A model for an institutional response to the opioid crisis

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ABSTRACT

The use of opioid analgesics for pain management has increased dramatically over the past decade, with corresponding increases in negative sequelae including overdose and death. Physicians, policymakers, and researchers are focused on finding ways to decrease opioid use and overdose. This crisis calls for a coordinated response that includes the entire healthcare sector. In this work, the authors lay out a blueprint for such a response at the level of the academic medical center. The proposed model is a comprehensive opioid overdose prevention, response, and education program to evaluate, monitor, and address prescription opioid-related adverse events and addiction among all patients within a healthcare system. The approach includes three inter-related elements: (1) creation of an organizational structure that is subdivided into subcommittees to facilitate cross-functional collaboration and implementation. These subcommittees will focus on Research and Design, Implementation, Advisory, and Compliance with the recommendation. (2) Development of an effective communication plan throughout the institution to enable the organization to function seamlessly and efficiently as a single unit, (3) development of a data tracking and reporting system that intended to have a 360° view of all aspects of opioid prescription and downstream patient outcomes. The most effective response system will require an organizational structure that facilitates the ad hoc constitution of cross-functional teams with members drawn from all levels of the organizational hierarchy (executive leadership to frontline staff). Such a structure provides the teams with immediate solutions as developed by the frontline staff and authority to remove institutional barriers that may delay or limit the successful implementation. The model described was developed in our institution by a cross-functional team that included members from the Johns Hopkins School of Medicine and Johns Hopkins University Carey Business School, Department of Operations Management. The multidisciplinary nature of collaboration allowed us to develop a model for an immediate institution-wide response to the opioid crisis, and one that other healthcare organizations could adopt with local modification as a template for execution. The model also meant to serve as a template for an institutional rapid-response that can be seamlessly implemented during any future drug-related crisis or epidemic.

INTRODUCTION

The use of opioid analgesics for pain management has increased dramatically over the past decade, with corresponding increases in negative sequelae including overdose and death. This crisis calls for a coordinated response that encompasses the entire healthcare sector. In this work, we lay out a blueprint for such a response at the level of the academic medical center.

Approximately one-third of individuals in the United States report experiencing chronic pain, and many receive prescription opioids. In fact, opioid prescribing has quadrupled since 1999, and the number of overdoses from the most commonly prescribed opioids[1] has risen in parallel. In 2015, an estimated 92 million individuals in the United States were prescribed an opioid, and more than 33,000 deaths were attributed to an opioid-involved overdose.[2,3] The economic cost of prescription opioid-related overdose, abuse, and dependence has exceeded $78.5 billion annually, with most of this expense relating to healthcare, substance use disorder (SUD) treatment, and lost productivity.[4]

Opioid medications are essential to treat cancer pain and severe pain after surgery or trauma. However, physicians frequently prescribe opioids for acute pain rather than using other modalities, such as nonsteroidal anti-inflammatory medications. Opioid dosages should be kept low, and duration of use should be as brief as possible in these cases.[5] According to a recent study, one in five patients who had been prescribed opioids for 10 days became long-term users.[6] Another study found that the quantity of pills prescribed for postsurgical acute pain could be reduced by 53 percent and that less than 1 percent of patients required refills.[7] These findings suggest that a coordinated effort is needed to encourage appropriate opioid prescribing, as well as monitoring for misuse, abuse, and diversion. This effort will require a broad approach that includes the means to develop and implement evolving guidelines for opioid prescription, expansion of prescription drug monitoring programs (PDMPs), and wider access to rescue naloxone and treatment programs for opioid use disorder. The opioid epidemic is largely iatrogenic, and the healthcare system has a responsibility to support actions that could prevent addiction and save lives.[8,9]

Opioid abuse is among the most consequential preventable public health threats facing the nation. More than 600,000 deaths have occurred to date, with 180,000 more predicted by 2020.[10] On August 10, 2017, President Trump announced his intention to declare a national opioid crisis.[11] In October 2017, the declaration of a national emergency for the opioid crisis authorized public health powers to mobilize resources and facilitate innovative strategies to curb a rapidly escalating public health crisis.

However, the magnitude and nature of the opioid epidemic implies that legal and regulatory responses alone will not be sufficient, because, as with all epidemics, the optimum solutions are multifaceted, addressing all the key areas of patient contact and providing the relevant resources in those areas. Because healthcare organizations may not simply refuse to provide opioid prescriptions, the solutions must include suitable alternatives to opioids that address the needs of patients with chronic pain, provide the appropriate amount of opioids to these patients, and develop tracking systems for "at-risk" patients to prevent adverse events.

Clinicians may help patients by setting individual goals and realistic expectations about their pain. They should also optimize patients' multimodal analgesic regimen by including anti-inflammatory agents, anticonvulsants, and neuromodulators that will help to manage their daily opioid requirement while maintaining their functional status. Patients who are dependent on chronic opioids should be managed with a multimodal approach that includes psychotherapy, if indicated, to help optimize pharmacological treatments for mood, anxiety, sleep, and SUD. Physical medicine and rehabilitation and integrative medicine techniques such as mindfulness, meditation, massage therapy, and acupuncture also can be viable alternatives for pain therapy.

Physicians, policymakers, and researchers are increasingly focused on finding ways to decrease opioid use and overdose. From the perspective of hospital administrators, the problem is particularly vexing for several reasons. First, the scale and scope of the current opioid epidemic goes far beyond what has been seen in the past. Second, healthcare organizations face critical challenges to execute a response given the fragmented nature of opioid prescribing and variability in prescription provision and monitoring programs. Finally, the need for a response arises in the context of ever-increasing pressures related to cost management and the evolving climate related to public and private payers for hospital services.

The development of a blueprint for an organizational response at the hospital level will be particularly relevant for medium-size to smaller hospitals or health systems where resources are already stretched thin and hospital leadership is required to perform dual/multiple roles. We present such a model used to inform and assist the response in our organization in the hopes that it may serve as blueprint for organizations in similar settings.

PROPOSED MODEL

The proposed model is a comprehensive opioid overdose prevention, response, and education program intended to evaluate, monitor, and address prescription opioid-related adverse events and addiction among all patients within a healthcare system. This model applies to both inpatient and outpatient care and addresses three inter-related elements: creation of an organizational structure, creation of a detailed communication plan, and development of a data tracking and reporting system. Plans as they relate to these elements include educating providers and patients regarding proper opioid prescribing and consumption, communicating with other providers within the system, and tracking opioid prescription patterns through PDMP and CRISP (Chesapeake Regional Information System for our Patients). The model can serve as a template should similar issues arise in the future at the home institution and as a blueprint for similar institutions.

The central element of organizational structure is built around a task force whose role is to coordinate hospital-wide efforts. The communication plan creates channels for information sharing in a way that enhances both buy-in and feedback from critical decision-makers. The data tracking and reporting system is meant to facilitate evidence-based decision-making and to serve as a base to guide initiatives, measure progress, and develop new incentives (Figure 1).

TASK FORCE ORGANIZATION

Given the evolving nature of the problem at hand and the complexity of the organizations involved, a productive approach to the issue requires a flexible structure that can evolve along with the problem, organization, and outcomes. In addition, owing to resource constraints and the time-sensitive nature of the needed response, it is imperative that redundant efforts be minimized. Hard choices must be made about which steps can be taken concurrently, and in some cases, which efforts must be postponed. Consequently, we propose a task force as the overriding structure that will include senior decision-makers as well as the management tiers of the institution involved. The intent is to allow for a direct channel of communication from the organizational leadership to each of the teams that will facilitate implementation of actionable initiatives. The clear involvement of institutional leadership in the

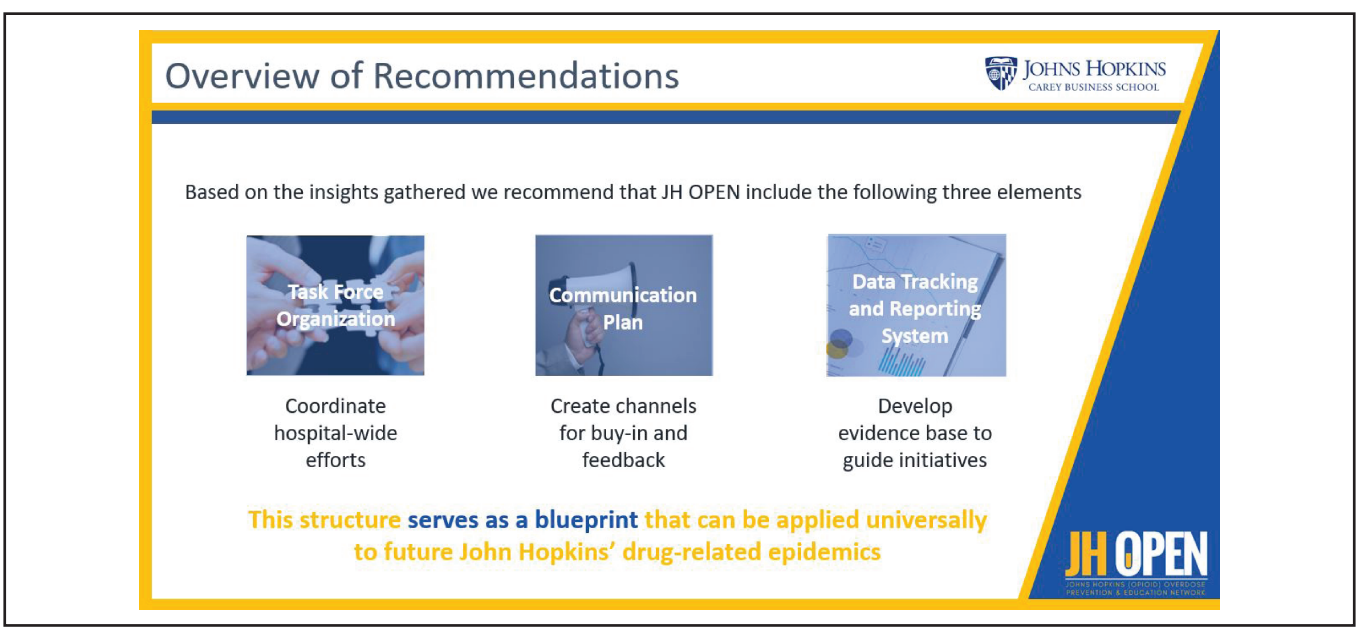


Figure 1. Proposed model.

development of formal and informal lines of communication with all stakeholders will help overcome the inertia present in all but the nimblest of small organizations (100- to 250-bed hospitals).

The main elements that make up the structure of the task force are three committees, each of which is subdivided into 3-6 subcommittees to facilitate cross-functional collaboration and implementation speed (Figure 2). These three committees will focus on Research and Design, Implementation, and Advisory and Compliance.

Research and Design Committee

The Research and Design Committee is devoted to using all available knowledge pertinent to the problem to develop and coordinate initiatives throughout the institution. The initiatives involved must reach patients coming from all ports of entry. Thus, it involves emergency care, inpatient care, and outpatient care. These three entry points naturally lead to the creation of three subcommittees that focus on emergency department (ED), inpatient, and outpatient areas. Each subcommittee requires representation from providers at multiple levels (eg. physicians, nurses, midlevel providers, and pharmacists) in each of these key hospital areas. These representatives will provide input regarding how best to design the programs to be deployed.

Each of these hospital areas faces challenges that may be idiosyncratic for its role, but all efforts must fit within a larger framework that encompasses the institution. For example, area-specific issues may include how to capture patients who present recurrently in the ED but rarely move to inpatient status. Other patients may interact with the hospital only on an outpatient basis, whereas a smaller population will be inpatients.

These subcommittees are to be composed of members who are in the "trenches" of each of these areas (ED, inpatient, and outpatient departments). Such members are best positioned to provide information regarding the nuances of workflow and capacity limitations that must be taken into consideration when designing programs that will potentially modify workflow in each of these individual areas. Without this crucial input, implementation of any program may be limited because of suboptimal execution.

Implementation Committee

This committee focuses on project implementation and will coordinate activities among six subcommittees charged with bridging concept to practice. These subcommittees will implement specific elements of programs aimed at preventing opioid overuse, training and educating providers, tracking

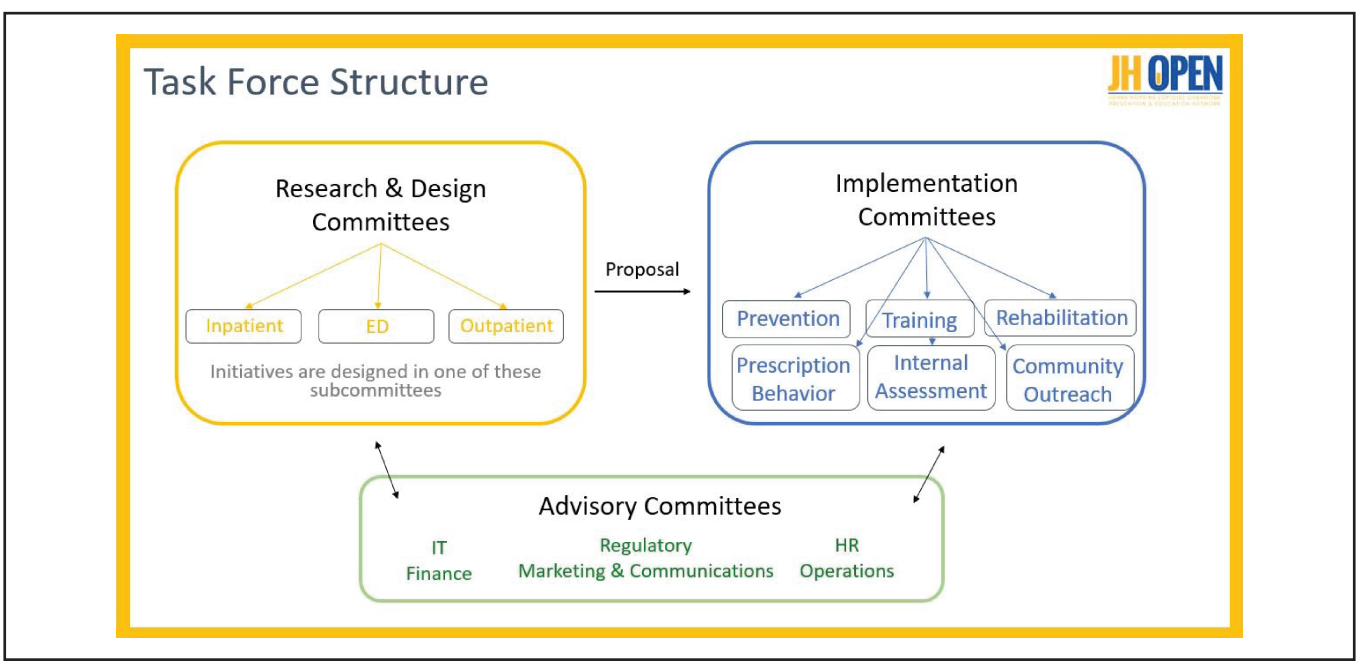


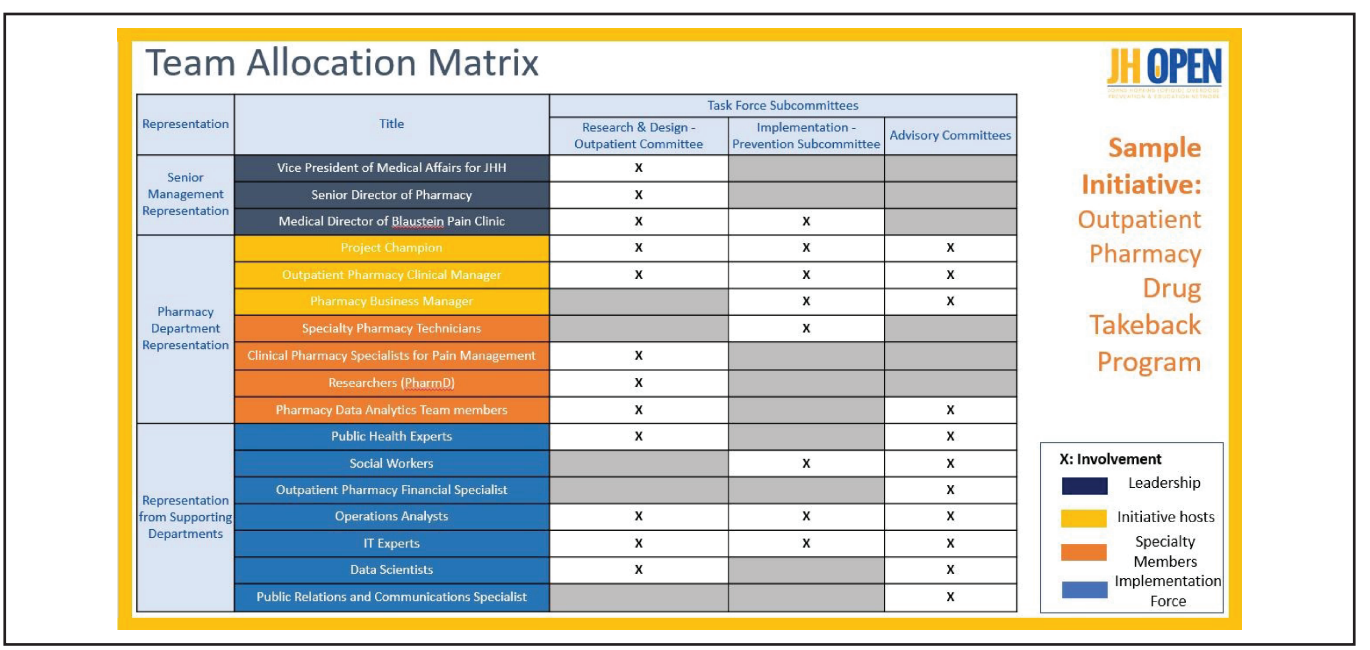
Figure 2. Task force organizational structure. ED, emergency department; HR, human resources; IT, information technology.

prescription behavior, facilitating access to rehabilitation and opioid treatment, and educating the community.The Implementation Committee operates under the auspices of the Research and Design Committee, with each area providing input on how each specific program area will be implemented in each portal of hospital entry (ED, inpatient, and outpatient). Each of the committees and subcommittees has representation from every level in the organization, from executive/leadership to departmental leadership to frontline staff, and is also cross-functional in structure. This structure is important because it facilitates the exchange of ideas and solutions that move freely and rapidly in a "top-down, bottom-up" fashion within and between each of the subcommittees (Figure 3).

Prevention. This subcommittee develops plans to implement actions aimed at preventing opioid misuse in new patients. A substantial proportion of patients who present for an initial visit in the ED, or as inpatient postoperatively, are inadvertently prescribed opioids for an indefinite period. There are two main areas of opportunity in this important subgroup of patients. The first is to provide guidelines for the use of opioids in these critical treatment areas. The second is to ensure clear communication between the initiating provider and the community-based provider. The efforts of this subcommittee will include focus on the dissemination of prescription guidelines to help minimize the number of patients who are appropriately provided "short-term" opioids but who end up on opioids indefinitely.

Training. This subcommittee is responsible for creating, planning, and delivering the area-specific training needed for all providers, including residents, attending physicians, and mid level providers. Responsibilities will include provision of treatment guidelines for the use of opioids in patients with various acute, acute-on-chronic, and chronic conditions commonly encountered in the various hospital portals of entry. This subcommittee will explore and implement different programs as needed. The guidelines for opioid prescribing should start by recommending nonpharmacologic and non-opioid alternatives to minimize the need for opioids and by encouraging the use of innovative services, such as a perioperative acute pain clinic with a patient-centered care model to treat pain with less opioids while maintaining high-quality recovery.

Rehabilitation. This subcommittee will focus on developing resources and methods for identifying patients with opioid addiction and developing clinical pathways for triaging such patients into addiction programs regardless of their portal of entry into the hospital system. Possible mechanisms include the liason of addiction medicine programs



Representation	Title	Task Force Subcommittees		
		Research & Design - Outpatient Committee	Implementation - Prevention Subcommittee	Advisory Committees
Senior Management Representation	Vice President of Medical Affairs for JHH	X		
	Senior Director of Pharmacy	X		
	Medical Director of Blaustein Pain Clinic	X	X	
Pharmacy Department Representation	Project Champion	X	X	X
	Outpatient Pharmacy Clinical Manager	X	X	X
	Pharmacy Business Manager		X	X
	Specialty Pharmacy Technicians		X	
	Clinical Pharmacy Specialists for Pain Management	X		
	Researchers (PharmD)	X		
	Pharmacy Data Analytics Team members	X		X
Representation from Supporting Departments	Public Health Experts	X		X
	Social Workers		X	X
	Outpatient Pharmacy Financial Specialist			X
	Operations Analysts	X	X	X
	IT Experts	X	X	X
	Data Scientists	X		X
	Public Relations and Communications Specialist			X

Figure 3. Team allocation matrix and implementation committee.

(outpatient or inpatient) with inpatient addiction medicine consults to ensure that patients are not lost to follow-up. The emphasis on the philosophy of care will destigmatize opioid misuse and rehabilitation care.

Prescription. In addition to provider training as outlined above, monitoring of physician prescription behavior within the organization will be an important component of the response. This subcommittee will be responsible for developing mechanisms such as provider prescription monitoring systems (possibly embedded in the electronic medical record [EMR] system), with alerts to facilitate provider behavior change and enhance adoption of guidelines. Members will communicate with providers regarding outlier prescriptions to ascertain any patient-specific reasons for deviation. When providers do not have specific reasons, they will be encouraged to refresh their knowledge of institutional guidelines. Such monitoring will be a crucial step for ensuring that the guidelines disseminated through the training programs are adopted and maintained. Without provider adoption of the treatment guidelines, the chances of successfully limiting dose escalation and high-dose opioid prescribing by providers will be highly variable.

Internal assessment. This implementation subcommittee will be responsible for determining what specific metrics should be monitored within each area of the hospital/institution to assess policy adherence and program success. Such metrics may include total number of prescribing physicians in the institution, total number of patients on each prescribing physician's patient panel, proportion of each physician's patients who are currently on chronic opioids and receiving prescriptions from the physician, number of patients prescribed opioids who have a history of SUD or psychiatric disorders, number of patients taking other potentially depressant drugs in combination with opioids, and the number of adverse events related to opioids including overdoses. These metrics ultimately will be tagged in the data tracking system embedded in the EMR and used to provide an overview of program progress to institutional leadership.

Community outreach. The goal of the community outreach subcommittee is to examine the impact of the opioid epidemic on the immediate local community and region with the aim of designing patient education materials and channels of communication that speak to needs relevant to the prevailing conditions (whether the institution is in an urban, suburban, or rural community). In addition, the subcommittee will conduct a community needs assessment to determine the extent of resources needed to address the capacity of and access to community-based addiction medicine programs that will help patients who have been identified as opioid-dependent and wish to participate in a long-term treatment programs. Such community-based addiction medicine programs will also be required to reduce the risk of relapse in postoperative surgical patients who have a history of SUD. The community outreach subcommittee will also explore opportunities to collaborate with local and regional governments (city, county, and state).

Advisory Committees

The third leg of the task force consists of advisory committees. These committees work to ensure cross-functional support to the entire set of initiatives and serve as a platform upon which all the required resources can be accessed, including information technology (IT) and finances, regulatory and marketing, and human resources (HR) operations. The rationale for the task force design is to develop teams that represent all stakeholders within the institution and ensure engagement and support of clinical and administrative leadership.

An additional rationale for the advisory committees is to provide forums that allow input from and information sharing with managers responsible for IT, marketing and communications, operations, finance, regulatory compliance, and HR departments. This committee provides the Implementation subcommittees with all the cross-functional support required for managing personnel (HR), cost (finance), compliance (regulatory), execution, and messaging (operations, marketing/communications, and IT). Members of the cross-functional Advisory Committees interface with the Implementation subcommittees before development or execution of any program. This workflow pattern guarantees that minimal reworking will be required because important details from the key supporting functions have been taken into consideration during the planning phase of each program, thus enabling the

committees to avoid major pitfalls in execution. It also enables strong cross-functional relationships to be developed between members of the Advisory Committee and the Implementation subcommittees, which helps foster a joint ownership of the programs/projects and a joint commitment to their success.

COMMUNICATION PLAN

The development of an effective communication plan throughout the institution is key to the ability of the organization to function seamlessly and efficiently as a single unit. Effective communication can be achieved by the intentional development of sustainable channels aimed at creating buy-in and processing actionable feedback from key stakeholders within the organization as represented in the various task force subcommittees outlined above. Such a plan will allow smooth translation of the work of the design committees into implementation. The communication plan will be designed to ensure that:

1. A structured mechanism is maintained for transmission of key messages.

2. Specific and relevant information is directed to the intended audience.

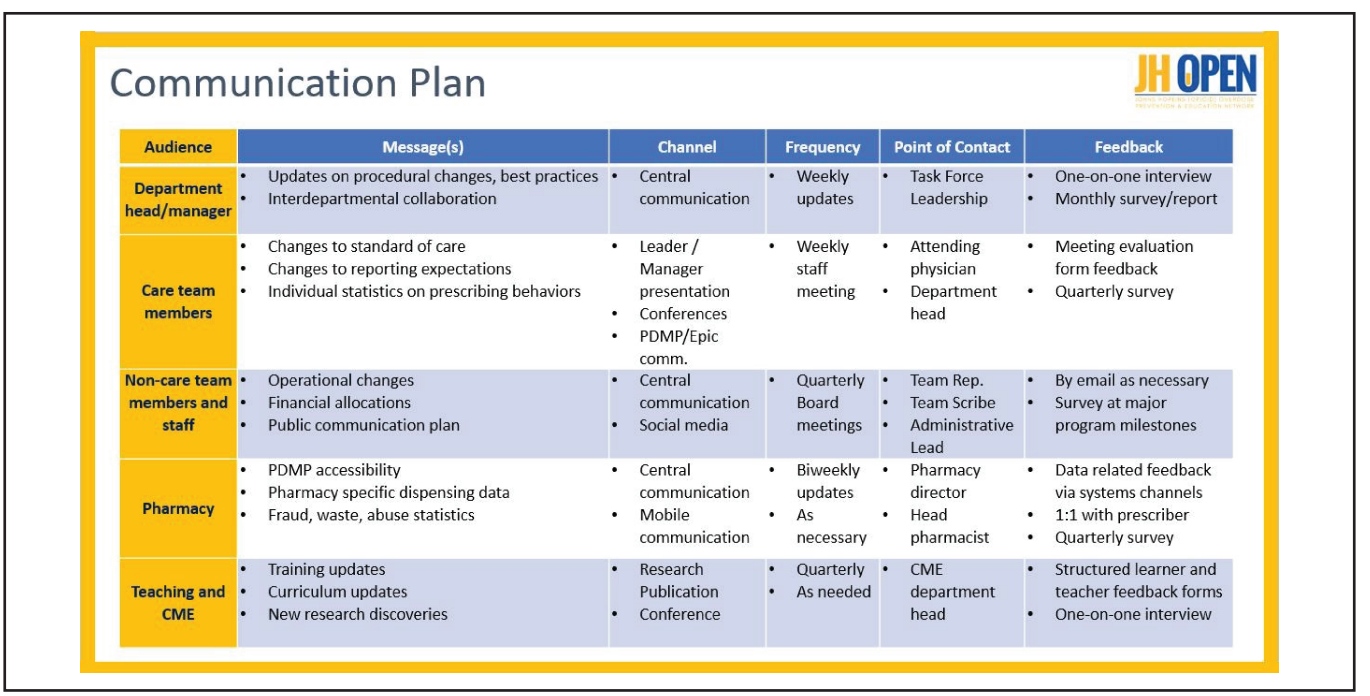
3. A formal plan is maintained that explains when and how information will be exchanged among departments and stakeholders.

4. A structured mechanism for feedback is maintained with a clear point of contact for such feedback to ensure that the buy-in is engendered through actionable communications.

An additional benefit of having a formal communication plan is the inclusion of steps to take if the task force has overlooked some issue in the implementation process. Thus, agents in the "trenches" will have a way to immediately bring such issues to the attention of the task force (Figure 4).

DATA TRACKING AND REPORTING SYSTEM

The effectiveness of such an institutional program will be determined in part by the impact on the population it is designed to benefit. Such effects may have qualitative and/or quantitative measures. The significance of many of these measures will be obvious from the outset. However, the significance of other measures may become apparent only during the implementation phase. Therefore, a mechanism is needed to analyze all relevant data collected



Audience	Message(s)	Channel	Frequency	Point of Contact	Feedback
Department head/manager	• Updates on procedural changes, best practices • Interdepartmental collaboration	• Central communication	• Weekly updates	• Task Force Leadership	• One-on-one interview • Monthly survey/report
Care team members	• Changes to standard of care • Changes to reporting expectations • Individual statistics on prescribing behaviors	• Leader / Manager presentation • Conferences • PDMP/Epic comm.	• Weekly staff meeting	• Attending physician • Department head	• Meeting evaluation form feedback • Quarterly survey
Non-care team members and staff	• Operational changes • Financial allocations • Public communication plan	• Central communication • Social media	• Quarterly Board meetings	• Team Rep. • Team Scribe • Administrative Lead	• By email as necessary • Survey at major program milestones
Pharmacy	• PDMP accessibility • Pharmacy specific dispensing data • Fraud, waste, abuse statistics	• Central communication • Mobile communication	• Biweekly updates • As necessary	• Pharmacy director • Head pharmacist	• Data related feedback via systems channels • 1:1 with prescriber • Quarterly survey
Teaching and CME	• Training updates • Curriculum updates • New research discoveries	• Research Publication • Conference	• Quarterly • As needed	• CME department head	• Structured learner and teacher feedback forms • One-on-one interview

Figure 4. Communication plan. CME, continuing medical education; PDMP, prescription drug monitoring program.

during execution of the programs/projects. In addition to documenting outcomes and progress, this system should play a pivotal role in the development of farther-reaching strategies related to the initiative, as well as parallel actions throughout the institution. The Data Tracking and Reporting System will be developed along a four-pronged approach intended to have a 360° view of all aspects of opioid prescription and downstream patient outcomes. Responsibilities will include data collection, aggregation, and analysis of the following:

1. *Prescription drug monitoring.* This category of data is intended to capture risk profile data points of patients that will help identify high-risk drug-seeking behavior and ensure concurrent use of the PDMP by prescribers and dispensers. The data will also facilitate the trend analysis needed to better monitor fraud, waste, and abuse. For example, a centralized repository of information is necessary to track the number of different prescribers approached by an individual patient.

2. *Prevention of adverse events.* This category of data will be used to track efficacy of harm reduction efforts, such as initiatives in place for overdose cases (including connection of individuals with SUD to community-based treatment facilities). It will also provide an indication of new services that could be rendered to enhance the reduction of adverse events. An example of such data would be the number of naloxone prescriptions at ED discharge for overdose cases (i.e., effectiveness of the naloxone program) and whether this number is associated with a concomitant reduction in overdose cases in the ED.

3. *Provider and dispenser behavioral analysis.* The Data Collection on Providers and Dispensers Program is an inward-facing program aimed at tracking provider prescription behavior after implementation of the training course. It enables identification of outlier providers and patients and an analysis of the issues facing such providers (Figure 5).

4. *Patient risk assessment.* This category of data will address adherence of patients to treatment with opioids within the institution. It will be used to evaluate the interventions placed by the initiative (such as guidelines developed by the Implementation subcommittees). In addition, it will

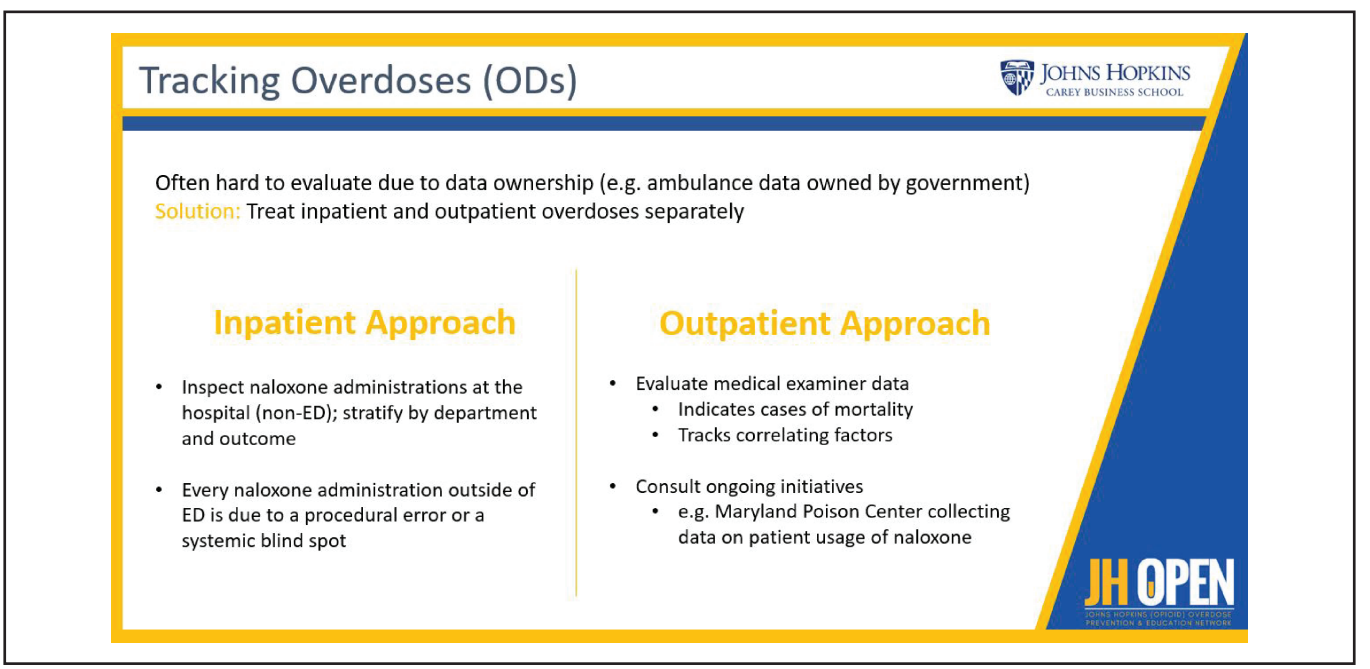


Figure 5. Behavioral analysis of providers and dispensers and the tracking of opioid overdoses. ED, emergency department.

help guide the development of proactive measures, including a risk profile detection tool (which can be deployed in Electronic Patients Medical Records). When high-risk individuals are identified early, they can be connected to appropriate care. An example data point in this category is the adherence of patients on opioid treatment regimens to urine drug testing requirements (Figure 5).

DISCUSSION

The opioid epidemic is a challenge facing the healthcare industry, which is currently undergoing significant transformation in structure and function. Several key factors that shape the healthcare industry tend to magnify the challenges associated with the response to the opioid epidemic. First, the patient typically does not pay directly for care. This reality leads to a moral hazard in which the healthcare consumer and providers may behave in a manner that adversely affects the party that pays for the consumer's care. Second, the healthcare system is fragmented in terms of organizational structure and geographical sites. This fragmentation limits access to care and effective flow/exchange of health-related information. In addition, wide variability in practice and clinical processes has led to significant variability in prescribing practices.

The range and variety of societal influences, including advocacy groups, the legal system, and the media, strain practitioners' abilities to engage with the societal stakeholders in a way to help provide effective evidence-based solutions.

The considerations outlined above have played a role in the development of the opioid epidemic. However, several recent developments have paved the way for a national response. The recent implementation of the state PDMP databases allows for statewide monitoring of provider prescription patterns and patient opioid-seeking behavior. These statewide databases are not yet connected across the entire nation. However there is an opportunity to develop technology-driven solutions to enable cross-connectivity between states and/or the development of a national repository where data are collected/collated and made available to all stakeholders in real time. Because of the "meaningful use" requirement of the Affordable Care Act, most major healthcare organizations have invested in EMR systems that will enable more local tracking of patient and provider prescription behavior. Such tracking will be possible if EMRs are modified to include relevant data collection points. The information collected will also help inform resource planning and allocation to build addiction medicine and rehabilitation structures and develop multidisciplinary, transitional/coordinated care programs such as perioperative pain clinics that will forestall a potential "gateway" to chronic opioid use and ultimately prevent addiction. Given the magnitude of challenges associated with the opioid epidemic, healthcare organizations will be under pressure to mount a nimble but all-encompassing response. The most effective response will require an organizational structure that facilitates the ad hoc constitution of cross-functional teams with members drawn from all levels of the organizational hierarchy (executive leadership to frontline staff). Such a structure provides the teams with immediate solutions as developed by the frontline staff and authority to remove institutional barriers that may delay or limit the successful implementation. We outline a proposed model developed in a tertiary healthcare organization.

Given the urgency and importance of the opioid epidemic, and because the epidemic is still ongoing, we believe that sharing this model is worthwhile, as it may stimulate discussion across the field. Our organization took several initiatives as part of an institution-wide response. As yet, we have only preliminary data to assess its success. An example of preliminary data from our institution is an implementation committee described in Figure 2 that addresses prescription behavior. Expert panel consensus guidelines[12] developed by a multi-stakeholder group from our institution in 2017 serves as a tool for procedure-specific opioid prescribing guidelines and helps to educate clinicians and patients about outpatient opioid use after surgery.

As in the proposed model, our institution convened a working group with representation from a broad array of disciplines and work environments to develop guidance for safe opioid prescribing practices. These guidelines apply to acute and chronic pain but do not address active cancer pain or palliative or end-of-life pain. The guidelines are intended for clinicians who practice in inpatient, ambulatory patient, and emergency care. They are presented as a series of 26 recommendations based on expert opinion, peer-reviewed literature, and existing guidelines and were peer reviewed for consideration of quality

of evidence, level of certainty, and a cumulative grade of recommendation. Guidelines are posted on the institution's Web site for dissemination and implementation. Preliminary data of clinician prescribing behavior showed a 40 percent decrease in opioid prescriptions and an 80 percent increase in naloxone prescriptions (Figure 5).

In June 2017, as in the design of this structure, our institution initiated an innovative multidisciplinary outpatient and inpatient program for weaning surgical patients from chronic opioid use. This multidisciplinary pain program includes acute and chronic pain physicians and psychiatrists and has direct access to clinicians from physical medicine and rehabilitation, addiction medicine, and integrative medicine.[13] Preliminary results from this multidisciplinary program have shown a 75 percent reduction in opioid consumption 2-3 months after surgery among patients who continue in the program (unpublished data). Additional results are still being analyzed but are showing a trend toward concomitant reduction in hospital length of stay in post-surgical patients.

Given the complexity of medium-to-large hospitals (350-1,000 beds), it is important to have a structure that includes all stakeholders for implementation and an effective communication plan that ensures that the relevant information reaches the appropriate stakeholders for timely execution of the plan. This approach has a high potential for ensuring maximum provider/stakeholder engagement throughout the organization because it solicits and engages these individuals at every level of the organization and thus impresses the importance of the implementation to all members of the institution.

LIMITATION

The primary focus of this work is academic medical centers, which tend to be relatively large organizations with formal governance structures. One limitation of our analysis is that the proposed structure cannot be simply over-layed onto smaller organizations such as private pain management offices with more limited resources. In such settings, the recommended system might be too costly and cumbersome. We believe that with some modification, our recommended approach might work well in a non-hospital setting or in smaller hospitals with fewer than 100 beds, where the model could be modified to include fewer stakeholders, and one individual may serve multiple function/roles. However, merging of committees may impute heavy burden on fewer stakeholders or force an oversimplification of the execution plan. Our expert panel consensus[12] drew on a wide cross section from the organization and was necessary to ensure a high adoption rate within the organization. Alternate approaches that build on the pre-existing culture and structure of smaller organizations will certainly evolve consequently; additional work is needed to address these settings.

CONCLUSION

Our institution is a highly matrixed organization with multiple entry points for patients to interface with their care providers. Our focus on implementing initiatives at these key entry point areas to circumvent and initiate opioid management strategies is comprehensive and scalable. Of note, other healthcare organizations have similar elements to our comprehensive approach; however, ours was specifically designed for the Johns Hopkins Health System and takes into consideration the sociodemographic and socioeconomic influences of our care environment. The model described was developed in our institution by a cross-functional team that included members from the Johns Hopkins School of Medicine and Johns Hopkins University Carey Business School, Department of Operations Management. The multidisciplinary nature of collaboration at Johns Hopkins allowed us to develop a model for an immediate institution-wide response to the opioid crisis, and one that other healthcare organizations could adopt as a template. The model is also meant to serve as a template for an institutional rapid-response that can be seamlessly implemented during any future drug-related crisis or epidemic.

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