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Self-Medication by Adolescents Marcia L. Buck, Pharm.D., FCCP

The ability to use prescription and over-the-counter (OTC) medications safely and effectively is an important facet of health maintenance. The transition from childhood, with parental control of medication administration, to independent adulthood is linked by a period during adolescence when most individuals first begin to take responsibility for self-medicating minor illnesses and become more involved with managing chronic conditions. While the transition to self-care proceeds seamlessly for most, there are patients, and families, for whom the transition is more difficult. This issue of *Pediatric Pharmacotherapy* will explore studies of medication use in adolescents and provide recommendations for assisting with the transition to self-care.

Transition to Self-Medication

Self-medication begins in early adolescence, often during the middle school years. By the age of 16, nearly all adolescents have taken medicine independently. There is considerable variation, however, in the age at which independent self-care is achieved, as well as in the accuracy of medication and dosage selection. In 1997, Chambers and colleagues found that 58 to 76% of the 651 junior high school students surveyed reported taking analgesics without the specific knowledge of their parents.¹ In many of these cases, the adolescents' level of autonomy was supported by their parents. Girls tended to self-administer medications more often than boys, and the percentage of adolescents self-administering medications increased with increasing age. Most of the adolescents reported initiating self-medication at 11 to 12 years of age.

This degree of self-medication among adolescents has been confirmed in several other studies. Results have been similar with both OTC and prescription medications. A 1998 evaluation of 392 families of children with asthma participating in an urban school-based education program revealed that more than half

of the children 9 years of age or older were responsible for their own medication administration.²

Stoelben and colleagues evaluated the medication knowledge of a group of 53 adolescents in Dresden, Germany.³ Fifty-six percent of the students had taken at least one medication during the previous 2 weeks, with the most common agents being analgesics and antipyretics. Girls reported taking significantly more medications than boys during the previous 2 weeks ($p < 0.05$) and over the previous 6 months ($p < 0.005$).

Despite the relative frequency of medication use, these students had little understanding of common medication information. On a test of medication knowledge, the mean score was only 5.74 ± 1.89 out of a possible 13. Forty-seven percent were able to select the correct definition for an antibiotic, but only 6% could define analgesic. Sixty-two percent of the students said they read the package insert for prescription drug information, with physicians listed as the second most commonly used information source. On the assessments of drug knowledge, girls performed significantly better than boys ($p < 0.05$). Parental education had no influence on medication knowledge. In spite of their relatively low scores on the medication knowledge test, 55% of the students rated their knowledge as satisfactory, 19% as good, and 11% as sufficient. One student labeled his knowledge as very good and one as bad. The results suggest that while self-medication is common among adolescents, they may have significant knowledge deficits which may predispose them to medication misuse and/or adverse effects.

In 2001, Sloand and Vessey surveyed 86 adolescents between 10 and 14 years of age about their medication use.⁴ Eighty-eight percent of the subjects reported having access to medicine in their household. Despite their access, 64% reported that they had asked a parent or guardian for the last dose of medicine

that they took, while 36% took medicine independently. When asked to choose an appropriate OTC medication for common illnesses, 62% of the students were able to correctly identify antipyretics for a headache. Analgesics were appropriately identified by 87% of the subjects, but only 15% were able to select appropriate therapy for menstrual pain. The selection of cough and cold products was made appropriately by 50-60% of the students.

The frequency of self-medication was also assessed in an international cross-sectional survey of 123,227 students in 2003.⁵ Hansen and coworkers utilized the 1997-1998 Health Behavior in School-aged Children database to identify medication use characteristics in three age groups: 11, 13, and 15 years. In all 28 countries included in the database, analgesic use was higher in girls than boys. Use of analgesics for headaches increased by age, but medications for inability to sleep or nervousness declined. Use of medications for stomachache increased by age in girls, but decreased in boys. Data from the United States revealed analgesic use for headache in 48.9% of boys and 65.9% of girls, with medication for stomachache used in 20.5% of boys and 34.6% of girls, while medications for sleeplessness or nervousness were used in 10% or less.

The use of medications for dysmenorrhea by adolescent girls has been studied by several investigators.⁶⁻⁸ O'Connell and colleagues from Columbia University recently surveyed 76 healthy adolescent girls (mean age 16.8 years) with moderate to severe dysmenorrhea.⁸ The patients were interviewed upon enrollment into a clinical study of oral contraceptives for the treatment of dysmenorrhea. Symptoms were reported as moderate in 42% of the young women and severe in 58%. Seventy-three patients (93%) reported taking at least one medication for menstrual pain. The majority (91%) used OTC medications, but 21% reported obtaining additional prescription medications, including acetaminophen and codeine, ibuprofen and hydrocodone, and rofecoxib. A third of the patients used at least two types of medication, and 15% used three types. Of interest, many of the young women may have been under-treating their condition. Approximately 70% took doses which were less than 50% of the recommended maximum daily dose. Fewer than 10% of the patients took the full daily dose.

In a study of 650 adolescents with recurrent migraines or tension headaches, 22% were determined by investigators to be overmedicating with OTC analgesics (taking more than three

doses per week for more than 6 weeks).⁹ Approximately 14% of the patients, all between 6 and 18 years of age, were self-medicating without telling their parents. The authors of the study reported that 85% of the adolescents were considered high-achievers. They suggested that these patients may be using OTC medications in place of exercising, eating better, or using other non-pharmacologic means of minimizing stress.

Teaching and Modeling Self-Medication

The ability to safely use medications should be both taught and modeled for adolescents. For most teens, the most important sources of medication information are their parents.¹ The following recommendations may be helpful for parents to guide instruction and make the transition to self-care easier for the adolescent taking OTC medications:

- Talk about why and when to treat common problems like headaches with older children and adolescents to help them gauge when treatment is needed.
- Show adolescents which products are appropriate for common problems and how to find the dosing instructions.
- Discuss appropriate duration of use and when to contact a parent or medical personnel.
- Limit the number of products available in the home and keep products in their original containers to reduce confusion.
- Model appropriate self-medication habits and encourage questions.

While family members often play a primary role in medication education, other resources may also be useful. In their survey, Stoelben and colleagues found that 62% of the students recommended including the topic in school lessons.³ In 2004, the Food and Drug Administration (FDA) developed a program designed to teach sixth grade (11 or 12 year old) students about safe medication use.¹⁰ The program, Medicines in My Home, was designed as a school-based module, but has been expanded to a web-based resource. The downloadable brochure provides instructions about reading medicine labels, measuring liquid medicines, and identifying common OTC ingredients. The website and the brochure stress the need to talk to parents before using an OTC medication.

Promoting Adherence in Adolescents

Numerous studies have demonstrated low rates of adherence (medication compliance) among adolescents with chronic illnesses.¹¹⁻¹⁴ Several of these studies have suggested that adherence with

chronic prescription medications is improved in pediatric patients where the family values the therapy, has an appropriate level of knowledge about the medications, and provides consistent routines which reinforce the role of the medication in family life.¹²⁻¹⁴ Martin and colleagues recently conducted a 6-month longitudinal study of medication adherence in 24 HIV-positive children (mean age 14 years) and their caregivers.¹⁴ Using an electronic monitoring device in the bottle caps, the authors found adherence rates of 81% during months 1-3 and 79% during months 4-6. Greater medication knowledge among the caregivers and less child-caregiver discrepancies about responsibilities regarding medication administration predicted better adherence (adjusted R=0.45). The authors concluded that clear responsibility for medication-related tasks is necessary for improving adherence and optimizing response.

The first step to a successful transition to self-medication with chronic therapies often involves providing age-appropriate medication information to the adolescent. Standard adult medication instructions, such as FDA-approved Medication Guides or patient package inserts, are generally appropriate for most adolescents over 11 years of age.

Curry and colleagues at Children's Mercy Hospitals developed Kid Cards, short summaries of basic information targeted for the 7-11 year old patient.¹⁵ In 2006, the authors conducted a pilot study to assess the efficacy of their tool in improving drug knowledge among nine children receiving aminocaproic acid. The children were provided with both verbal education and a copy of the Kid Card. They were then asked six questions regarding their medication, including items related to the dosage formulation, duration of therapy, frequency of administration, rationale for use, and adverse effects. At both 2 and 4 weeks post-intervention, the number of correct responses was significantly higher than baseline, indicating the ability of children in the 7 to 11 year old age range to retain basic medication information.

Improving adherence in adolescents and increasing self-care may include many different steps. In addition to understanding the medication itself, adolescent patients should also understand the rationale for therapy as well as the consequences of non-compliance. Health care providers can serve not only as a trusted information source for these patients, but also as a neutral "third party" for discussions between adolescents and their parents, including the

development of contracts to assist in ensuring or improving adherence.^{11,16}

Summary

The adolescent years mark a period of transition for many activities, including the development of appropriate health care behaviors. Among these behaviors are the ability to identify common illnesses and to use OTC and prescriptions medications safely and effectively. As adolescents patients take on these new responsibilities, pediatric health care providers, educators, and family members can play a vital role in making the transition to self-care successful.

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Literature Review

Echinocandin Review

The echinocandins, caspofungin, micafungin and anidulafungin, are a unique class of antifungals with a broad spectrum of activity. This comprehensive review covers basic microbiologic information, as well as pharmacokinetic data, drug interactions, adverse effects, and the results of several clinical trials. The authors include sections on the use of the echinocandins in infants and children, pregnant women and breastfeeding mothers, the elderly, and patients with impaired hepatic function. This article will be a useful reference for students and health care providers treating patients with fungal infections unresponsive to traditional therapies. Cappelletty D, Eiselstein-McKitrick K. The echinocandins. **Pharmacotherapy** 2007;27:369-88.

Insulin Lispro Review

Insulin lispro is a human insulin analogue, identical to human insulin except for the transposition of two amino acids. It has a faster onset and a shorter duration of action than regular insulin, providing a physiologic response more like endogenous insulin. This extensive review describes the pharmacokinetic and pharmacodynamic properties of insulin lispro, as well as its efficacy in treating type 1 and type 2 diabetes. Simpson D, McCormack PL, Keating GM, et al. Insulin lispro: a review of its use in the management of diabetes mellitus. **Drugs** 2007;67:407-34.

Pertussis Review

This comprehensive review covers the diagnosis, prevention, and treatment of pertussis infections. The authors reviewed studies published between 1966 and 2006, including the most recent CDC Advisory Committee for Immunization Practices (ACIP) recommendations for pertussis immunization. The article contains several useful tables, including the available vaccines and the differences among their components, recommendations for treatment, and control measures for pertussis outbreaks. Raguckas SE, VandenBussche HL, Jacobs C, et al. Pertussis resurgence: diagnosis, treatment, prevention, and beyond. **Pharmacotherapy** 2007;27:41-52.

Risperidone in Pregnancy

There have been few reports on the effects of risperidone, an atypical antipsychotic, taken during pregnancy. The authors of this study examined reports from 713 pregnancies in which the mothers received risperidone, identified through the Benefit/Risk Management Worldwide Safety Database. In the 68

prospectively monitored cases, there was a 3.8% incidence of organ malformations and a 16.9% incidence of miscarriage, similar to expected background rates in the general (untreated) population. Overall, there were 12 reported cases of major organ malformation and 37 infants with perinatal symptoms ranging from tremor and jitteriness to somnolence and feeding problems. The authors concluded that there does not appear to be an increased risk for miscarriage or structural malformations in infants exposed to risperidone in utero, but that self-limited extrapyramidal effects may occur after birth. Coppola D, Russo LJ, Kwarta RF, et al. Evaluating the postmarketing experience of risperidone use during pregnancy: pregnancy and neonatal outcomes. **Drug Safety** 2007;30:247-64.

Formulary Update

The following actions were taken by the Pharmacy and Therapeutics Committee at their meeting on 4/27/07:

1. Atomoxetine (Strattera[®]) was added to both the Inpatient and Outpatient Formularies for the management of attention deficit hyperactivity disorder.
2. The restrictions on the use of cilostazol (Pletal[®]) and raloxifene (Evista[®]) were deleted.
3. The restriction on nitric oxide use was amended to allow prescribing by attending physicians in the pediatric intensive care unit.
4. The restriction on fondaparinux (Arixtra[®]) was amended to include use by Orthopedic Surgery for elective hip replacement. The restriction to Hematology was retained.
5. Tegaserod (Zelnorm[®]) and pergolide were removed from the U.S. market and have been removed from the Formulary.

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