Original Article

Medication Safety and Pharmacovigilance Resources for the Ambulatory Care Setting: Enhancing Patient Safety

Jennifer A. Gershman, PharmD, CPh,* and Andrea D. Fass, PharmD*

ABSTRACT

Reputable medication safety resources are fundamental to assist in reducing medication errors and educating consumers. The purpose of this article is to describe medication safety and pharmacovigilance electronic and mobile resources that are available to pharmacists to enhance patient safety in the ambulatory care setting at the national level through the US Food and Drug Administration (FDA), Drug Enforcement Administration (DEA), American Medicine Chest Challenge, and Institute for Safe Medication Practices (ISMP). Information concerning drug disposal methods is available through the FDA, DEA, and the American Medicine Chest Challenge Rx Drop app. The ISMP provides a variety of tools for reporting and preventing medication errors including Assess-ERR and ConsumerMedSafety.org. Risk Evaluation and Mitigation Strategies (REMS) were created as a requirement of the FDA Amendments Act of 2007 to ensure that the drug's benefits outweigh the risks. Health care professionals are encouraged to report adverse drug events through the FDA's MEDWATCH reporting system. Pharmacists have a variety of useful resources for their medication safety and pharmacovigilance toolbox. Studies should evaluate the use of these resources by pharmacists and consumers.

Key Words—electronic resources, medication safety, mobile resources, pharmacovigilance

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Approximately half of all Americans take at least 1 prescription medication daily, with older adults using at least 5 drugs.¹ In 2007, the Institute for Safe Medication Practices (ISMP) published a white paper on medication safety, which was a call to action for community pharmacists to enhance patient safety by decreasing inappropriate medication use.² The Institute of Medicine (IOM) reports that at least 1.5 million preventable adverse drug events (ADEs) occur annually in the United States.³ The IOM issued a report in 2006 that discusses methods to prevent medication errors, including empowerment of patients to take charge of their health and the use of medication safety resources by pharmacists to enhance patient care.³ The report also discusses the use of point-of-care drug information

references. This demonstrates the importance of reputable medication safety resources in reducing medication errors and educating consumers.

Pharmacovigilance is a component of phase IV of the US Food and Drug Administration's (FDA) drug approval process, which includes further post-marketing clinical studies and reporting of ADEs.⁴ The World Health Organization defines pharmacovigilance as “the science and activities relating to the detection, assessment, understanding, and prevention of adverse effects or any other drug-related problem.”⁵ The pharmacovigilance process prompts the FDA to review drug safety information to determine whether the safety content in the prescribing information needs to be updated or to identify an unsafe medication that should be removed from the market.

*Assistant Professor, Department of Pharmacy Practice, Nova Southeastern University, College of Pharmacy, Ft. Lauderdale, Florida. Corresponding author: Jennifer A. Gershman, PharmD, CPh, Assistant Professor, Nova Southeastern University, Health Professions Division, College of Pharmacy, 3200 South University Drive, Ft. Lauderdale, FL 33328; phone: 954-262-1115; fax: 954-262-2278; e-mail: jennifer.gershman@nova.edu

A recent cross-sectional study evaluated pharmacists' knowledge of ADE reporting through the FDA's MEDWATCH program.⁶ Survey results from 377 Texas pharmacists practicing in hospital and community settings revealed knowledge deficits regarding ADE reporting.⁶ A majority of pharmacists (65.7%) indicated that they had inadequate knowledge regarding ADE reporting. The lack of ADE knowledge was highest among older pharmacists, those working in community pharmacies, pharmacy owners/partners, relief pharmacists, and those practicing in rural and suburban settings.⁶ Knowledge items pertaining to ADEs included the severity of the ADE that should be reported, whether all information regarding the ADE is required to be known prior to reporting, and whether reports can be submitted anonymously.⁶ The following review describes electronic and mobile resources for medication safety and pharmacovigilance to be used by pharmacists to enhance patient safety in the ambulatory care setting at the national level. Additionally, the potential impact of these resources on patient safety is emphasized.

MEDICATION SAFETY RESOURCES

Drug Take-Back Programs

Drug take-back programs provide a way for patients to safely dispose of unused, expired, or unwanted medications. President Obama's 2013 National Drug Control Strategy includes a prescription drug abuse prevention plan that emphasizes the need for prescription drug disposal programs.⁷ According to the 2011 National Survey on Drug Use and Health, approximately 50% of individuals 12 years old and older using pain relievers for non-medical reasons in the past 12 months obtained these medications from a friend or relative for free.⁸ There is evidence that pharmaceuticals affect the ecological system, but their impact on humans through the drinking water is unknown.⁹ Additionally, education and awareness regarding drug disposal is lacking.⁹

The federal Controlled Substances Act does not offer guidance to individuals about disposal of controlled substances.¹⁰ The Secure and Responsible Drug Disposal Act of 2010 encourages the establishment of controlled substance disposal methods for consumers, including drug take-back programs, and amends the Controlled Substances Act.¹¹ The Drug Enforcement Administration (DEA) is in the process of revising the Controlled Substances Act, as pharmacists are currently not permitted to take back consumers' controlled substances for disposal. Therefore, law enforcement must collect controlled substances at

drug take-back events.¹⁰ The *Federal Register* issued a proposed rule December 2012 to expand options for consumers to dispose of controlled substances, including take-back events, mail-back programs, and collection receptacles at retail pharmacies.¹²

The DEA recognizes the importance of drug disposal and has established National Prescription Drug Take-Back Day.¹³ These take-back events have taken place in all 50 states and US territories and have been successful in disposing over 2.8 million pounds of medication since the program's inception in 2010.¹³ These events are usually held twice a year. Pharmacists should inform consumers about disposal sites that can be located through the DEA homepage using the collection site locator by state and zip code.¹³

The FDA recommends that consumers dispose of medications through a drug disposal program.¹⁴ If one is not readily available, then patients can consult the list of 36 medications (mostly Schedule II controlled substances) recommended for disposal by flushing, because accidental ingestion is harmful or they have a high potential for abuse. All other medications can be mixed with an unpalatable substance, such as cat litter or coffee grounds, placed in a sealed plastic bag, and disposed of in the household trash.^{14,15}

On May 8, 2012, the American Medicine Chest Challenge (AMCC) released the free AMCC Rx Drop app for Apple and Android products.¹⁶ This is the first app to display permanent prescription drug disposal sites across the United States. Individuals can enter their zip code and get the distance in miles from their current location to the drug disposal site; the address, distance, and map are provided for convenience. Additionally, the app has a special prescription drug abuse prevention feature that includes the 5-step challenge of prescription drug abuse prevention.¹⁶ Pharmacists can show patients how to utilize this mobile app to safely and appropriately dispose of medicine. One disadvantage of the app is that drug take-back events are not listed.

Pediatric Labeling Information Database

In 2012, The FDA created the Pediatric Labeling Information Database as a one-stop resource for information on pediatric medications.¹⁷ Each entry includes the pediatric labeling information, trade and generic names, indications studied, label changes summary, and therapeutic category. The database can be searched by product name or condition. As of May 2013, there were 470 products in the database.¹⁷ The FDA's Office of Pediatric Therapeutics developed a Safety Reporting page describing adverse

events occurring in the pediatric population with recommendations from the Pediatric Advisory Committee.¹⁸ Historically, the package insert has contained inadequate pediatric information.¹⁹ In 2009, 46% of medications in the *Physicians' Desk Reference* contained pediatric information, an increase since 1975 (22% of medications).¹⁹

MEDICATION ERROR PREVENTION AND REPORTING ISMP MERP

Consumers and health care professionals can anonymously report medication errors through the ISMP's National Medication Errors Reporting Program, ISMP MERP.²⁰ Individuals can describe the specific medication error, including the drug involved and the practice setting.²⁰ ISMP then distributes alerts describing medication errors, which benefit the consumer and the pharmacy community.

ISMP Risk Safety Manual

ISMP created a free manual (Improving Medication Safety in Community Pharmacies: Assessing Risk and Opportunities for Change) in 2001 that is available online. Pharmacists can use this resource to enhance safety and improve patient care by identifying processes that may increase the incidence of medication errors at their practice site.²¹ This safety tool emphasizes the importance of risk identification and the use of an appropriate medication use system to reduce risk. It includes the Assess-ERR medication system worksheet that can be used in error reporting within the pharmacy practice site and to the ISMP MERP by recording those events that occurred or nearly occurred (near misses) and environmental factors (eg, human factors, workload). Once the problem is identified, the manual provides guidance in formulating an appropriate course of action. This risk safety tool identifies 10 key elements of a medication use system that, when used optimally, may identify and prevent risk in daily practice errors. These key elements include patient information, drug information, appropriate communication of drug orders, drug labeling (including packaging and nomenclature), drug standardization (including storage and distribution), accurate medication device use (eg, pen injector administration counseling through pharmacist demonstration), environmental factors including workflow and staffing patterns, staff competencies and education, patient education, and quality processes and risk management. Within each of these key elements, instances are outlined where errors may occur. For example, the impor-

tance of obtaining allergy information is highlighted within patient information, and the significance of maintaining readily retrievable updated references is included within drug information. Within communication, there is an emphasis on electronic prescribing in replacing handwritten orders or verbal orders that may be misinterpreted. Examples and case studies are provided to reinforce the information.²¹ This free manual provides community pharmacists with a resource to manage potential risks.

Consumer Medication Safety Web Site

Sponsored by the ISMP, ConsumerMedSafety.org provides medication safety articles, the latest FDA drug alerts, the ability to report medication errors, and additional tools and resources for patients.²² Medication safety articles include information for consumers on important points to consider when they are receiving their prescriptions or purchasing medications and appropriate strategies of medication administration at home, including storage and drug disposal. The Web site also highlights the importance of medication safety while in the hospital, child safety, and use of over-the-counter and herbal products. Tools and resources on the Web site include safe medicine newsletters, links to patient safety Web sites, an insulin safety center, and other information regarding high-alert medications and how to read prescriptions. On the Web site, patients have the ability to create personalized medication alerts, which can generate personalized drug interactions, safety alerts, and drug recalls. Automatic medication safety checks are routinely performed to update any new interactions or safety information for a patient's medication profile.²² This Web site is a valuable resource for patients for medication safety as well as consumer drug information.

PHARMACOVIGILANCE RESOURCES

Risk Evaluation and Mitigation Strategies

Risk Evaluation and Mitigation Strategies (REMS) were created as a requirement of the FDA Amendments Act of 2007 to ensure that a drug's benefits outweigh the risks.²³ The FDA maintains a complete electronic list of products requiring REMS, including the medication name, dates of REMS approval and modification, and specific requirements.²³ REMS apply to drugs already on the market and may be requested as a safety plan with new drug applications. In addition to medication guides and patient package inserts, REMS may include communication plans and elements to assure safe use

(ETASU).²⁴ The communication plan provides ways to alert health care professionals of REMS for specific products through letters and professional societies.²⁴ ETASU provides patients with safe access to drugs with known risks that usually would not be available without these safety measures. These requirements may include special certifications and trainings, dispensing restrictions, and patient enrollment in a registry.²⁵ For example, thalidomide (*Thalomid*) can only be prescribed and dispensed by health care providers and pharmacies certified in the S.T.E.P.S. program as part of their ETASU.²⁶ Pharmaceutical companies are required to include plan assessments of whether REMS components are meeting the program goals and objectives at 18 months, 3 years, and 7 years following drug approval.²⁷

The FDA requires REMS for all long-acting and extended-release opioid products to support President Obama's prescription drug abuse prevention plan.²⁸ The major component of opioid REMS is prescriber education that emphasizes the risks and benefits of opioid therapy.²⁹ Manufacturers are required to develop educational programs; however, it is not mandatory for prescribers to complete them to prescribe these opioids.²⁹ The FDA issued a draft blueprint for prescriber education on November 4, 2011 and requested public comment; the final blueprint was published on July 9, 2012 and was updated April 2013.²⁹ This document contains prescription drug abuse statistics, guidance on patient assessment and monitoring, counseling points, safety concerns, and drug information.

Bad Ad Program

The FDA launched the Bad Ad Program in 2010 to educate health care professionals regarding their role in ensuring that prescription drug advertising is not misleading and presents a fair balance of medication risks versus benefits.^{30,31} The FDA's Division of Drug Marketing, Advertising, and Communications (DDMAC) targeted health care providers at medical conventions and collaborated with professional societies.³² The DDMAC created an information video, Webinar, and brochure that provided examples of false and misleading advertisements. Additionally, DDMAC employees attended 15 medical conferences throughout the United States to discuss how health care professionals can play an important role in identifying misleading drug promotion.³² The FDA published their 2011-2012 annual report, which describes the development of a Web-based continuing education program for health care professionals

and education of medical, pharmacy, and nursing students on truthful prescription drug advertising and promotion. Information has also been displayed at medical professional conferences. The FDA has investigated promotional advertisements submitted by health care professionals that are potentially untruthful or misleading. Pharmacists can assist the FDA in the pharmacovigilance process by reporting false or misleading prescription drug promotion.³² Individuals can report inappropriate promotion of dietary supplements and over-the-counter drugs to the Federal Trade Commission, which regulates advertising practices for these products.³³

ADE Reporting

ADE reporting is one of the most important aspects of pharmacovigilance. Manufacturers are required to report ADEs to the FDA; however, it is not mandatory for health care professionals and consumers to do so.³⁴ The following severe outcomes associated with a medication should be reported through the FDA's MEDWATCH program: death, life-threatening reaction, hospitalization, disability, congenital anomaly/birth defect, required intervention, or other serious events.³⁴ Less than 1% of all serious ADEs are reported to the FDA.³⁵ In 2010, consumers submitted 403,746 reports and 427,064 reports were submitted by health care providers (36,448 pharmacists, 229,374 physicians, and the remainder by other health care providers including nurses and dentists).³⁵ MEDWATCH reports can be submitted online or by fax, phone, and US postal mail. Individuals can register to receive MEDWATCH safety alerts, which can assist them in staying up-to-date with medication safety information and product recalls. The FDA had created a consumer-friendly reporting form to encourage patients to report adverse effects.³⁶ The submission form takes approximately 10-15 minutes to complete. Boston Children's Hospital collaborated with the FDA to create the free interactive iPhone and Android app MedWatcher for health care professionals and consumers to report drug, vaccine, and device ADEs to the FDA.³⁷ In addition to serving as a platform for submitting reports, the app provides the latest drug safety updates from the FDA. Individuals can upload photographs of medical devices, which can also assist in reporting safety problems.

CONCLUSIONS

Pharmacists are at the forefront of promoting patient safety. The resources reviewed in this article provide pharmacists with medication safety and

pharmacovigilance tools. Additionally, pharmacists should ensure that consumers have access to reliable and up-to-date information regarding the safety of their drug therapy. Through community outreach programs, pharmacists have the opportunity to educate patients and colleagues regarding electronic and mobile resources available at the point of care.

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