Identification of Errors in Pediatric Prescriptions and Interventions to Prevent Errors: A Survey of Community Pharmacists

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OBJECTIVES Assess the competency of community pharmacists in identifying errors in pediatric prescriptions and to determine how often pharmacists perform interventions known to mitigate the likelihood of error. The study sought to recognize factors that may impact the pharmacist's ability to identify and mediate these errors, and to detect barriers that limit the role of the pharmacist pediatric patient care.

METHODS A survey was distributed through the University of Illinois at Chicago College of Pharmacy Alumni Network and the Illinois Pharmacists Association email listservs. Pharmacists practicing in a retail setting within the last 5 years were included. Three prescription scenarios for commonly used pediatric medications with corresponding questions were created to assess a pharmacist's ability to identify errors. Demographics pertaining to the pharmacist and the practice site, as well as information about dispensing practices, were collected. Logistic regression was used to identify factors that might impact the pharmacists' ability to identify errors.

RESULTS One hundred sixty-one respondents began the survey and 138 met inclusion criteria. In 15% to 59% of scenario-based questions, pharmacists did not appropriately identify errors or interventions that would decrease the likelihood of error. Correct identification of doses was associated with total prescription volume in one scenario and with pediatric prescription volume in another scenario. Pharmacists did not consistently label prescriptions for oral liquids in milliliters or dispense oral syringes. Barriers to pharmacist involvement included availability and interest of the caregiver, ability to contact prescriber, and pharmacy staffing.

CONCLUSION Community pharmacists did not consistently identify medication errors or use interventions known to mitigate error risk.

ABBREVIATIONS AAP, American Academy of Pediatrics

KEYWORDS attitude of health personnel; clinical competence; community pharmacy services/organization & administration; drug prescriptions/statistics & numerical data; medication errors/prevention & control; pharmacist, community setting; pharmacists/standards; professional role; survey

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Introduction

It has been estimated that 3% to 9.7% of outpatient pediatric prescriptions result in a preventable medication error.[1,2] Furthermore, pediatric patients are more susceptible to serious harm when medication errors occur.[3] In 2004 it was estimated that 5691 pediatric patients visited the emergency room owing to medication errors, with the most common error being administration of the incorrect dose by a caregiver.[4] Community pharmacists are uniquely positioned to impact medication safety in the ambulatory setting; however, in a survey of community pharmacists conducted by Rashid and colleagues,[5] only 58% to 64% rated themselves as comfortable evaluating common pediatric prescriptions.

For pediatric patients, medication prescribing is particularly complex owing to weight- and age-based dosing, the variety of concentrations and dosage forms used, and the need to alter dosage forms intended for adult use. Medication administration is complicated by the need for caregivers to measure patient-specific doses. Studies have shown that caregivers do not accurately measure oral liquid doses 15% to 84% of the time.[6,7] Several factors have been shown to improve accuracy of administration, including labeling doses in milliliters, dispensing oral syringes, and counseling that includes demonstration of measurement technique.[8–10] Using these interventions, the community pharmacist can mitigate potential errors in pediatric ambulatory medication use. The extent to which such interventions are incorporated into current practice remains

unknown. The purpose of this study was to determine what percentage of community retail pharmacists identified errors in pediatric prescriptions and how often pharmacists performed interventions known to mitigate the likelihood of errors. Furthermore, the study sought to recognize factors that may impact the ability to identify and mediate these errors, and to detect barriers that limit the community pharmacists' role in the care of pediatric patients.

Methods

Design. This was an observational, cross-sectional, survey-based study. The survey included pharmacists who have practiced in the community retail setting within the last 5 years. Student pharmacists, pharmacists who practice only in other settings, and pharmacists who last practiced in the community retail setting more than 5 years ago were excluded. The survey and study protocol were approved by the Institutional Review Board at the University of Illinois at Chicago.

The survey was disseminated through the University of Illinois Alumni Network and the Illinois Pharmacists Association. At the time of dissemination there were approximately 4800 email addresses in the Illinois Pharmacists Association listserv and 4650 email addresses in the University of Illinois Alumni Network listserv. How many email addresses were active, how many belonged to practicing community pharmacists, and how many overlapped between the groups is unknown.

Survey Tool. A 30-question survey was developed by using Qualtrics online software (Qualtrics Labs Inc, Provo, UT). The University of Illinois at Chicago Survey Research Laboratory provided guidance developing the survey questions. The question format included multiple-choice and scale-based responses. Some questions allowed multiple responses and free-text comments. Respondents could skip individual questions with the exception of the first question, which was used to establish criteria for study inclusion. The survey contained navigation logic. For example, respondents who indicated they did not compound at their site were not asked questions about compounding practices. Participants could leave the survey and return at any time from the same device.

The survey solicited information about responding pharmacists' education and practice site (Supplemental Table). Pharmacists were asked to rate their comfort evaluating, counseling, and making recommendations on pediatric prescriptions. The survey included 3 common pediatric prescriptions with corresponding questions intended to gauge the respondent's ability to identify potential errors in prescribing, dispensing, and administering the medication. Respondents were asked about references available at their practice site, compounding practices, counseling practices, and perceived barriers to pharmacist involvement. Prescription scenarios were designed by the study team, based on clinical experience with common prescription errors.

Scenario 1. In this prescription scenario, respondents were shown a prescription for amoxicillin suspension 400 mg/5 mL, dose 800 mg, for a 20-kg patient. Respondents were asked if they would fill the prescription and given the following possible responses: 1) Yes, this prescription is appropriate; 2) No, the dose is too high; 3) No, the dose is too low; and 4) Need more information. As this prescription correlated to a total dose of 80 mg/kg/day—an appropriate dose for the most common amoxicillin indications for community-acquired pneumonia and otitis media, but not all indications—answers 1 and 4 were accepted as correct.[11,12] Respondents were asked how they would label this prescription and given the following options: 1) Give 2 teaspoonfuls by mouth twice daily for 10 days; 2) Give 10 mL by mouth twice daily for 10 days; 3) Give 10 mL (800 mg) by mouth twice daily for 10 days; and 4) Give 800 mg by mouth twice daily for 10 days. Options 2 and 3 were accepted as correct because the patient was instructed to measure doses in units of milliliters.

Scenario 2. In this prescription scenario respondents were presented with a prescription for ferrous sulfate 90 mg twice daily for a 6-kg patient. As ferrous sulfate is available in multiple concentrations, respondents were shown nutrition facts for over-the-counter ferrous sulfate 75 mg/mL (equivalent to 15 mg/mL elemental iron) to allow them to answer the subsequent questions. Respondents were asked if the dose is appropriate and were shown the following options: 1) Yes, this dose is appropriate; 2) No, the dose is too high; 3) No, the dose is too low; and 4) Need more information. Ferrous sulfate dosing in pediatrics is typically expressed in terms of elemental iron, which would make the dose of 90 mg twice daily too high for this patient; however, if that dose was taken to mean 90 mg twice daily of ferrous sulfate salt the dose is appropriate. Options 1 and 4 were both accepted as correct. Respondents were then asked how they would counsel the caregiver to administer this over-the-counter product and given the following options: 1) Give 90 mg by mouth twice daily; 2) Give 1.2 mL by mouth twice daily; 3) Give 6 mL by mouth twice daily; and 4) Give 1 dropperful by mouth twice daily. As the dose was 1.2 mL, only Option 2 was correct for this question. Finally, respondents were asked what device they would dispense with this product and given the following options: 1) Dropper provided in box; 2) Oral syringe; 3) Dosing spoon; and 4) Dosing cup. Only Option 2 was considered correct for this question.

Scenario 3. Respondents were shown a prescription for cefdinir 250 mg/5 mL, take 10 mL twice daily, for a 70-kg patient. This dose was correct as based on pediatric per kilogram dosing but exceeds the maximum total daily dose for this medication. Respondents were asked if they would fill the medication and given the following options: 1) Yes, this prescription is appropriate; 2) No, the dose is too high; 3) No, the dose is too low;

Table 1. Characteristics of the Practice Site*

Parameter	Percentage
Pharmacy type (N = 124)†	
Chain	73
Independent	32
Other	16
Prescriptions filled per week (N = 123)	
<500	14
500–1000	29
1001–2500	41.5
>2500	15.5
Pediatric prescriptions filled per week (N = 122)	
<10	8
10–50	35
>50	57
References available (N = 88)†	
Facts and Comparisons	72
Internet search engine	51
Micromedex	24
Pediatric and Neonatal Dosage Handbook (Lexicomp)	22
Neofax	2
Harriet Lane Handbook	1

* Not all participants completed the entire survey and thus the total number of respondents for each question is reflected in the denominator.
† Multiple responses accepted.

and 4) No this concentration is incorrect. Option 2 was accepted as correct.

Data Collection and Analysis. Survey results were captured in the Qualtrics online tool. All completed and partially completed surveys were included, using the actual number of respondents for each question in the analysis. Results of the survey were analyzed by using descriptive statistics, and logistic regression was used to identify correlations. Participants were only included in the regression analysis if they provided responses for both the dependent and independent variable being analyzed. Statistical analysis was performed with SPSS (version 24, IBM Corp, Armonk, NY). An alpha of 0.05 was considered significant for all analyses.

Results

One hundred-sixty-one respondents began the survey. Twenty-three responders were excluded (21 had not practiced in a community retail pharmacy setting within the past 5 years, 2 were pharmacy students), resulting in a final sample size of 138. Not all participants completed the entire survey and thus the total number of respondents for each question is reflected in the denominator. Fifteen states were represented in the sample, with 78% of respondents practicing in Illinois. Pharmacists had been in practice for a median of 13.5 years (range, 1–55 years), 62% had a PharmD (77/125), and 8% had completed residency or fellowship training (10/125). Thirty-five percent of pharmacists (44/124) had some form of pediatric-specific education or experience, defined as a pediatric-focused elective in pharmacy school (24/44), pediatric student clerkship (9/44), pediatric rotation during postgraduate training (10/44), or previous employment in a pediatric institution (10/44). Most pharmacists practiced in a chain pharmacy with a prescription volume of more than 1000 prescriptions per week and more than 50 pediatric prescriptions per week (Table 1). The most common references available were Micromedex (IBM, Armonk, NY), Facts and Comparisons (Wolters Kluwer, Alphen aan den Rijn, Netherlands), and an internet search engine (Table 1).

Pharmacists were presented with a series of 3 hypothetical pediatric prescriptions with corresponding questions (Supplemental Table). The first was a prescription for amoxicillin. The dose was correctly assessed by 81% (88/108), and 82% (90/109) chose a label for the prescription that included appropriate units of milliliters. The second prescription was for ferrous sulfate oral liquid. Sixty-two percent (63/101) correctly

Table 2. Community Pharmacists' Responses to Prescription Scenarios

Question	Answer*			
	A n (%)	B n (%)	C n (%)	D n (%)
Scenario 1				
1A: Amoxicillin dose (n = 108)	58 (54)†	20 (19)	0 (0)	30 (28)†
1B: Amoxicillin label (n = 109)	19 (17)	47 (43)†	43 (39)†	0 (0)
Scenario 2				
2A: Ferrous sulfate dose (n = 101)	29 (29)†	38 (38)	0 (0)	34 (34)†
2B: Ferrous sulfate instruction (n = 99)	1 (1)	84 (85)†	4 (4)	10 (10)
2C: Ferrous sulfate device (n = 100)	48 (48)	51 (51)†	1 (1)	0 (0)
Scenario 3				
3: Cefdinir dose (n = 94)	46 (49)	39 (41)†	0 (0)	9 (10)

* Not all participants completed the entire survey and thus the total number of respondents for each question is reflected in the denominator.
† Correct answer.

identified that the dose was appropriate, 84% (84/99) identified the correct instructions for administration, and 51% (51/100) would have dispensed a device capable of measuring the dose accurately. The third prescription was for cefdinir oral suspension. Forty-one percent (39/94) correctly identified that the dose was too high. A complete representation of responses to the scenarios is available in Table 2.

Pharmacists' comfort evaluating, counseling, and making recommendations on pediatric prescriptions was self-reported by using a 7-point scale where 1 = extremely uncomfortable, 2 = moderately uncomfortable, 3 = somewhat comfortable, 4 = neither comfortable nor uncomfortable, 5 = somewhat comfortable, 6 = moderately comfortable, and 7 = extremely comfortable (Table 3). Ratings of 6 or higher were considered to indicate comfort. Fifty-eight percent (70/120) of respondents were comfortable evaluating pediatric prescriptions, 69% (82/119) were comfortable counseling on pediatric prescriptions, and 54% (64/119) were comfortable making recommendations on pediatric prescriptions.

Regression analysis was performed to identify factors that impacted pharmacist performance on scenario-based questions. The respondent's performance on case scenarios was compared with all other demographic responses. No correlation was found between scenario performance and pharmacists' years in practice, pediatric specific education or experience, or self-reported comfort evaluating pediatric prescriptions. Participants who practiced in a pharmacy with a prescription volume with fewer than 500 prescriptions per week were less likely than participants who practice in a pharmacy with a higher prescription volume to correctly assess the dose of amoxicillin (OR 0.30; 95% CI, 0.094–0.955; p = 0.042). Participants were more likely to identify the dosing error in the cefdinir prescription if pediatric prescription volume was more than 50 prescriptions per week as compared with those practicing in a pharmacy that fills 50 pediatric prescriptions per week or fewer (OR 3.06; 95% CI, 1.272–7.338; p = 0.013).

Pharmacists were asked a series of questions regarding counseling practices. Respondents selected all applicable reasons a pharmacist would be prompted to counsel on pediatric prescriptions, including the following: when parents ask to speak to a pharmacist (73%, 68/93), at the discretion of the individual pharmacist (62%, 59/93), all new prescriptions (59%, 55/93), all high-risk medications (47%, 44/93), all prescriptions (24%, 22/93), and all oral liquid prescriptions (22%, 20/93). When asked how often counseling occurs on pediatric prescriptions, 23% (21/93) noted always counseling on pediatric prescriptions, 41% (38/93) chose most of the time, 13% (12/93) chose about half the time, 24% (22/93) chose sometimes, and no respondents (0/93) chose never. The respondent's self-reported comfort in counseling was not correlated with frequency of counseling (p = 0.999). Pharmacists were less likely to counsel at least half of the time if the prescription volume was between 1000 and 2500 prescriptions per week (OR 0.27; 95% CI, 0.101–0.745; p = 0.011).

Ninety-five percent (88/93) of respondents indicated dispensing a dosing device with every pediatric prescription for an oral liquid. When asked what device is provided, 99% (92/93) dispensed an oral syringe, 71% (66/93) dispensed a dosing spoon, 42% (39/93) dispensed a dropper, and 24% (22/93) dispensed a dosing cup. Respondents could choose multiple answers, to account for use of different devices at different times. No respondent chose "none."

Respondents were asked to select from a list of barriers to making recommendations to providers that included the following: only ancillary staff available (71%, 64/90), unable to reach prescriber (63%, 57/90),

Table 3. Pharmacists' Self-Reported Comfort Evaluating, Counseling, and Making Recommendations on Pediatric Prescriptions

Responses	Evaluating* N = 120	Counseling* N = 119	Making Recommendations* N = 119
Extremely uncomfortable	2 (2)	3 (3)	5 (4)
Moderately uncomfortable	7 (6)	5 (4)	1 (1)
Somewhat uncomfortable	7 (6)	6 (5)	11 (9)
Neither comfortable nor uncomfortable	8 (7)	6 (5)	8 (7)
Somewhat comfortable	26 (22)	17 (14)	30 (25)
Moderately comfortable	48 (40)	50 (42)	51 (43)
Extremely comfortable	22 (18)	32 (27)	13 (11)

* All result shown as n (%).

parent does not want to wait for prescriber to be contacted (50%, 45/90), prescribers are unresponsive to recommendations (31%, 28/90), uncomfortable questioning pediatric prescribers (13%, 12/90), and "other" (2%, 2/90). The free-text comments provided included "younger physicians are receptive to recommendations, while older physicians are not" and "no barriers encountered." Similarly, respondents were asked to select from a list of barriers to counseling on pediatric prescriptions that included the following: caregiver is in a hurry (78%, 70/90), caregiver is uninterested in counseling (77%, 69/90), dispensed in drive-through (39%, 35/90), non-pharmacist at the pick-up window (38%, 34/90), language barrier (23%, 21/90), no system to target prescriptions requiring pharmacist counseling (7%, 6/90), uncomfortable counseling on pediatric prescriptions (2%, 2/90), and "other" (4%, 4/90). The free-text responses included "low health literacy of the parent," "no time due to busy store," "I always make time to counsel on pediatric prescriptions, even refills," and "Wisconsin requires counseling by a pharmacist, even on refills."

Discussion

Over 250 million prescriptions are dispensed to pediatric patients each year, accounting for approximately 8% of all prescriptions dispensed in the United States.[11] If 3% of those prescriptions resulted in a preventable medication error, as seen in the study by Kaushal et al,[1] then an estimated 7.5 million preventable medication errors could occur with pediatric patients in the United States each year. Furthermore, studies have estimated that 14% to 31% of pediatric medication errors could result in harm or death.[1,3] It is evident from these estimates that there is significant opportunity for pharmacists to identify and correct potential errors in pediatric ambulatory medication use. Unfortunately, the present study demonstrated that community pharmacists do not consistently identify appropriate doses or provide counseling that could prevent errors in pediatric prescriptions. No studies have previously quantified the pharmacists' ability to identify and prevent potential medication errors. Therefore, it is not possible to compare the performance of respondents in this study with previous estimates.

This study demonstrated correlations between prescription volume at the respondent's practice site and the ability to correctly assess doses in the scenario-based questions. The prescription in Scenario 1 was written for amoxicillin 800 mg twice daily, which equates to a dose of 80 mg/kg/day. The appropriate dose for amoxicillin for community-acquired pneumonia and acute otitis media is 80 to 100 mg/kg/day divided into 2 doses, while dosing for other indications is typically 25 to 50 mg/kg/day in 2 to 3 divided doses.[12] Respiratory infections and acute otitis media are the most common indications for antibiotic use in pediatric patients; therefore, high-dose amoxicillin would be a frequently encountered prescription.[13] Participants working in a store with a low prescription volume likely have less exposure to this dosing and, therefore, were less likely to correctly assess the amoxicillin dose in our scenario. The response "need more information" was also accepted, as the indication was not provided. Fifty-four percent and 28% of respondents answered "yes, this dose is appropriate" and "need more information," respectively. The prescription in Scenario 3 was written for cefdinir 500 mg twice daily, which corresponds to 14 mg/kg/day. Although this dosing is consistent with the recommended weight-based dose, the prescribed dose exceeded the maximum daily dose of 600 mg.[14] Similarly, pharmacists who had less exposure to pediatric prescriptions were less likely to identify this cefdinir dosing error than pharmacists dispensing large weekly volumes of pediatric prescriptions. The prescription in Scenario 2 was for ferrous sulfate, written as milligrams of ferrous sulfate salt. Typically, drug references provide pediatric dosing of ferrous sulfate in milligrams of elemental iron with a maximum of 6 mg/kg/day.[15] The dose of 90 mg of ferrous sulfate twice daily corresponds to 6 mg/kg/day of elemental iron for this patient,

which is an appropriate dose.[15] Misinterpretation of the intended dose may explain why 38% of respondents felt the dose was too high and 34% felt they needed more information. Our data suggest that pharmacist familiarity with pediatric medications is an important factor that impacts the ability to identify errors. Targeted education for community pharmacists regarding pediatric dosing and references may be an effective method to reduce errors and should be researched in future studies.

The present study demonstrated that community pharmacists do not consistently label prescriptions in milliliters or routinely dispense oral syringes. Additionally, although most respondents chose oral syringes as a device being dispensed, it is important to note that 71% and 42% indicated dispensing dosing spoons and droppers, respectively, which are not preferred.[8,16] Inconsistency in dispensing the proper oral liquid device represents a gap in knowledge about safe medication practice in children. Providing the proper device and including the dosing in milliliters has been shown to increase caregivers' ability to accurately measure doses and is recommended by the AAP.[16] While 1.2 mL was the correct volume for Scenario 2, 48% of respondents would dispense only the dropper provided in the package, which is not capable of measuring more than 1 mL. Inconsistency in dispensing the proper oral liquid device represents a gap in knowledge about safe medication practice in children. This survey did not address the volume of liquid being prescribed when considering dosing device selection; however, previous studies have shown significant variability in the appropriateness of dosing device dispensed.[17,18] A study by Gildon et al[18] demonstrated that pharmacies do not carry optimal devices for 51% of liquid medication prescriptions dispensed. A survey of New York pharmacies by Wojewoda and Chou[19] demonstrated only 74.3% of pharmacists routinely dispensed devices, 73.3% routinely demonstrated the use of devices, and 35.3% recommended using a household spoon to measure correct doses at least some of the time.

The AAP recommends dispensing the smallest syringe capable of measuring the dose.[16] In our study, 24% of respondents indicated dispensing medication cups for pediatric prescriptions. While this device is not recommended for small volumes, it might be appropriate in certain circumstances where the dose is easily measured. To decrease variability in practice, education focusing on dispensing of appropriately sized measuring devices for all oral liquid medications is necessary.

The present survey demonstrated significant variation in what prompts pharmacists to counsel on pediatric prescriptions. However, most pharmacists (76%, 71/93) indicated counseling on pediatric prescriptions at least half of the time. Pharmacists were less likely to counsel at least half of the time if prescription volume was between 1000 and 2500 prescriptions per week, indicating that higher prescription volume in the practice site may negatively impact the pharmacists' likelihood to counsel. However, this correlation was not seen with prescription volumes greater than 2500 prescriptions per week. One possible reason for the above findings may be that a pharmacy that fills between 1000 and 2500 prescriptions per week may not be able to justify having a second pharmacist on staff at peak times, which may hinder the ability of the pharmacist to provide services such as patient counseling. A busier pharmacy may have more pharmacists and allow for more counseling. This survey was not able to study the impact of staffing models. Interpretation of these results is also limited by the few states represented because legal requirements for counseling vary among states. Furthermore, this survey did not characterize the type or quality of counseling provided. However, this information has been previously investigated by Condren and Desselle[20] who found that only 16% and 40% of pharmacists demonstrate how to use an oral syringe "nearly always" or "fairly often," respectively. It is difficult to assess from any of these data what prompts pharmacists to counsel and demonstrate proper oral device technique when dispensing pediatric prescriptions. Nevertheless, the evidence provided here supports inconsistency in practice, which can increase the likelihood of errors in medication use.

The most commonly cited barriers to counseling and making recommendations on pediatric prescriptions were not pediatric specific. Interpretation of these data is limited by the multiple-choice design of the questions used. Respondents were provided a list of possible barriers and asked to select all that apply. Therefore, the information collected was not quantitative in nature, nor specific to pediatrics. In the future, studies using a different format such as scenarios, free-text comments, or ranking of applicable barriers may provide more meaningful information.

Overall, this study is limited by its survey-based design. Surveys do not accurately reflect the performance of pharmacists in the work environment. In any survey or assessment, the knowledge that responses are being evaluated may impact the respondent's performance. Respondents were most likely completing this survey under different conditions than they would experience in a community pharmacy. The multiple-choice format, which was used in the scenario-based examples, does not accurately simulate the pharmacists' review process and could lead the respondents to correct choices they otherwise would not have identified. Furthermore, respondents were allowed to skip questions, which could have led to pharmacists avoiding questions they found more challenging, thus skewing the results. It is also important to note that in all scenario-based questions the patient's weight was provided on the prescription. In practice, the child's weight is often not included on the prescription and the pharmacist must obtain an accurate weight through other means. Interestingly,

in the survey by Condren et al[20] 58% of respondents rated obtaining an accurate weight for a pediatric patient as "somewhat difficult" or "very difficult," and 50% of pharmacists stated that when the weight is not provided on the prescription, an attempt to obtain the weight is made "rarely" or "very rarely." Thus, this creates another barrier and potential for error and was not captured by our survey. In Scenario 2 the respondents were provided with an image of the supplement facts for iron sulfate. While this was necessary to allow the pharmacist to calculate the volume of the patient's dose, it may have also alerted pharmacists that they needed to convert to elemental iron. Furthermore, while we collected information about the pharmacists' practice environment, such as references available, it was not possible to assess the impact of such factors on the pharmacists' performance. As the total number of pharmacists who received the survey is not known, the precise response rate cannot be calculated. However, it can be surmised that the overall response rate for this survey was low, which may limit the external validity of the results.

Conclusions

This survey demonstrated that pediatric outpatient medication errors and interventions known to mitigate the risk of errors were not identified consistently. Continuing education targeting community pharmacists should include an overview of common pediatric prescriptions and strategies to identify and prevent errors. Interventions should focus on verifying the accuracy of weight-based dosing, recognizing maximum doses, labeling oral liquids using only milliliters, and dispensing appropriately sized oral syringes. The impact of a pharmacist on pediatric patient outcomes has been demonstrated in a variety of settings.[21–27] This survey helps to highlight the need to enhance community pharmacists' ability to impact pediatric patient outcomes. Further studies should attempt to quantify the ability of community pharmacists to prevent errors in pediatric prescriptions and measure the impact of interventions intended to change pharmacists' practice. The impact of educational interventions targeting enhanced pediatric prescription review, appropriate labeling, and consistent counseling with demonstration of administration device, on improving pediatric prescription safety, should be assessed.

ARTICLE INFORMATION

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