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Review

What we know, and don't know, about the impact of state policy and systems-level interventions on prescription drug overdose

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ABSTRACT

Background: Drug overdose deaths have been rising since the early 1990s and is the leading cause of injury death in the United States. Overdose from prescription opioids constitutes a large proportion of this burden. State policy and systems-level interventions have the potential to impact prescription drug misuse and overdose.
Methods: We searched the literature to identify evaluations of state policy or systems-level interventions using non-comparative, cross-sectional, before–after, time series, cohort, or comparison group designs or randomized/non-randomized trials. Eligible studies examined intervention effects on provider behavior, patient behavior, and health outcomes.
Results: Overall study quality is low, with a limited number of time-series or experimental designs. Knowledge and prescribing practices were measured more often than health outcomes (e.g., overdoses). Limitations include lack of baseline data and comparison groups, inadequate statistical testing, small sample sizes, self-reported outcomes, and short-term follow-up. Strategies that reduce inappropriate prescribing and use of multiple providers and focus on overdose response, such as prescription drug monitoring programs, insurer strategies, pain clinic legislation, clinical guidelines, and naloxone distribution programs, are promising. Evidence of improved health outcomes, particularly from safe storage and disposal strategies and patient education, is weak.
Conclusions: While important efforts are underway to affect prescriber and patient behavior, data on state policy and systems-level interventions are limited and inconsistent. Improving the evidence base is a critical need so states, regulatory agencies, and organizations can make informed choices about policies and practices that will improve prescribing and use, while protecting patient health.
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1. Introduction

In 2011, drug overdose was the leading cause of injury death, reaching epidemic levels in the United States. Among deaths where the drugs involved were specified, three quarters (over 16,000) of prescription drug overdoses involved opioid analgesics (CDC, 2014). While effective in treating cancer pain (Wiffen et al., 2013) and acute pain, such as in the perioperative setting (American Society of Anesthesiologists Task Force on Acute Pain Management, 2012), the evidence that opioids are effective at treating chronic, non-cancer pain safely over time is limited in quantity and quality (Haroutiunian et al., 2012; Noble et al., 2010). There are risks to opioid use including dependence, withdrawal, and overdose (Inturrisi, 2002). Because of their euphoric properties, they are also a candidate for diversion for nonmedical use. Yet, opioids are commonly prescribed: In 2010, an estimated 20% of patients presenting to physician offices in the United States with pain symptoms or diagnoses were prescribed opioids (Daubresse et al., 2013).

More than 125,000 people have died from overdoses involving prescription opioids during 1999–2010, and the number of such deaths per year quadrupled during this time period (CDC, 2011). Interestingly, opioid sales have increased in lock step during this period (CDC, 2011). While prescribing of opioids has increased and prescribing of non-opioid pain medications (e.g., non-steroidal anti-inflammatory drugs; NSAID) has decreased, changes in patient-reported pain severity seem to be insufficient in explaining shifts in prescribing (CDC, 2011; Chang et al., 2014).

Although it is a complicated picture, many overdose deaths can be linked to prescriptions from medical providers. For example, in a study of drug overdose fatalities in North Carolina, nearly half filled a prescription for at least one of the drugs that contributed to their death within 60 days of dying (Hirsch et al., 2014). In a study of opioid analgesic overdoses in an employer-sponsored insurance claims database, one-quarter of nonfatal overdoses were daily users with a prescription, 43.5% were other (intermittent) users with a prescription, and 31% used the opioid without a prescription (Paulozzi et al., 2014).

Several factors increase risk for drug overdose at the individual, community, and systems level. Individuals at higher risk include men; 35–54 year olds; whites and American Indians/Alaskan Natives; individuals at lower incomes; patients with mental health conditions; and patients receiving a high daily dose, prescriptions from multiple prescribers/pharmacies, and opioids combined with benzodiazepines. At the community level, those living in rural areas and communities with higher levels of use of prescription drugs prone to abuse are at higher risk (Paulozzi, 2012). Factors at the systems level include payer (with Medicaid incurring a higher rate of opioid prescriptions and adverse events such as ED visits and neonatal abstinence syndrome compared to other payers; Creanga et al., 2012; Raofi and Schappert, 2006) and prescriber volume (with those at high prescribing rates accounting for a greater proportion of patient deaths; Dhalla et al., 2011).

States operate the major levers that control access to drugs through prescription origination points (such as physician practices, emergency departments, hospitals, and pharmacies), payment and reimbursement (such as through insurers and pharmacy benefit managers), and public education (such as through campaigns and community initiatives). Innovative state policy and systems-level preventive interventions have been proposed to address the problem of opioid analgesic overdose at a population level. Table 1 summarizes these interventions and explains the state role. We sought to understand the evidence available on the effectiveness of such interventions on intermediate outcomes, such as provider and patient behavior, as well as health outcomes, such as fatal and nonfatal overdose. Previous reviews have investigated specific interventions (e.g., PDMPs), but none have integrated the strategies within one comprehensive, broad-scoped review across multiple strategies—a unique focus of the current paper.

2. Material and methods

2.1. Data sources and searches

With the assistance of a librarian, MEDLINE was searched for research articles evaluating on state policy and systems-level interventions published from 1946 to 2014 with search terms including, but not limited to, “drug overdose”, “analgesics/opioid”, “health education”, “patient education”, “organizational policy”, “prescription”, “monitoring”, “guideline”, “legislation”, “insurer”, “formulary”, and “drug utilization review”, resulting in over 500 citations. Additional articles were identified through searches of the references of retrieved articles, as well as relevant federal and organizational websites.

2.2. Selection criteria

Article abstracts were reviewed for relevance. Articles were selected for the review if they were written in English and evaluated a state or system policy or practice using a non-comparative, cross-sectional, before–after, time series, cohort, or comparison group study or a randomized/non-randomized trial. Studies were excluded if they were purely descriptive (e.g., characterized practices in a health system) without aiming to evaluate the influence of a state or system-level policy or practice. Eligible studies included the following intermediate and/or distal outcomes: provider behavior (e.g., controlled substance prescribing patterns, dose, guideline-concordant care), patient behavior (e.g., use of multiple providers or pharmacies, number of prescriptions), and health outcomes (e.g., adverse effects, misuse, abuse, non-fatal overdose, death). We prioritized interventions that offer prevention effects at a population level over substance abuse treatment interventions. Although there are effective strategies that focus on underlying substance use disorders and assist in recovery (e.g., expanding access to medication-assisted therapies; Volkow et al., 2014),