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Review

How ephedrine escaped regulation in the United States: A historical review of misuse and associated policy

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ABSTRACT

Objective: Ephedrine is not only efficacious in the treatment of numerous ailments, but also has a long history of misuse. Research was needed to examine ephedrine policy over time in order to determine potential regulatory flaws that allowed misuse to continue.
Methods: This review is based on primary literature derived from systematic searches of historical and scientific archives, as well as grey literature.
Results: Ephedrine managed to pass through numerous regulatory loopholes within seventy years. Despite warnings of misuse over the latter half of the century, ephedrine, and its herbal source, ephedra, were regulated in a piecemeal fashion and remained easily available to the public. Health authorities have struggled to control ephedrine, as an amphetamine "look-alike," as a methamphetamine precursor, as a dietary supplement, and as a medication. Despite being a potentially dangerous stimulant, under-regulation was perhaps more problematic than the substance itself.
Conclusions: Tighter control of all ephedrine products, drugs and dietary supplements alike, might have prevented adverse outcomes and allowed this substance to remain available in a safer manner. Stringent regulation of all ephedrine products is necessary to prevent misuse and to protect the public's health.

Contents

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1. Introduction

A variety of ephedrine products are available over-the-counter (OTC) in the United States (US), for individuals to self-treat ailments such as asthma. However, in the last decade, use and misuse of products containing ephedrine, and its herbal source, ephedra, have led to numerous adverse events (AEs). Specifically, by 2004, the Food and Drug Administration (FDA) had received over 18,000 adverse event reports (AERs), potentially related to use [1]. Ephedrine products are now more tightly controlled, and ephedra products were banned due to misuse and AEs. Ephedrine and ephedra continue to be regulated differently despite similar pharmacological effects, and such piecemeal regulation has acted as a loophole for numerous channels of misuse. It is important to examine the history of such misuse and associated regulation in order to prevent similar situations from occurring in the future.

2. A new medicinal stimulant is introduced to the US

Ephedra (ma huang) is the herbal source of ephedrine, and has been used for medicinal purposes in China for 5000 years. Ephedrine was originally thought to be too toxic for medicinal use in the US, but in the early 1920s, it was discovered that ephedrine can safely alleviate symptoms of the common cold and bronchial disorders such as asthma. Despite the strong stimulant properties of ephedrine products, they became considered efficacious in the treatment of bronchiolar disorders, even in children. The American Medical Association (AMA) approved ephedrine for medicinal use and it was introduced to the market in 1926 [2–4]. Because scientists agreed that ephedrine had low toxicity and a wide margin of safety, it became widely promoted and used throughout the US to treat a variety of disorders [5–8]. However, regulation of such products would become burdensome to federal agencies.

In the 1930s, OTC stimulant advertizing was largely unregulated, and unsubstantiated claims had become problematic. In 1940, an author warned that claims about an ephedrine product were "false, misleading and untrue" and that use can result in serious illness or even death [9]. In the same year, in response to misleading claims, the Federal Trade Commission (FTC) warned drug companies that ephedrine product advertisements were not permitted to state that use was "safe" or a "cure" for asthma [10–12]. Such claims were regulated after mass distribution so products reached the public prior to evaluation. Stricter regulation of OTC drugs took place after the Food, Drug & Cosmetic Act of 1938; however, ephedrine was grandfathered as an old drug, so unlike new drugs, it was assumed safe without testing. As an old remedy, ephedrine escaped the new drug approval process. Ephedrine products remained widely available and exaggerated claims and unapproved uses would reoccur throughout the century.

By the 1950s, use of OTC stimulants for nonmedical purposes was prevalent [13,14]. However, it was difficult to regulate such medicinal products because strict control (or prohibition) was generally reserved for more dangerous or stigmatized substances [15]. Additionally, stimulant use was at least thought to be "respectable" when used to improve endurance or mental functioning (e.g., for studying) [16].

Although many physicians still felt that use of OTC stimulants was safe, by mid-century use had become prevalent in sports and health authorities expressed concern. Stimulants were generally used to "pep up" and "tone down," and were thought to make individuals "super athletes" [17–19]. In response to such misuse, in the late 1960s, the International Olympic Committee and other sports federations banned the use of stimulants such as ephedrine [20].

Throughout the 1960s, the abuse of legal stimulants remained prevalent, with amphetamine the main drug of concern. Few published reports noted ephedrine abuse. Specifically, only two case reports described "addiction" or psychosis, resulting from heavy, idiosyncratic use [21,22]. By 1965, ephedrine emerged as a drug which was used by young people for "kicks" [23]; however, due to the sensation surrounding amphetamine, the misuse of ephedrine was ignored or misclassified. For example, adulterated pills and cross-reactions on drug tests led to overreporting of amphetamine and underreporting of ephedrine [24].

Due to high rates of stimulant abuse in the 1960s, the World Health Organization (WHO) Expert Committee on Drug Dependence (ECDD) recommended stricter national control of such substances [25]. Shortly after amphetamines became more strictly regulated in 1965 [26], the committee then stressed better control of less potent stimulant drugs, which still presented a hazard to public health. They recommended that drugs with some, but low risk of abuse become more closely monitored [27]. However, despite such warnings, research remained dedicated to more visibly problematic stimulants such as amphetamine.

Prior to the 1971 Convention on Psychotropic Substances, the new legal basis for the international control of scheduled drugs, the WHO reviewed the published research on numerous psychoactive drugs. In response to the dearth of literature citing abuse, they determined ephedrine to be of low abuse potential. So "despite huge sales and easy availability," incidence of abuse was thought to be small. It was, however, noted that "it would seem strange if such a drug were not subject to some misuse" [28]. The WHO did not recommend ephedrine to be controlled under the new convention. A year later, a trial found that ephedrine is capable of producing similar physiological, subjective and behavioral effects to amphetamine, thus demonstrating ephedrine to have abuse potential [29].

Ephedrine misuse was not a visible problem, and surveys rarely, if ever, assessed for use, so statistical evidence of misuse is limited. Some surveys may have indirectly assessed for ephedrine misuse, but under the umbrella of "stimulant use." In absence of such data, some drug experts questioned why ephedrine was "under-abused" and correctly predicted that if another stimulant became outlawed then the public would resort to another stimulant as a replacement [30].

3. Modern illicit drug regulation begins

In 1971, the Controlled Substances Act (CSA) became the new legal basis for illicit drug regulation in the US. Ephedrine, however, was not scheduled as an illicit substance. Less "deviant" stimulant drugs were not scheduled because it was thought that misuse could be reduced through education [31]. Likewise, a case to schedule an abusable drug may not be compelling when harm has yet to be demonstrated, even when pharmacologically similar to another drug of abuse [32]. When a substance is not controlled it is not closely monitored, making it difficult to track patterns of use.

After stricter regulation of more potent stimulants took place in 1971, ephedrine products remained easily available. For example, a study in California found that an ephedrine drug was among the most heavily overprescribed drugs with some prescriptions written for as many as 1000 pills [33]. It is not clear whether pills were diverted for recreational use, but patterns were beginning to appear problematic. In 1972, the Drug Abuse Warning Network (DAWN), an information system operated by the National Institute on Drug Abuse (NIDA) and the Drug Enforcement Administration (DEA), began tracking mentions of drugs of abuse from emergency departments throughout the US. In 1974, ephedrine reached 50 reports of abuse indicating a potentially significant problem [34].

As the availability of amphetamine had decreased substantially [14], the phenomenon of amphetamine "look-alikes" had emerged. Look-alikes were pills that looked similar to amphetamine, and usually contained ephedrine. In Los Angeles (LA), between 1971 and 1980, 20% of confiscated "amphetamine" samples actually contained ephedrine. Additionally, 21% of stimulant-containing urine samples analyzed at the LA Probation Dept. from 1975 through 1976, contained ephedrine. Rates of ephedrine serving as an adulterant or look-alike escalated throughout the 1970s [35,36].

Look-alikes became available OTC in similar shapes and colors as real "street drugs," and were often sold as *Purple Hearts* or *Black Beauties*, which were street names for real amphetamine. Mail and magazine advertisements began targeting young users who could purchase 1000 capsules for as little as $10 through the mail. By the early 1980s, look-alikes became ubiquitous—available at pharmacies, grocery stores, rock concerts and convenience stores. With such widespread access to the substance, many users assumed it was safe. It was also not uncommon for users to ingest many pills simultaneously or concomitantly with alcohol to get "high" [37–40].

Look-alikes became a multi-million dollar business and according to the *Monitoring the Future* national drug survey, in 1982 almost 11% of high school seniors reported using such drugs. Investigators noted that high rates of amphetamine use may have been exaggerated due to the popularity of look-alikes [41,42]. Drug experts became concerned in response to use of this new "street drug," which was abused by adolescents only slightly less than alcohol and marijuana [37]. The recreational use of ephedrine emerged as a public health issue requiring federal response.

In 1982, the FDA banned "triple drug" look-alike products, which contained ephedrine, caffeine and phenylpropanolamine (PPA), because such combinations were untested and not proven to be safe. Likewise, the DEA charged several look-alike companies with drug counterfeiting [43]. In response, companies removed one of three stimulants from their products and altered the shapes and colors of their pills so that they no longer resembled "street drugs." The FDA then banned drugs containing two stimulants and companies responded by marketing pure ephedrine pills [44,45]. Ephedrine companies utilized numerous loopholes in order to maintain sales of their products. The DEA, FDA, FTC and the US Postal Service all attempted to regulate the look-alike industry, but companies were able to remain a step ahead. Despite numerous regulatory efforts, rates of look-alike use among high school seniors remained at over 9% throughout the early 1980s [41].

Ephedrine remained a widely abused stimulant throughout the 1980s. In 1984, representatives of NIDA displayed concern at a drug symposium, and it was noted that the US would be justified in controlling it [46]. In 1985, an article in the *Bulletin on Narcotics* correctly predicted that future trends would include increased recreational use of ephedrine [47]. According to DAWN, mentions of ephedrine abuse, potentially involved in hospital emergency visits, rose from 405 in 1988 to 2133 in 1992, leading it to rank among the top 50 substances abused in the US [48]. Additionally, from 1993 through 1995 the Texas Dept. of Health received approximately 500 AERs from ephedrine users. In response to such misuse and AEs, by 1995, over 20 states had passed their own regulations. Some states scheduled ephedrine as a controlled substance, and others required a prescription for purchase or prohibited label claims [49]. Findings from drug trials continued to suggest the abuse potential of ephedrine [50,51], but no federal regulation had existed to protect the public from such products.

Ephedrine misuse had also expanded after gaining popularity as a precursor in the illicit production of methamphetamine after another precursor, P2P (1-Phenyl-2-Propanone), was scheduled in 1980 [52]. In response to such illicit production throughout the 1980s and early 1990s, three laws were passed to limit distribution of ephedrine. However, illicit production of methamphetamine continued to rebound because ephedrine products remained available through numerous legal outlets [53–56].

In response to abuse and use as a precursor for methamphetamine manufacture, in 1995, the FDA proposed to limit sales to individuals who hold a prescription. Placing ephedrine under Schedule V would have allowed legitimate access for medical purposes and curbed misuse. However, despite high rates of abuse, the FDA withdrew its proposal because they felt the benefit of having a medication available OTC outweighed the risks of misuse [57].

4. The creation of an "herbal" loophole

Ephedrine had been regulated as a drug since 1938, but ephedra, the herbal source of ephedrine, was regu-

lated as a food. However, after the Dietary Supplement Health and Education Act of 1994 (DSHEA) [58] was passed, untested herbal products could remain marketed while escaping stringent drug regulation. As a result, ephedra, which contains ephedrine and thus provides similar effects to ephedrine [59,60], remained available as a "dietary supplement." Accordingly, if the FDA wanted to remove an ephedra product from the market, the burden was now on them to demonstrate that it was unsafe. DSHEA was the ultimate loophole for ephedrine availability because it allowed its herbal source to remain virtually unregulated. Additionally, after years of battling the look-alike companies, stimulant combination products (e.g., ephedra and caffeine) became available again.

Throughout the late 1990s, ephedra sales skyrocketed. Between 1995 and 1999, the estimated number of servings sold per year increased by over 700%, from about 425 M to over 3B servings [61]. Between 1996 and 1998, about 12.5 M adults in the US used ephedra [62], and misuse was common. For example, a poison control center reported that ephedrine was intentionally abused by over 8% of substance abusing 6–19 year olds in Utah from 1990 through 1999 [63].

Ephedrine remained a popular recreational drug; however, it was a legal substance and use was not associated with the "drug addict" stigma. For instance, dieters reported that they would take "herbal speed," but would never take "chemical speed" [64]. Ephedrine also became marketed as a "healthier," legal, "non-addictive" alternative to illicit drugs. *Herbal Ecstasy*, which was marketed to get individuals "high," sold 15 M units within the first five years after its introduction [65–67]. However, the manufacturer did not disclose potential health risks on the label and advertised to young users on television channels such as *MTV (Music Television)* and *Nickelodeon* [68]. Such promotion might have misled consumers into believing use was safe. In 1996, an adolescent died after ingesting 8 capsules [66], and in response, the FDA warned that companies must include safety claims and should not market products to "get high." The FDA also stated that they did not consider street drug alternatives to be dietary supplements and such products could be subject to seizure [69,70]. Despite warnings, many products that promoted a legal "high" remained available [71].

Although some companies promoted ephedrine as a recreational drug, the majority of ephedra products were marketed for weight control. However, the FDA warned that such claims were not approved [72]. In response, companies often resorted to loopholes and made label claims more ambiguous. Yet, due to heavy competition, many product labels continued to display exaggerated claims. Many labels also did not list health warnings or even list ephedra as an ingredient, so the public was often unaware that they were ingesting ephedrine. Additionally, magazines published advertisements for such products without considering the legitimacy of claims. As a result, the FTC brought cases against such companies, but after advertisements had already reached consumers [73]. In effect, companies were able to escape regulation until after products had been marketed.

5. A proposal to control ephedrine at the international level

In response to increasing rates of methamphetamine production and trafficking, in 1992, ephedrine was deemed a controlled precursor at the international level [74]. However, the use of ephedrine itself was still uncontrolled and widely abused, internationally. In 1995, the WHO ECDD recommended a review for the international scheduling of ephedrine as a controlled substance. Twelve countries including the US reported trafficking or abuse [75,76]. The US in particular reported abuse of ephedrine through herbal preparations. It was determined that ephedrine had abuse potential, so the ECDD recommended that ephedrine be placed in Schedule IV of the 1971 Convention on Psychotropic Substances, meaning it poses a significant risk to public health, despite having therapeutic usefulness with only minimal abuse liability.

In 2001, however, of the countries that reported ephedrine abuse, none noted the need for additional control measures. In response, ephedrine was not scheduled beyond its status as a controlled precursor [77]. Although widely abused, ephedrine would remain a legal drug at the international level.

6. Failed attempts to regulate the increasing use of ephedra

Between 1993 and 1997, the FDA received over 800 AERs, potentially related to the use of ephedra products. In response, the FDA proposed a rule to establish dose recommendations and a warning label system for such products [78]. However, after protest and lobbying by the dietary supplement industry, the US General Accounting Office (GAO) investigated the FDA's scientific basis for the proposal and determined that they did not establish a link of causality. Thus, the FDA required stronger scientific evidence in order to proceed with a rulemaking [79]. During this continued period of under-regulation, AEs reported by national poison centers increased 150-fold from 55 reports in 1993 to 8189 in 2002 [80].

By 2002, 3.9% of adults in the US had used ephedra within the last year [81], and 2.1% of adolescents had used ephedra in their lifetime [82]. Athletes in particular reported use of ephedra [83]. In 1997, 3.5% of student athletes reported use of ephedrine within the last year. Over a third began use in high school, about 20% used for social or recreational reasons, and over 15% used it "to feel good" [84,85].

In response to ephedra misuse, numerous bills were introduced to Congress to regulate sales (see Table 1), but none made it out of committee [86–90]. State-level regulations, however, had been placed sparsely throughout the US, but the billion dollar supplement industry continued to lobby and prevented numerous regulatory efforts. Between 1996 and 2002, *Metabolife* contributed $1.6 M to politicians, and in 2000, ranked seventh among pharmaceutical companies in donations to federal campaigns, nationwide. Thus, with powerful political lobbying, the industry stymied government efforts to regulate sales. Additionally, lawsuits regarding serious AEs were quickly

Table 1
National and international efforts to regulate ephedrine distribution and sales in the United States.

Year	Proposed regulation	Purpose	Outcome
1982	Ban of Triple-Stimulant Drugs	OTC ephedrine products may not contain more than one additional stimulant	Rule Passed
1983	Ban of Stimulant Combination Drugs	OTC ephedrine products may not contain additional stimulants	Rule Passed
1989	Chemical Diversion and Trafficking Act	Amended the CSA to control ephedrine as a precursor and limit sales in bulk powder form	Law Passed
1992	UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances	Amendment for international control of ephedrine as a precursor to prevent trafficking	Law Passed
1995	Domestic Chemical Diversion and Control Act	To regulate the distribution of single-entity ephedrine products which are used as a precursor	Law Passed
1995	FDA Proposed Rule for OTC Ephedrine	To restrict sales of ephedrine by amending the CSA and deeming it a Schedule V controlled substance	Rule Not Passed
1996	Comprehensive Methamphetamine Control Act	To regulate distribution of ephedrine-combination products and increase penalties for trafficking	Law Passed
1997	FDA Proposed Rule for Ephedra Dietary Supplements	To regulate doses, enforce dose recommendations, and to make warning labels mandatory	Rule Not Passed
2001	Proposal to Amend the Convention on Psychotropic Substances Act of 1971	To schedule ephedrine as a controlled substance at the international level (WHO)	Proposal Withdrew
2001	Dietary Supplement Information Act	To require ephedra manufacturer registration and the submission of serious AERs	Bill Not Passed
2001	Ephedrine Alkaloid Consumer Protection Act	To establish standard warning labels on ephedra products and to prohibit sales to minors	Bill Not Passed, Twice
2003	Ephedra Public Protection Act	To require good manufacturing practices and serious AE reporting; new products would require approval	Bill Not Passed
2003	Dietary Supplement Safety Act of 2003	To require serious AE reporting to FDA, and increased investigation of such events	Bill Not Passed
2003	Dietary Supplement Access and Awareness Act	To require product registration, AE reporting, postmarket surveillance and health professional education	Bill Not Passed, Twice
2004	FDA Final Ruling on Ephedra Supplements	To ban the sale of dietary supplements that contain ephedra	Rule Passed
2006	Combat Methamphetamine Epidemic Act of 2005[a]	To amend the Patriot Act; restricting, tracking and limiting individual purchases of ephedrine	Law Passed
2009	Combat Methamphetamine Enhancement Act of 2009	To require retail sellers of ephedrine to submit self-certifications of compliance	Passed Senate

[a] *Note*: within the same year, similar bills did not make it out of committee.

settled with confidentiality agreements in order to protect products from public scrutiny [91,92].

By 2003, the FDA had received thousands of AERs, including instances of myocardial infarction, stroke, and death, all potentially related to the use of ephedra products [93]. However, the FDA still did not have enough evidence to meet the burden of proof for a ban so the public continued to have access to such products.

7. Public discourse and the loss of social acceptance

It sometimes takes decades for a drug to lose social acceptance [94,95]. For ephedra, the last straw was pulled in February 2003, when professional baseball pitcher, Steve Bechler, suffered a heat stroke during spring training, and died. Bechler was suspected of taking a supplement containing ephedra, and Bechler's medical examiner suggested that ephedrine played a significant role in his death [96].

Despite Bechler's poor medical history, the news media linked ephedrine use directly to his death. In reaction, proponents of ephedrine supplements published articles in top selling fitness magazines defending ephedrine, suggesting that AEs result from misuse [97,98]. Authors of such influential magazines were furious in reaction to news media coverage because they felt there were plenty of individuals who used this substance in a 'responsible' manner. Many sports authors, on the other hand, demonized ephedrine use [99]. Yet despite such discourse, the professional baseball players' union was against a proposed ephedrine ban [100].

Scientists also battled over the safety of ephedrine products. Epidemiological manuscripts suggesting that ephedra is a dangerous substance were criticized by researchers and specialists [101,102]. Likewise, findings from trials suggesting use is not associated with significant AEs [103] generated a series of published critical letters. Thus, the battle over ephedrine regulation was not simply government agencies confronting a multi-million dollar industry. With consumers creating demand, the dietary supplement industry lobbying, and scientists and politicians battling over its safety, ephedra was more difficult to control than problematic substances in the past, which often lacked proponents.

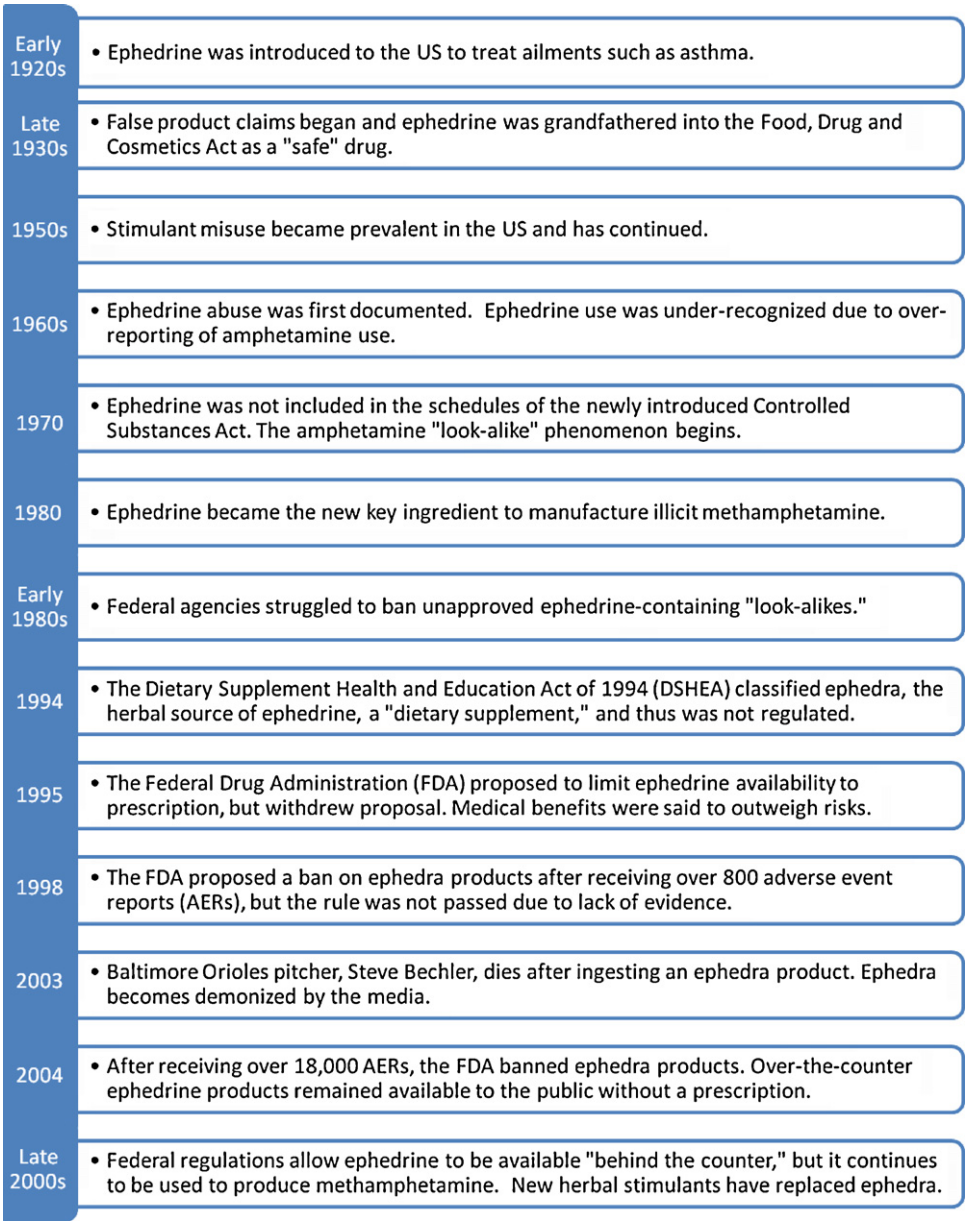

Fig. 1. Ephedrine timeline.

After Bechler's death, an investigational hearing about the safety of ephedra products took place. Evidence presented helped establish that ephedra, in its context of a dietary supplement, is generally not safe [104]. After the hearing, the FDA sought to gather the additional evidence necessary in order to justify stricter regulation. By 2004 it had received over 18,000 AERs and over 48,000 comments regarding regulation (a quarter opposed increased regulations). The FDA examined additional AERs and scientific literature, and determined that the risks of use outweigh its promoted benefits. In April 2004, the FDA banned the sale of ephedra products because they were determined to present an unreasonable risk [1]. In 2005, the ban on low dose ephedra products was overturned by a district judge who felt the FDA failed to prove that small doses presented an unreasonable risk. However, within a year this decision was overturned [105,106]. The rule to ban ephedra was final and this was the only rule regarding ephedra that the FDA managed to pass. The timeliness of the ban suggests that Bechler's death not only mobilized proponents of the ban, but it also served as a catalyst for policy change unlike any previous FDA warning (Fig. 1).

In 2006, to further regulate the illicit manufacture of methamphetamine, a new law was passed, which allows OTC ephedrine products to remain available behind the counter, but with strict regulation of purchases [107]. Additional laws are in the making to tighten such regulation [108]; however, ephedrine products can still be purchased

and used in a recreational manner, and small amounts continue to be purchased in order to produce methamphetamine [109].

8. Conclusions and recommendations

8.1. DSHEA and the lack of regulation of potentially dangerous substances

Unlike drugs, which go through years of safety and efficacy testing, dietary supplements often have little to no data supporting safety, so the FDA must rely on voluntary AERs. As of 2006 [110], supplement companies are required to submit serious AERs to the FDA. This is a step forward, but mandatory reporting of all AEs could allow the FDA to keep more valuable records on potentially dangerous supplements. While additional AE information would be beneficial, requirements of pre-marketing safety information could better protect the public. Specifically, the public could benefit if the FDA required dietary supplements to meet minimum safety requirements prior to marketing. The FDA also needs the authority to remove dangerous products from the market in a timely manner. Currently, there is a bill in review that covers such issues [111]. Another possibility would be to manage loopholes in DSHEA by creating subcategories of herbs by strength, and categorizing drugs such as ephedra as more powerful, thus requiring stricter regulation [112].

Supplement companies and the herbal lobby will continue to fight regulation of such products. If supplement companies and the herbal lobby would have agreed to regulate ephedrine as per the FDA's proposal in 1997, fewer AEs would have occurred and an outright ban might not have been necessary. In order to find a medium that ensures safety and yet allows access to the public, another alternative was a possibility—regulation through prescription. However, it was unlikely for the herbal lobby to ever agree to prescription status [113], or to any regulation at all, until ultimately the herb was banned.

8.2. Scheduling ephedrine as a prescription drug

If ephedrine was regulated with the same degree of oversight as prescription drugs (e.g., Schedule V), fewer AEs would have occurred because those with ailments such as hypertension could not legitimately obtain a prescription. Likewise, it would be difficult for individuals to obtain in order to misuse. Results from meta-analyses suggest that ephedrine may be useful for short-term weight loss [114,115] and large epidemiological studies have found that prescribed ephedrine preparations were not associated with increased risk for adverse cardiovascular outcomes [116]. Thus, prescription regulation may have been an alternative. However, due to ethical requirements of clinical trials and negative publicity, at this point it is unlikely for studies to gain approval to test the safety of ephedrine on weight loss [104].

Banning a substance is not always the most cost-effective response to misuse because access to a valuable drug may be lost. Currently, although controlled in at least 19 states, the continued FDA approval of OTC status of many ephedrine products suggests that medicinal value still outweighs abuse potential. Other abusable drugs are now adequately controlled through prescription (e.g., amphetamine). If ephedrine could follow suit we can prevent misuse and still allow access to individuals who need it.

8.3. The problem of piecemeal regulation: what's in a name?

Each psychoactive substance is subject to its own level of regulation, but in the case of ephedrine, regulation varies depending on its 'name' and marketed use. In attempts to control illegitimate use, government agencies have controlled different forms of the substance in a piecemeal fashion. However, ephedrine produces similar physiological effects whether in herbal form, synthesized, or isolated from ephedra [60,61,104,117]. Likewise, similar effects occur after ingestion, whether the substance is labeled a drug, a precursor, or a dietary supplement. If an individual intends to use ephedrine to fight a cold or to get "high," one can do so similarly whether through *Herbal Ecstasy* or through OTC *Primatene*® drugs. So preventing sales of ephedrine under one name still leaves a similar product available under another name.

With regard to other drugs, if one form is controlled, then typically, so too are other forms. The herb, marijuana, is controlled, thus, so too is its active ingredient, THC. Ephedrine, however, despite the ephedra ban, has not been banned in a de facto manner even though it is the main active component in the herb. Labeling ephedra as a dietary supplement because it is herbal seems to have shifted attention away from the fact that it is an abusable drug. Not controlling an abusable drug because it is herbal or has medical efficacy allows the substance to fall through the cracks of regulation and remain subject to misuse. A more comprehensive regulation plan could have prevented misuse and AEs, and policymakers need to consider such a plan for other potentially dangerous substances in the future.

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