized clinical trial. *JAMA*. 2015 Apr 28;313:1636–1644.
23. Brigham and Women's Hospital. Brigham Comprehensive Opioid Response and Education (B-CORE) Program. 2018. Accessed Jul 25. <http://bcore.brighamandwomens.org>.
24. Sanghavi D, et al. To address the opioid crisis, build a comprehensive national framework. *Health Aff (Millwood) blog*. Dec 18, 2017. Accessed Jul 25, 2018 <https://www.healthaffairs.org/doi/10.1377/hblog20171215.681297/full/>.
25. Von Korff M, et al. De facto long-term opioid therapy for noncancer pain. *Clin J Pain*. 2008;24:521–527.
26. The Joint Commission Joint Commission enhances pain assessment and management requirements for accredited hospitals. *Jt Comm Perspect*. 2017 Jul 3-4;37:1.
27. California Health Care Foundation. Webinar Series—Support for Hospital Opioid Use Treatment (Project SHOUT). 2018. Accessed Jul 25, 2018. <https://www.chcf.org/collection/webinar-series-support-hospital-opioid-use-treatment-project-shout/>.