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Physician continuing education to reduce opioid misuse, abuse, and overdose: Many opportunities, few requirements

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ABSTRACT

Background: The opioid overdose epidemic in the United States is driven in large part by inappropriate opioid prescribing. Although most American physicians receive little or no training during medical school regarding evidence-based prescribing, substance use disorders, and pain management, some states require continuing medical education (CME) on these topics. We report the results of a systematic legal analysis of such requirements, together with recommendations for improved physician training.

Methods: To determine the presence and characteristics of CME requirements in the United States, we systematically collected, reviewed, and coded all laws that require such education as a condition of obtaining or renewing a license to practice medicine. Laws or regulations that mandate one-time or ongoing training in topics designed to reduce overdose risk were further characterized using an iterative protocol.

Results: Only five states require all or nearly all physicians to obtain CME on topics such as pain management and controlled substance prescribing, and fewer than half require any physicians to obtain such training.

Conclusions: While not a replacement for improved education in medical school and post-graduate clinical training, evidence-based CME can help improve provider knowledge and practice. Requiring physicians to obtain CME that accurately presents evidence regarding opioid prescribing and related topics may help reduce opioid-related morbidity and mortality. States and the federal government should also strongly consider requiring such training in medical school and residency.

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1. Introduction

The United States is in the grips of an opioid overdose epidemic (Rudd et al., 2015). While the root causes of the dramatic increase in opioid-related morbidity and mortality that has occurred over the past two decades are complex and varied, prescribing practices are a key factor (Beauchamp et al., 2014; Bohnert et al., 2011). Sales of prescription opioid analgesics increased by more than 300% between 1999 and 2011, accompanied by a corresponding rise in the rate of opioid-related fatalities (Centers for Disease Control and Prevention, 2013). According to the CDC, enough prescription painkillers were prescribed in 2010 to medicate every American adult 24 h a day for an entire month (Centers for Disease Control and Prevention, 2011).

1.1. Causes and consequences of inappropriate opioid prescribing

Although some of these opioid analgesics are dispensed via “pill mills” or obtained through other illicit channels, most are issued by legitimate providers in their normal course of practice. Unfortunately, many of these prescriptions will do little to help the patient, and some will cause harm. Approximately half of all opioid prescriptions are written for indications and durations for which evidence of effectiveness is weak or nonexistent, such as long-term treatment of osteoarthritis and lower back pain (Chaparro et al., 2014; da Costa et al., 2014). Indeed, in 2010, nearly 20 percent of office-based physician visits where non-cancer pain was either a primary symptom or diagnosis resulted in a prescription for opioid painkillers (Daubresse et al., 2013). In the same year, 31% of all emergency department visits – even those that were not pain-related – resulted in at least one opioid being prescribed (Mazer-Amirshahi et al., 2014). In many cases, the potential adverse effects of these prescriptions outweigh any potential benefits (Baldwin, 2015; Chou et al., 2015; Katz et al., 2015).

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Chronic opioid use can have severe negative consequences (Cheatle, 2015; Kaplovitch et al., 2015). A recent literature review revealed that, on average, between 21 and 29 percent of chronic opioid patients misuse their medications, and between 8 and 12 percent show signs of addiction (Vowles et al., 2015). Nearly 19,000 Americans died in 2014 of opioid analgesic-related overdoses – more than 52 every day (Centers for Disease Control and Prevention, 2015b). The dramatic rise in prescription drug abuse, misuse, and overdose has corresponded with an explosion in heroin overdoses, which more than tripled between 2010 and 2014 (Rudd et al., 2015). Opioid analgesic misuse is the strongest predictor of transition to heroin, which is both cheaper and in some cases more readily available than prescription painkillers (Cicero et al., 2015, 2014; Dasgupta et al., 2014; Hedegaard et al., 2015; Jones et al., 2015; Kuehn, 2013).

It is not entirely clear why the prescription of opioids for conditions for which they are not indicated continues despite the now well-documented potential harms of such therapy. It is likely that at least some of these prescriptions result from physician-directed marketing produced by some pharmaceutical manufacturers (Kolodny et al., 2015). For example, Purdue Pharma, the maker of OxyContin, engaged in a years-long marketing campaign that encouraged physicians to prescribe opioid analgesics for non-cancer pain and systematically downplayed potential negative effects. This campaign included thousands of episodes of provider education, and was partially responsible for the adoption by many professional associations of pain treatment guidelines that encourage the aggressive identification and treatment of pain with opioid analgesics, often in ways that defied existing evidence of safety and efficacy (Van Zee, 2009).

The provider education materials created and widely distributed by Purdue included numerous false and illegal claims. In 2006, three Purdue executives, as well as the company itself, pled guilty in federal court to a number of criminal charges related to the marketing of OxyContin and paid nearly \$635 million in fines (Meier, 2007). In August 2015, Purdue reached a settlement with the New York Attorney General regarding improper marketing of OxyContin, and in December 2015, the company agreed to a \$24 million settlement with the state of Kentucky over claims that the company improperly marketed OxyContin as non-addictive (Kentucky Office of the Attorney General, 2015; New York State Office of the Attorney General, 2015). Although these results are notable because of their similarity and severity, Purdue was not the only bad actor. In 2008, Cephalon paid \$425 million in criminal and civil fines to settle claims that it had improperly marketed three drugs, including Actiq, a powerful opioid (United States Food and Drug Administration, 2008). The Oregon Attorney General recently reached a \$1.1 million settlement with Insys Therapeutics, maker of the oral fentanyl spray Subsys, to settle claims that the company targeted unqualified doctors to prescribe the potent medication and marketed it for off-label use (Oregon Department of Justice, 2015). Insys faces additional investigations in Arizona, Illinois, and Massachusetts, as well as from federal officials (Insys Therapeutics, 2015). In 2016, the New York Attorney General fined Endo Pharmaceuticals \$200,000 after finding that the company improperly marketed Opana ER, a powerful opioid, and instructed its sales representatives to “diminish and distort” risks associated with the medication (Attorney General Eric T. Schneiderman, 2016). The city of Chicago, several counties in California, and numerous private plaintiffs have recently sued a variety of opioid manufacturers, alleging inappropriate marketing and related claims (Girion, 2015).

Many providers may be receptive to such marketing because their baseline knowledge of pain management and addiction treatment is low. Most medical schools devote an extremely small amount of time to evidence-based opioid therapy, pain management, and substance use disorder (SUD) treatment, in what

has been described as a “failure of the medical profession at every level... to confront the nation’s number one disease” (The National Center on Substance Abuse at Columbia University, 2000). According to the Director of the National Institute on Drug Abuse, veterinarians receive substantially more training in pain treatment than medical doctors (Muchmore, 2016). In a recent nationwide survey of 104 American medical schools, only four reported having a required pain course, and only 16 percent offered a designated pain elective. The mean number of instructional hours spent on pain was 11, with some students receiving only a single hour of instruction during their entire medical school career (Mezei and Murinson, 2011). There are no full-term pain residency programs, and fellowships in pain medicine are available only to specialists such as anesthesiologists and neurologists (Johns Hopkins Bloomberg School of Public Health, 2015).

Unsurprisingly, physicians consistently report that their medical education did not adequately prepare them to address chronic pain or SUD and that they lack knowledge and competence in these areas. In a recent survey of medical residents, nearly three in five rated their medical school preparation in assessing chronic non-cancer pain as “fair” or “poor” (Yanni et al., 2010). Another study of residents at Massachusetts General Hospital reported that only 13 percent felt “very prepared” to treat addiction, and 62 percent felt “unprepared” to treat it. More than half rated the quality of instruction they received in addiction as “fair” or “poor” (Wakeman et al., 2013). Among practicing primary care physicians, nearly 46 percent reported that their medical education and training was unsatisfactory in preparing them to address opioid dependence, and 40 percent reported that it was unsatisfactory in preparing them to address chronic pain (Keller et al., 2012). Another study focusing on community health clinics found that more than four in five attending physicians rated their medical school education regarding chronic pain as insufficient (Upshur et al., 2006).

These training deficits directly contribute to physicians’ lack of knowledge and their inability to consistently provide evidence-based treatment (Miller et al., 2001). Many primary care providers hold incorrect beliefs about basic facts regarding opioid painkillers, such as that abuse-deterrent formulations are less addictive than the regular versions of those medications and that patients are likely to see improvements in pain and quality of life when prescribed opioids for chronic pain (Hooten and Bruce, 2011; Hwang et al., 2015). Moreover, fewer than 20 percent of primary care physicians in one national survey reported being “very prepared” to identify alcohol or drug dependence (The National Center on Substance Abuse at Columbia University, 2000). A nationwide study of HIV care providers revealed that they seldom follow recommended guidelines for opioid prescribing and have limited confidence in their ability to recognize opioid abuse (Lum et al., 2011). Similar findings are widespread in the literature (Polydorou et al., 2008).

Despite at least three decades of well-documented shortcomings of medical education in these areas interspersed with periodic calls for its improvement, medical schools largely continue to fail to adequately prepare physicians to prevent, diagnose, and properly treat chronic pain and substance use disorders (Doorenbos et al., 2013; Institute of Medicine (U.S.) and Committee on Advancing Pain Research Care and Education, 2011; Miller et al., 2001; O’Connor et al., 2011; Pokorny et al., 1978; Tauben and Loeser, 2013). In an attempt to fill this gap, several states and the federal government have recently taken steps to ensure that physicians in their jurisdictions receive at least some instruction in these important topics after they have entered practice.

While the federal Drug Enforcement Administration (DEA) grants providers the authority to prescribe controlled substances, the ability for each provider to practice medicine, and therefore to prescribe any medication, is granted by each state. State licensing

requirements, therefore, present a straightforward path to improving provider knowledge and practice. States have rapidly adopted some legislative and regulatory initiatives to address the overdose epidemic, such as changing practice rules and immunity provisions to increase access to the opioid antidote naloxone (Davis et al., 2014, 2013). Modifications to improve provider education, however, have seen much slower uptake.

2. Material and methods

To determine the presence, characteristics, and effective dates of continuing medical education requirements in the United States, we systematically collected, reviewed, and coded all statutes and regulations (hereafter referred to as “laws”) that require such education as a condition of obtaining or renewing a license to practice medicine (Wagenaar and Burris, 2013). First, we searched the Westlaw legal database for all statutes and regulations relevant to the research question. All laws in the 50 United States and the District of Columbia that had been codified as of December 2015 were searched for the terms “medical education,” “continuing medical education,” “CME,” “pain management,” and “pain clinic.” Results were cross-referenced with publicly available collections of continuing medical education requirements maintained by the American Medical Association and Federation of State Medical Boards (American Medical Association, 2014; Federation of State Medical Boards, 2015).

Each law identified through this process was reviewed for provisions requiring general continuing medical education as a condition of obtaining or renewing a license to practice medicine, as well as specific requirements related to pain management, controlled substance prescribing, and substance use disorders. Previous versions of each law were reviewed to determine the date on which each requirement became effective. Specific characteristics developed through an iterative process were coded as noted in Table 2. Each law was independently reviewed and redundantly coded by each researcher. Discrepancies were minor and were resolved via consensus.

3. Results

Forty-six states and the District of Columbia require physicians to obtain periodic CME as a condition of maintaining their license to practice medicine (Table 1). Prior to 2012, only seven states had enacted provisions requiring some or all physicians to obtain training in pain management or controlled substance prescribing as a condition of obtaining or renewing their license to practice medicine or to specialize in pain management. As of December 2015, 23 states require at least some physicians to receive such training. The characteristics of these laws vary across states in such attributes as the types of physicians who are required to receive training, the duration and frequency of the training, and the subjects covered (Table 2).

Only five states (CT, IA, MD, SC, and TN) require all or nearly all physicians to obtain periodic CME on such topics as pain management, controlled substance prescribing, or substance use disorders. In all states with such requirements, they represent a small fraction of the total required CME hours. For example, Connecticut requires that physicians obtain 50 CME hours every two years, but only one CME hour in pain management and controlled substance prescribing every six years. Similarly, Maryland requires all physicians to obtain 50 CME hours every two years, of which only one must be relevant to pain management, proper prescribing, or substance use disorders.

Similar CME requirements apply to some or all physicians who are licensed to prescribe or dispense controlled substances (or,

Table 1
General continuing medical education requirements in the United States, December 2015.

State	MD/DO	Hours	Frequency (Years)
AL	Both	25	1
AK	Both	50	2
AZ	MD	40	2
AZ	DO	20	1
AR	Both	20	1
CA	MD	50	2
CA	DO	150	3
CO	–	–	–
CT	Both	50	2
DC	Both	50	2
DE	Both	40	2
FL	Both	40	2
GA	Both	40	2
HI	Both	100	2
IA	Both	40	2
ID	Both	40	2
IL	Both	150	3
IN	–	–	–
KS	Both	150 ^a	3.5 ^a
KY	Both	60	3
LA	Both	20	1
MA	Both	100	2
MD	Both	50	2
ME	Both	100	2
MI	Both	150	3
MN	Both	75	3
MO	Both	50/40 ^b	2
MS	Both	40	2
MT	–	–	–
NC	Both	60	3
ND	Both	60	3
NE	Both	50	2
NH	Both	100	2
NJ	Both	100	2
NM	Both	75	3
NV	MD	40	2
NV	DO	35	1
NY	Both	2	4
OH	Both	100	2
OK	MD	60	3
OK	DO	16	1
OR	Both	60	2
PA	Both	100	2
RI	Both	40	2
SC	Both	40	2
SD	–	–	–
TN	Both	40	2
TX	Both	48	2
UT	Both	40	2
VA	Both	60	2
VT	Both	30	2
WA	MD	200	4
WA	DO	150	3
WI	Both	30	2
WV	MD	50	2
WV	DO	32	2
WY	Both	60	3

^a Kansas provides physicians the option to complete 50 h every 1.5 years, 100 h every 2.5 years, or 150 h every 3.5 years.

^b Physicians are permitted to complete only 40 h if the CME includes a post-test.

in some states, only those who actually prescribe controlled substances) in an additional eight states (DE, KY, MA, MS, NM, UT, VT, and WV). There are variations in these requirements as well. For example, Kentucky requires physicians who are authorized to prescribe or dispense controlled substances to obtain four and a half CME hours related to pain management, addiction disorders, and use of the state prescription monitoring program every three years,

Table 2
Controlled substance continuing medical education requirements in the United States, December 2015.

State	Pain/CS Specific Reqt.	Covered physicians	Required Subjects	Hours	Frequency (Years)
AL	Yes	Pain Clinic Medical Director ^a	Pain Management	40	One-time
AK	–	–	–	–	–
AZ	–	–	–	–	–
AR	–	–	–	–	–
CA	Yes	All ^a	Pain Management; End-of-life Care	12	One-time
CO	–	–	–	–	–
CT	Yes	All	Pain Management; Proper Prescribing	1	First Renewal & every 6 yrs.
DC	–	–	–	–	–
DE	Yes	CS Prescribers	Laws and Rules related to CS Pain Management; Proper Prescribing; Other CS Topics	1 2	One-time 2
FL (MD)	Yes	Pain Clinic Physicians ^a	Pain Management; Proper Prescribing; SUD	40	One-time
FL (DO)	Yes	All	Laws and Rules related to CS	15	1
GA	Yes	Practice is 50% or Greater Opioid Pain Management Patients ^a	Pain Management OR Palliative Care	1 20	2 2
HI	–	–	–	–	–
IA	Yes	All ^a	Pain Management End-of-life Care	2 2	5 5
ID	–	–	–	–	–
IL	–	–	–	–	–
IN	–	–	–	–	–
KS	–	–	–	–	–
KY	Yes	CS Prescribers	Prescription Drug Monitoring Program; Pain Management; SUD	4.5	3
LA	–	–	–	–	–
MA	Yes	All CS Prescribers	Pain Management Pain Management	3 3	Initial Licensure 2
MD	Yes	All	Pain Management; Proper Prescribing; SUD	1	2
ME	–	–	–	–	–
MI	– ^b	–	–	–	–
MN	–	–	–	–	–
MO	–	–	–	–	–
MS	Yes	CS Prescribers Pain Clinic Practitioners ^a Pain Clinic Practitioners	Proper Prescribing Pain Management Pain Management	5 100 15	2 One-time 1
MT	–	–	–	–	–
NC	–	–	–	–	–
ND	–	–	–	–	–
NE	–	–	–	–	–
NH	–	–	–	–	–
NJ	–	–	–	–	–
NM	Yes	CS Prescribers	Laws and Rules; Pain Management; Proper Prescribing; SUD	5 (MD)6 (DO)	3
NV	Yes ^c	DOs only	Pain Management OR SUD OR Ethics	2	2
NY	–	–	–	–	–
OH	Yes	Pain Clinic Physician/Owners	Pain Management; SUD	20	2
OK	Yes	DOs only	Proper Prescribing	1	2
OR	Yes	All ^a	Pain Management; End-of-life Care	7	One-time
PA	–	–	–	–	–
RI	– ^d	–	–	–	–
SC	Yes	All	Proper Prescribing	2	2
SD	–	–	–	–	–
TN	Yes	All ^a	Proper Prescribing	2	2
TX	Yes	Pain Clinic Physicians	Pain Management	10	1
UT	Yes	CS Prescribers	Proper Prescribing	4	2
VA	–	–	–	–	–
VT	Yes	MDs only	Hospice, Pain Management OR Palliative Care	1	2
WA	Yes ^e	MD CS Prescribers Pain Management Specialist ^a Physicians Prescribing High Opioid Dosages ^a	Proper Prescribing Pain Management Pain Management; Proper Prescribing	1 18 12 ^e	2 2 2 ^e
WI	–	–	–	– ^f	–
WV	Yes	CS Prescribers	Drug Diversion; Proper Prescribing	3	2
WY	–	–	–	–	–

^a Exceptions Apply.

^b Statute requires CME in pain management, but that requirement has not been implemented.

^c DOs may take CME in ethics rather than pain management or SUD.

^d Statute requires two CME hours on "topics related to current public health needs," which currently includes "safe opioid prescribing".

^e WA requires DOs prescribing high opioid dosages to obtain either 12 CME hours on pain management and proper prescribing every 2 years or 18 hours on those topics every 3 years.

^f Relevant CME requirements are in the rulemaking process.

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while Mississippi requires all physicians authorized by the DEA to prescribe controlled substances to obtain five CME hours in pain management every two years. Massachusetts requires that physicians who prescribe controlled substances obtain three credits in pain management every two years, while West Virginia requires every physician who has prescribed, administered, or dispensed a controlled substance in the previous three years to obtain three credits every two years on drug diversion and best-practice controlled substance prescribing.

Additionally, eight states (FL, GA, MS, NV, OH, OK, TX, and WA) impose CME requirements based on a provider's licensure type, practice setting, or patient characteristics. Three states (FL, NV, and OK) have requirements specific to osteopathic physicians. Florida, Georgia, Mississippi, Ohio, Texas, and Washington require some physicians who practice in pain management clinics or with certain patient populations to obtain CME in pain management or controlled substance prescribing. Among the most stringent of these is Georgia, which requires physicians who do not hold a certification in pain management or palliative medicine and whose opioid pain management patients comprise 50 percent or more of their practice to obtain 20 CME hours pertaining to pain management or palliative care every two years, and Mississippi, which requires physicians practicing in pain management clinics to obtain 15 CME hours each year in pain management. Uniquely, Washington State requires many physicians prescribing opioids in high dosages to consult with a pain management specialist unless they have received at least 12 CME hours on chronic pain management, including two hours on long-acting opioids, within the previous two years.

Finally, several states require that physicians obtain relevant training at least once in their careers, either in addition to or in lieu of continuing education. Three states (CA, MA, and OR) mandate a one-time training for all physicians. California requires all doctors other than pathologists and radiologists to receive 12 h of training on pain management and the treatment of terminally ill patients, while Oregon requires a minimum of seven hours on those topics. Applicants for a medical license in Massachusetts must receive three credits in pain management, in addition to the CME requirements noted above. Additionally, Alabama requires certain pain management clinic medical directors to receive a one-time 40-h training on pain management.

4. Discussion

This review discovered that the majority of states do not require any physicians to receive post-graduate training in evidence-based opioid prescribing, addiction, and related topics, and that very few require all physicians to receive such training. It appears that many physicians will not seek out such courses if they are not required to do so. According to a survey conducted by the American Medical Association, approximately half of all physicians have never taken CME on managing pain with opioid alternatives, and only 15 percent of respondents have obtained training on medication-assisted treatment (American Medical Association, 2016). In early 2016, the College of Family Physicians of Canada rejected a request that it require its members to take courses on safer opioid prescribing, in part because it did not want to be in a position of potentially decertifying physicians who did not comply (Weeks, 2016). These data suggest that state or federal requirements may be necessary to ensure that physicians receive training in these topics.

Although CME is likely insufficient to fully balance the lack of integrated medical school curricula or formal post-graduate training in these areas, systematic reviews of CME training initiatives show positive effects on both provider knowledge and patient outcomes (Cervero and Gaines, 2015). In one relevant study, physicians who participated in a CME course regarding proper prescribing

demonstrated significantly improved scores in knowledge and attitudes on that topic after completing the training (Swiggart et al., 2012). In a survey of California physicians who received mandatory CME courses on pain control and end-of-life care, 67 percent reported that they planned to change their practice based on the information they had received, and of respondents who replied to a follow-up survey four months later, 90 percent reported that they had in fact modified their actions (Leong et al., 2010). Likewise, a survey of physicians who attended a CME course in New Mexico that covered a variety of opioid-related topics, including safe opioid prescribing and pain diagnosis and treatment, resulted in "significant positive change in knowledge, self-efficacy, and attitudes," in trainees (Katzman et al., 2014). Finally, an evaluation of a nationwide CME course that consisted of three hours of either live or online instruction in evidence-based pain treatment found that participants demonstrated a significantly higher level of knowledge, confidence, attitudes, and self-reported improvements in clinical practice after the training (Alford et al., 2015).

Although most relevant education requirements have been enacted at the state level, there are many actions the federal government can also take to improve prescriber knowledge and behavior. To address the gulf between evidence-based and current practice, CDC has developed evidence-based guidance on prescribing opioids for chronic non-cancer pain (Dowell et al., 2016). These guidelines represent an important step towards creating best practices that address "the lack of consensus among providers on how to use opioid pain medication," with the goal of "improv[ing] provider knowledge, chang[ing] prescribing practices, and ultimately benefit[ing] patient health (Centers for Disease Control and Prevention, 2015a)." In late March 2016, 60 medical schools announced that they will incorporate these Guidelines into their curricula, and require all students to receive instruction consistent with them prior to graduation (Obama, 2016).

There are opportunities for other federal agencies as well. Since 2012, the Food and Drug Administration (FDA) has required manufacturers of extended-release and long-acting opioids (ER-LA) to create CME programs as part of a Risk Evaluation and Mitigation Strategy (REMS), but there is no requirement that prescribers receive this training and serious questions have been raised regarding the program's effectiveness (Department of Health and Human Services, Office of the Inspector General, 2013). The FDA initially intended to impose a training mandate on prescribers and stated that the voluntary system "offered little improvement over existing measures," but eventually capitulated to pressure from interests opposed to the requirements (Kuehn, 2010a). There are other ways, however, to ensure that opioid prescribers have received training in evidence-based prescribing and related topics. The DEA, for example, has the authority to require that prescribers demonstrate sufficient knowledge and education in proper opioid prescribing as a condition of receiving a license to prescribe or dispense controlled substances. Indeed, the recently introduced Safer Prescribing of Controlled Substances Act would create a requirement that all practitioners receive training in pain management and substance use disorder as a condition to obtaining or renewing a DEA license to prescribe or dispense controlled substances. The FDA and the White House support this requirement (Executive Office of the President, 2011; United States Food and Drug Administration, 2012).

In the absence of federal legislative or regulatory action, the President has recently required some federal employees to obtain relevant training through executive action. In a Memorandum, the White House announced that all federal departments and agencies will be required to provide training on the "appropriate and effective prescribing of opioid medications" to all federally-employed health care professionals who prescribe those medications as part of their job responsibilities. Agencies must also require this training for contractors who prescribe controlled substances and spend

50 percent or more of their time under contract with the federal government and clinical trainees who spend 50 percent or more of their time in an executive department or agency facility. This training must be received by April 21, 2017, and be refreshed every three years (Obama, 2015).

Potential reforms are not constrained to currently practicing physicians. Both state and federal governments provide an enormous amount of funding for physician training, both in medical school and residency programs (Association of American Medical Colleges, 2010; Rich et al., 2002). Medicare, the largest funder of graduate medical education, spends an estimated \$9.5 billion per year on the endeavor (Rich et al., 2002). Billions more are spent by both states and the federal government through the Medicaid program (Health Affairs, 2012). On average, the federal government contributes approximately half a million dollars to the graduate training of each physician, in addition to other funds such as subsidized loans, loan forgiveness programs, aid to states, and other support (Health Affairs, 2012). State and federal funding, therefore, represents a key fulcrum to drive changes in the education provided to the next generation of providers.

This funding could be leveraged in numerous ways. Although few published studies have evaluated the effectiveness of relevant educational programs aimed at medical residents, existing evidence is positive. For example, one study found that case-based training improved prescribing practices among medical residents in a palliative care setting, and a pain management course for internal medicine residents increased their knowledge regarding pain management and confidence in managing chronic pain (Elhwairis and Reznich, 2010; Ury et al., 2002). The Centers for Medicare and Medicaid Services (CMS) could require many federally-funded post-graduate medical residency programs to train their residents in evidence-based pain management, SUD, and other interventions such as the co-prescription of naloxone by conditioning Medicare Direct Graduate Medical Education (DGME) payments on the provision of such training.

Additionally, public medical schools, which receive extensive taxpayer subsidies, can and should revise their curriculum to require that all students receive training that includes the latest research to prevent, identify, and treat SUD, as well as the proper prescribing of prescription medications, including non-opioid therapy. Publicly funded and nonprofit hospitals could be required to ensure that all physicians have been trained in evidence-based opioid prescribing as a condition of receiving direct taxpayer funds or the many state tax breaks that accompany nonprofit status (Davis et al., 2012). Several states require or recommend education for providers who prescribe or dispense naloxone outside the traditional regulatory setting; these requirements could be extended to all practitioners to increase uptake of this promising intervention (Davis and Carr, 2015; Green et al., 2015).

Finally, it is important that the content of provider education be based on the most recent evidence regarding the risks and benefits of opioid therapy, free of potential biases or conflicts, and of the appropriate length and format to modify attitudes and behavior. Pharmaceutical and medical product manufacturers spend in excess of one billion dollars annually on clinician continuing education, raising serious ethical concerns even when the educational content complies with relevant laws (Kuehn, 2010b). To address these concerns, states should accredit only CME that is free from industry bias and consider designing or requiring educational programs that explicitly address misinformation provided by past industry-funded CME. Such training should cover not only clinical aspects of prescribing, but also training in skills such as discussing concerns with patients and caregivers. All provider training programs should face rigorous evaluation to determine whether they

are successfully modifying physician attitudes and beliefs, as well as improving patient outcomes.

5. Conclusions

Physicians currently receive minimal, if any, training on pain management, the proper prescribing of controlled substances, and the identification and treatment of substance use disorder. These deficiencies have contributed directly to the rise in opioid-related morbidity and mortality that has occurred over the past two decades. States and the federal government can and should take steps to address this failure by requiring that physicians receive timely and unbiased education regarding evidence-based pain treatment, opioid prescribing, and SUD treatment.

While likely not as effective as the integration of comprehensive, evidence-based education into medical school and residency programs, CME is the low-hanging fruit of provider education. States and the federal government should strongly consider requiring all providers who prescribe controlled substances to receive continuing training on the appropriate uses of those medications, as well as the recognition of and proper response to SUD.

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Contributors

C. Davis conceptualized the article, supervised and conducted research, and led the writing. D. Carr conducted research, created the table, and contributed to the writing. All authors reviewed and approved the submitted manuscript.

Conflict of interest

No conflicts declared.

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