

Adolescents' Misuse of Over-The-Counter Medications: The Need for Pharmacist-led Intervention

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Abstract

Adolescents' misuse of over-the-counter (OTC) medications is a growing patient safety concern, resulting in an alarming number of poisonings and emergency department visits. OTC medications are easily accessible and adolescents often have the misconception that these medications are safe, even at higher than recommended doses. Dextromethorphan and acetaminophen are the most common and frequently misused OTC medications among adolescents, with significantly dangerous health risks if used improperly. Pharmacists are critical to the provision of education on safe OTC medication use for adolescents and their family caregivers by leading and implementing relevant community-based interventions. Ideal channels in which to do this in the community are pharmacies and schools. It is challenging to gain the attention of adolescents and to engage them; methods that include innovative measures and initiatives may be the solution. Research is needed to determine how pharmacists can improve adolescents' knowledge and safe use of OTC medications. Pharmacists must be supported through training and acquisition of expertise specific to adolescent engagement and education. The development of pharmacist-led educational interventions that are tailored for adolescents that address their limited OTC medication knowledge and raise awareness of safety risks associated with misuse is crucial to preventing and reducing this patient safety problem in the community.

Keywords: adolescents, over-the-counter medications, OTC misuse, pharmacists

Introduction

Adolescent misuse of over-the-counter (OTC) medications is an increasingly prevalent public health and safety concern in the United States (US).^{1,2} The US Poison Center and hospital emergency department (ED) report that adolescents' medication misuse accounts for nearly half, or 48%, of all OTC medication-related poisonings and emergency room visits.³ The Centers for Disease Control and Prevention reports that poisoning deaths among adolescents aged 15 to 19 increased by 91% from 2000 to 2009.⁴ Equally concerning is that adolescents under the age of 18 are the most rapidly growing age group misusing OTC medications.⁵ "Misuse" of OTC medications can be defined as the intentional or unintentional use of an OTC medication in a way that is contrary to directions; this includes taking a higher than recommended dose, using it more frequently than directed, or combining the medication with other licit or illicit substances.⁶ Medication "abuse", also a form of misuse, is the intentional pattern of medication use to alter one's state of consciousness (i.e., to "get high").⁶

Adolescents, defined by the World Health Organization to be persons aged 10-19, are particularly vulnerable during the transition from childhood to young adulthood.⁷ It is a time when adolescents experience an increased need for a sense of belonging and acceptance among their peers.⁸ It is also early in adolescence when parents and caregivers typically begin to transfer responsibility for independent self-medication, at about age 11 or 12, and shift increasingly more as the child ages.^{9,10} Adolescents are, therefore, assuming greater autonomy in medication self-management at a time when they are balancing significant changes in themselves and their environment.

Adolescents' false perceptions of OTC medication safety have likely contributed to the increase in misuse.^{1,11,12} Easy accessibility to OTC medications likewise contributes to adolescents' false perceptions that they are safer than those requiring a prescription.^{11,13} OTC medications can be purchased in absence of patient counseling or assistance from pharmacists.¹⁴ Study findings suggest that 57-78% of adolescent report using OTC medications within the previous month.^{12,14,15}

Pharmacists are accessible medication experts essential to addressing this serious and escalating patient safety problem by providing adolescents and their family caregivers support regarding safe use of OTC medications through education and intervention. Adolescents have reported that they are interested in talking to pharmacists about medication-related topics.¹⁶ However, limited research exists on effective approaches to address OTC medication abuse among

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adolescents and of the usefulness of pharmacist-led interventions to prevent negative health consequences. There is a need for more research to educate the vulnerable adolescent patient population about safe OTC medication use and to explore the pharmacist's role in addressing this growing problem among adolescents.

Factors That Contribute to Adolescents Misuse of OTC Medications

Reasons that adolescents assume that OTC medications are safe include that they are accessible without a prescription in pharmacies, grocery and convenience stores and other retail outlets, are often relatively inexpensive, and can be easily obtained from peers, parents, siblings, and home medicine cabinets.^{10,17} By 16 years of age, approximately 90% of adolescents report self-medicating specifically with OTC medications.¹⁵ In addition to gaining increasing independence to self-medicate, adolescents often internalize their parents' values, attitudes, and behaviors.⁸ As such, parents, mothers in particular, strongly influence adolescents' OTC awareness, knowledge, and medication-taking behaviors.^{17,18} Other relatives, peers, healthcare professionals, media and advertisements, medication package inserts, and websites that promote the abuse of OTC medications may also have impact.^{8,11,17,19} It has been reported that youth who were educated by their parents about risks with OTC use were less likely to use these medications.¹⁵ Adolescents' family, social, and environmental experiences shape their knowledge and beliefs about safe use of medications, which could be harmful if their knowledge of OTC medications is incorrect.²⁰

Adolescents' limited knowledge about OTC medications also contributes to misuse.²¹ They know that they can easily obtain OTC medications, but a true understanding of what these medicines are used for, how to use them, and what they do is lacking. One study found that adolescents scored an average of about 44% on an OTC medication knowledge survey², and findings also suggest that adults that may care for this vulnerable population also possess limited knowledge.^{2,12} Adolescents have reported minimal awareness of dosage, side effects, combining OTC medications, and safety risks with prolonged use.⁸ Only 8% of adolescents reported that medications should be taken as instructed on the package insert or by a physician, though they identified both to be common resources for health information.¹⁰ A concerning finding is that, despite having minimal medication knowledge, many adolescents report it to be satisfactory.^{10,22} Unfortunately, the result may be unintentional misuse and a greater risk for experiencing negative health consequences.

Demographic characteristics may also influence the prevalence of OTC misuse among this population. Age may have an effect because older adolescents are more likely to self-medicate with OTCs, likely due to their higher level of

impulsivity and lack of maturity.^{6,17} Gender is likewise associated with OTC use and misuse among adolescents.^{9,10,19,22,23} Research has shown that female adolescents are more likely to report using OTCs to "get high" than their male counterparts.^{17,24} Conversely, males may believe that they will be perceived by their peers as weak if they take OTC medications for pain, therefore, self-report and actual use by male adolescents may differ.⁸

Racial and ethnic differences are also associated with OTC misuse among young people, though findings vary among the different studies.^{12,24,25} These disparities, as well as socioeconomic status and its influence on OTC self-medication practices^{23,26} remain important characteristics for further exploration. OTC medications may also be a substitute for individuals who are addicted to another substance but are unable to obtain that product.²⁷ While adolescent use of illicit drugs that are more difficult for minors to obtain, such as sedatives, ecstasy, synthetic marijuana, heroin, and nonmedical use of prescription drugs, has declined in recent years,^{11,28} OTC medications that may be used as substitutes are challenging to detect via routine drug testing.²⁷

Commonly Misused OTC Medications Among Adolescents

Dextromethorphan hydrobromide (DXM) is the most frequently used cough medication. It is an ingredient in more than 125 OTC cough and cold medications with various dosage forms,^{13,27} and DXM-containing medications are the most commonly misused OTCs among US adolescents.^{1,11,13,24,29,30} A study of adolescents who presented to the ED with drug misuse found that 25% were OTC medication-related, and dextromethorphan (DXM) was the most prevalent legal medication used.²⁹ Over a 10-year period from 2004-2013, adolescents intentionally used DXM-containing agents more than any other; this continues to rise at an even higher rate than ethanol (alcohol), benzodiazepines, and marijuana.³¹ The highest proportion of cases involved adolescents aged 15 to 16.¹¹ In this same 10-year period 26% of 9th graders reported the use of OTC cough medications to get high, surpassing the use of marijuana (25%) to achieve the same effect.⁵ Consuming a large amount of DXM beyond the recommended therapeutic dose will cause several psychotropic effects, beginning with mild stimulant behavior and including hallucinations and delusions.¹³ Intoxication with DXM can result in psychological and physiological effects similar to phencyclidine, including "out of body" experiences, and cause dissociation that abusers may pursue, further initiating dependence and physical withdrawal.²⁷

Many cough and cold OTC medications with DXM also contain "hidden ingredients" such as acetaminophen, antihistamines, and pseudoephedrine, which can result in toxicity in large doses. DXM intoxication usually resolves within six to eight hours; however, intoxication with acetaminophen can be

delayed for ten hours and may only appear as an upset stomach. Adolescents may not be aware of the resulting exposure or toxicity after taking a high dose of an OTC medication and consequently fail to seek medical attention. Rates of DXM misuse are likely even higher than reported, due to underreporting or an incorrect diagnosis of phencyclidine intoxication due to a false positive laboratory urine or blood test.¹¹

As mentioned, acetaminophen is a hidden ingredient in many OTC cough and cold medications; it is also a commonly used analgesic for mild pain among young people.^{10,11} When administered in the recommended therapeutic dose, acetaminophen is considered to be safe. However, intoxication can occur from a single or repeated dose over the recommended amount, and overdose can lead to liver damage or failure.^{12,32} Overdose from acetaminophen is the leading cause of acute liver failure in the US, above viral hepatitis, and 50-66% of these overdoses are unintentional.¹⁴ The Food and Drug Administration and the Institute for Safe Medication Practices have recognized that a prominent factor in unintentional overdose is that consumers are often unaware that acetaminophen is a common ingredient in many formulations.¹²

OTC misuse is not limited to medications containing DXM or acetaminophen. Diphenhydramine, an antihistaminic drug commonly known as Benadryl®, is generally considered to be harmless. However, individuals with a genetic predisposition to addiction may abuse diphenhydramine in order to feel the high experienced with stimulant drugs; intoxication can range from sedation to more serious effects, including tachycardia, agitation, hallucinations, convulsions, delirium, and coma.²⁷ Other OTC medications, including stimulants (e.g., pseudoephedrine, caffeine) and antidiarrheal medicines (e.g., loperamide) also have a high potential for misuse and serious detrimental health effects. To foster safe use of the loperamide, the U.S. Food and Drug Administration (FDA) is working with manufacturers to use blister packs or other single dose packaging to limit the number of doses in a package.³³

Consequences of OTC Medication Misuse

Adolescents' false perceptions that OTC medications are "safe", their limited medication knowledge, and the ease of accessing these products increase the likelihood of misuse and significant health risks.^{8,34} Adverse health consequences associated with the misuse of OTC medications, such as psychosis, agitation, tachycardia and seizures, are similar to those experienced with illicit drug use.^{1,30} OTC medication misuse can negatively influence adolescents' social relationships and cause long-term addiction and dependence.¹ Furthermore, young adults who have misused OTC medications are significantly more likely to report use of

marijuana, cocaine, nonmedical use of prescription drugs, stimulants, sedatives, and dangerous alcohol use.^{1,30}

Medication overdoses associated with the misuse of common OTCs are prevalent among adolescents.³⁵ One study found that adolescents ages 12-18 accounted for the highest number of ED visits for medication overdoses, most commonly caused by acetaminophen, cough and cold agents, and NSAIDs.³⁵ Medication-related poisonings are becoming increasingly evident as OTC misuse continues to rise. Poisoning is a leading cause of death in the US, surpassed only by motor vehicular accidents.³⁶ Nearly 90% of poisoning-related deaths are caused by drugs or medications.³⁶ A study of ED visits for unintentional poisonings in adolescents found that an estimated 69% were due to medication overdoses, 39% of which were from OTC medications.³⁵ This alarming increase in hospital ED visits and poisonings resulting from OTC misuse among adolescents indicates both the need for further research and implementation of community-based interventions to reduce safety risks and adverse health effects for this vulnerable population.

Opportunity for Pharmacists

It is evident that adolescents lack the necessary knowledge of appropriate OTC medication use and would benefit from receiving tailored education on this topic. Young people rarely seek consultation from healthcare professionals, such as pharmacists, who may provide valuable information regarding OTC medications to improve safe use. As more medications are converted to OTC status, the role of the pharmacists is crucial in providing patient-centered counseling on appropriate and cost-effective drug therapy.³⁷ Adolescents have reported that they consider pharmacies to be a trustworthy and reliable source of OTC medication information, thus reinforcing the opportunity for pharmacist-led education and widespread dissemination of information on safe OTC use.⁸

Misunderstandings about dosage instructions and safety risks have also been recognized as a prominent cause of OTC medication errors and adverse drug events.¹⁴ Shone et al. reported that 85% of adolescents, after reading the label instructions for an OTC product, communicated dangerous errors in their understanding of acetaminophen use.¹⁴ Since most adolescents are using OTC medications to self-medicate without parental or healthcare professional assistance, this is especially problematic. Pharmacists are well-positioned in the community to counsel adolescents, clarify OTC brand name confusion, correctly interpret medication labels and warnings and dosage instructions. Pharmacists, as medication experts, have the knowledge to inform educational interventions in pharmacies, schools, youth development programs and community settings to educate adolescents, parents, and other members of the community.³⁸

There is a dire need to develop and implement educational interventions focused on younger adolescents and to create a more comprehensive initiative for older adolescents.^{8,24} Interventions for adolescents should be tailored to address their unique medication concerns and discuss the risks and consequences of OTC misuse.⁸ Adolescents' substance use may also be related to their desire to be socially accepted by their peers, and they will likely demonstrate the same medication-taking behavior of those in their peer group.²⁴ Adolescents must manage the challenge of connecting with peers while establishing autonomy regarding peer influences; the nature of this challenge and how it is handled is closely linked to how adolescents are treated by the adults in their lives.³⁹ Adolescents' capacities for autonomy and connection can be developed both in the family and in interventions that engage youth with adults outside the family,³⁹ thus presenting an opportunity for pharmacists to improve OTC medication literacy, which may significantly influence overall patient safety.

Contexts and Strategies Pharmacists Should Consider

Strategies needed to motivate adolescents to learn about safe use of OTC medications may need to incorporate visually engaging tools and technologies. For instance, adolescents may enter a pharmacy, grocery store or other retail outlet for any purpose. The pharmacy environment could present signage or posters that are placed throughout the pharmacy or OTC aisles that are printed on brightly colored paper, contain youth-oriented graphics and language, and ask brief, open-ended questions, such as "Got an OTC medication question?" All signage must refer the viewer to contact the pharmacist, ideally in person though it may be useful to provide a website or email address. A simple and direct message could convey: we recognize that you may have questions and we are eager to answer them. The use of brief videos on display tablets might also be effective. One study found that using rap music to facilitate student interest promoted adolescent health.²⁶

When possible adolescents should be encouraged to directly communicate and interact with a pharmacist. Pharmacies can consider developing advertisement messages that target adolescents to see the pharmacist for some type of reward, for example, to request a code for access to play an educational game that occurs either on an in-pharmacy tablet or via the pharmacy website. Interactive computer applications and serious games are designed to entertain while achieving changes in knowledge or skills.⁴⁰ In some cases the result may be a one-time interaction, but it could also facilitate a base rapport from which to build. Given the pressures adolescents perceive or experience,⁸ we must also integrate topics of peer influence and social norms in educational programs and interventions.

A related topic of significant importance to adolescents is that of confidentiality.⁴¹ Pharmacists must be aware of this and specifically discuss confidentiality up front. Attending respectfully to these concerns may both reassure and accomplish the critical importance of gaining young people's trust.⁴¹

Pharmacist interventions may be very effective if introduced in schools and similar settings, e.g., after school programs or peer-involved activities, and may be target-rich environments in which to engage and educate adolescents. A school-type setting provides a natural environment in which students are of the mindset to learn, or, at a minimum, they are aware of the expectation to participate in learning. Previous educational interventions in schools that promoted adolescents' rational drug use showed positive changes in the participants' attitudes.²² Methods that incorporate tools that adolescents consider relevant and meaningful to their own lives will be more engaging to them. One study found that an educational intervention led by student pharmacists in middle schools effectively improved adolescents' safe use of OTC medications and literacy.¹⁵ This example provides further support for findings that indicate that camaraderie with peers is influential and may also point to the influence of including younger persons as educators. This also provides valuable experiential learning opportunities to increase student pharmacists practice in counseling younger patients. More research is needed to examine the effect of educational interventions led by student pharmacists to improve adolescents' OTC medication knowledge.

Due to parents' influence on adolescents' attitudes and questions regarding safe use of OTC medications,² pharmacist-led interventions should be developed to educate parents. Such an intervention could: 1) raise awareness of the potential safety risks associated with OTC medication misuse, 2) assist parents in guiding their children in appropriate use of these medications, and 3) promote modeling of appropriate OTC medication-taking behavior. The strategies used to interest adolescents may also be of interest to adults, if only because their aim is to attract adolescents. It is anticipated that adults may have an innate interest in what their child is doing or thinking, which serves as the catalyst that may drive adults' interest to understand or learn about OTC medication safety.

Efforts within the community are further impacted by state and national initiatives to increase awareness of OTC misuse, including the Partnership for Drug-Free Kids, D.A.R.E. America, Community Anti-Drug Coalitions of America, and the Stop Medicine Abuse prevention campaign.⁴² These initiatives provide resources for healthcare professionals, including pharmacists, to inform interventions focused on addressing OTC misuse among adolescents.⁴² The use of these resources and building upon previous findings of successful educational

programs with adolescents will inform the development of future pharmacist-led interventions to address OTC medication misuse.

Conclusions

There is a limited understanding of OTC medication knowledge among adolescents. A significant number of adolescents are self-medicating with OTC medications, resulting in potentially dangerous misuse and risk for negative health effects. Easy accessibility of OTCs, limited knowledge of appropriate use, false perceptions of safety, high incidence of pain, social influences, and specific demographic characteristics may be factors in adolescents' misuse of OTC medications.

Pharmacists are among the most accessible healthcare professionals in a wide range of communities who can provide counseling directly to adolescents to promote safe OTC medication use. The literature is sparse on adolescents' perspectives of pharmacist-provided education regarding OTC medications. More research is needed to explore the environmental factors that influence adolescents' OTC medication misuse, including their parents and peers, and on what is meaningful to attract and engage adolescents to improve patient safety. This line of research will provide insight regarding specific adolescent characteristics related to OTC misuse and the information needed to design tailored interventions.

Pharmacists recognize that there are differences in the skills required to fulfill their professional responsibilities in a clinical setting versus those required to educate adolescents in a community setting. They possess the capacity to effectively address this important and potentially preventable health concern. Pharmacists and pharmacists-in-training must be supported through training and acquisition of expertise specific to adolescent engagement and instruction. The development of pharmacist-led educational interventions that are tailored for adolescents that address their limited OTC medication knowledge and raise awareness of safety risks associated with misuse is crucial to preventing and reducing this patient safety problem in the community.

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