GENERAL

EVALUATION OF THE PRESCRIBING PATTERNS OF PAEDIATRIC MEDICATIONS IN POLISH COMMUNITY PHARMACIES

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Abstract: A pediatric population is a specific group of patients. Due to the considerable physiological changes, extensive knowledge of the pharmacological and pharmacokinetic properties of medications is required to adjust pharmacotherapies to children properly. The objective of this paper is to evaluate the prescribing patterns of pediatric medications and the frequency of administering off-label medications for children, as well as to identify quantitative and qualitative errors in prescriptions for children. A retrospective (consecutive) analysis of prescriptions for pediatric patients in community pharmacies in Poland was undertaken. Prescriptions for children were most often issued by pediatricians (66.09%) in the city, and by specialists in family medicine (78.46%) in the town. The percentage of prescribing errors, in the form of a lack of dose specification, was relatively high (17.51% in the city and 32.84% in the town). Most of the medications prescribed for children comprised respiratory system drugs (R) and antiinfectives (J) (ATC classification). It has been shown that quite a large number of pediatric prescriptions contained errors. The role of pharmacists in evaluating the selection of medications for this group of patients should be emphasized.

Keywords: prescribing, prescribing error, medications for children, off-label, pediatric population

INTRODUCTION

Children are a specific group of patients requiring special care. Pediatric pharmacotherapy entails extensive knowledge as it differs significantly from adult pharmacotherapy and, in many cases, is customized. Regulation (EC) No. 1901/2006 on medicinal products for pediatric use defines the pediatric population as those aged between birth and 18 years (1). According to European Medicines Agency (EMA) guidelines regarding studies on medicinal products, the following age categories are distinguished in the pediatric population: preterm newborn infants, full-term newborn infants (0 to 27 days), infants and toddlers (1 to 23 months), children (2 to 11 years), including pre-school children (2-5 years) and school children (6-11 years), and adolescents (12 to 16-18 years) (2).

Physiological differences resulting in changes in pharmacokinetics and the effects of medications in children compared to adults include absorption, distribution, metabolism, and excretion (3). To provide appropriate treatment to all children, various routes of administration, forms, and doses are required, depending on the age group (4). Child development is associated with changes in the activity of hormones and enzymes, the maturation of internal organs, and the scale of sensitivity to medications and their effects. This makes the selection and appropriate dosage of medicinal products in children difficult. Good knowledge of the pharmacological and pharmacokinetic properties of medications, as
well as pharmacodynamic response to medications and their active metabolites, constitute the basis for proper pharmacotherapy (5).

The availability of pediatric medications is much lower than that of adult medications (6). Clinical studies with children are difficult and very expensive due to the heterogeneity of this population. Additionally, the ethical and moral aspects are troublesome. According to the European Medicines Agency, more than half of the medications have not been studied with respect to their safety and effectiveness in the pediatric population (7).

Most medications administered to children have not been registered for their specific indications. The use of off-label medications in the pediatric population arouses controversy, as this poses a higher risk of adverse effects and complications than in adult patients. Nevertheless, this is the only chance for a cure or even a slight health improvement in many cases. Evaluation of the benefit-risk ratio of a given medication is of key significance in selecting therapies for pediatric patients (8).

Oral formulations, namely liquids, are the most common forms for children. The FDA assumes that children aged 6 years and older are able to swallow solid oral dosage forms safely (9). When a required dose of a medicinal substance is not available, pharmacists can prepare the right formulation of the medication for a child (compounded pediatric medications). The basic reason behind prescribing compounded medications is to individualize the dose of the medication. The most common drug forms prepared in Polish pharmacies are ointments, oral suspensions, and compounded powders (10). In combination with solid forms, liquid forms are able to be administered to the entire pediatric population as they eliminate the risk of choking and have the widest range of dosage selection (2).

The conversion of a medication form from solid to liquid should be supported by knowledge of the physicochemical properties of API, the composition of the finished product used, and the possible impact of the form on clinical effectiveness (11).

Difficulties related to proper pharmacotherapy of pediatric patients lead to many medication errors. A medication error is defined as the administration of a medication that does not comply with the recommendations in the package leaflet. This may include the dose, speed, route of administration, form, the preparation itself, or the patient (12). A medication error is an unintentional error in the treatment process that leads or may lead to an unfavorable reaction in a patient. This includes prescribing, storing, dispensing, or preparing for dispensing a medicinal product (13).

Medication errors also include prescribing errors. These are all errors on the prescription regarding the name of the medication, the form, the dose, the route of administration, and any omissions, including the name of the doctor and drug interactions (all included in the study).

A recommendation is considered a potential error if it is inconsistent with standard pediatric recommendations, current literature data, or dosage guidelines approved by hospital committees (12).

The objective of the study was to evaluate the prescriptions of medications for children, to determine the frequency of prescribing errors and the use of off-label medications, as well as to identify forms of medication improperly matched to the age of the child. The dosing devices attached to the package leaflets were examined to see if it was possible to administer the prescribed dose, and the information in the patient leaflets was analyzed in terms of the relevant data that determine correct preparation of the medication by caregivers.

EXPERIMENTAL

Individual medical prescriptions for pediatric patients (up to 18 years of age) and collective lists of prescriptions prepared by community pharmacies were analyzed retrospectively. The prescription analysis was conducted between February and May 2017 in two community pharmacies located in Szczecin and Lipiany after obtaining the consent of the pharmacy managers. The study was approved by the Bioethics Committee of the Nicolaus Copernicus University in Toruń at the Ludwik Rydygier Medical College in Bydgoszcz.

Prescriptions were analyzed using the author’s questionnaire, which consisted of 5 parts. The first part concerning information related to the pediatric patient, which made it possible to divide the pediatric population into age groups (according to EMA recommendations) and to determine their size. The second part concerned information related to the individual prescriptions, which made it possible to determine the percentage of specialties of the doctors prescribing pediatric medications in the analyzed period and the number of prescribing errors (the wrong drug name, dosage form, or abbreviation, and incorrect dosage calculations). The third part concerns information related to the prescribed medicinal product and whether it had pediatric indications. The fourth part concerned the solid forms of the medications prescribed (tablets, capsules, and
suppositories) and was aimed at checking how often it is necessary to divide solid forms and whether the manufacturer guarantees the correct dose. The fifth part concerned oral preparations of liquid medications immediately prior to use and the dosing devices attached to them, so that it was possible to determine whether the necessary information for the preparation of the medication was given and whether the prescribed dose could be given with the dosing devices attached.

The study analyzed all (consecutive) prescriptions from the period May and October 2016.

**Place and subject of the study**

In a community pharmacy in Szczecin (a large city with over 400 thousand inhabitants in the West Pomeranian Region), 15 710 prescriptions for ‘ready-made’ medications were analyzed, i.e. forms available in community pharmacies on the basis of marketing authorization in the territory of the Republic of Poland in accordance with relevant legal acts and permits accepted by the Office for Registration of Medicinal Products, comprising 634 (4.04%) pediatric prescriptions and 2 481 prescriptions for compounded medications, of which 416 (16.77%) were pediatric prescriptions. The pharmacy serves the local pharmacy market of one of the larger housing estates during a thirteen-hour working day (8 a.m.-9 p.m.). The facility is located near a specialist clinic and a hospital with a pediatric ward. It employs two persons holding master’s degrees in pharmacy and two pharmaceutical technicians, which meets the requirements of the Polish pharmaceutical law.

In a community pharmacy in Lipiany (a small town with less than 5 thousand inhabitants in the West Pomeranian Region), 20 552 prescriptions for ready-made medications were analyzed, which included 469 (2.28%) pediatric prescriptions. In the analyzed period no prescription for a compounded pediatric medication was filled. The facility is open ten hours a day (8 a.m.-6 p.m.) and is located at the outpatient clinic. It employs one person holding a master’s degree in pharmacy and two pharmaceutical technicians, which meets the requirements of the Polish pharmaceutical law.

**RESULTS**

In total, 36 262 prescriptions for ready-made medications were analyzed, of which 1 103 (3.04%) were pediatric prescriptions, and 2,481 prescriptions for compounded medications, of which 416 (16.77%) were pediatric.

The highest percentage of pediatric patients for whom prescriptions were issued were pre-school children in Szczecin (46.53%) and school children in Lipiany (43.28%). The percentage of infants was 9.15% in Szczecin and 6.18% in Lipiany.

Table 1 summarises information on the pediatric prescriptions for ready-made medications in both pharmacies. The data indicate that the doctors issuing prescriptions in Szczecin were mainly pediatricians

| Table 1. Data from pediatric prescriptions for ready-made medications filled in the community pharmacies in Szczecin and Lipiany. |
|---|---|
| **Prescribing physician** | 
| Prescribing physician | Szczecin [% (n)] | Lipiany [% (n)] |
| Pediatrician | 66.09% (419) | 17.48% (82) |
| Family medicine specialist | 25.71% (163) | 78.46% (386) |
| Another specialist | 8.20% (52) | 4.05% (19) |
| Pro familiae prescription | N/A | N/A |
| Pro auctore prescription | N/A | N/A |
| Reimbursed prescription | 57.26% (363) | 48.61% (228) |
| 30% | 13.50% (49) | 12.28% (28) |
| 50% | 49.31% (179) | 30.26% (69) |
| R* | 36.91% (134) | 57.02% (130) |
| B** | 0.28% (1) | 0.44% (1) |
| Private prescriptions | 42.74% (271) | 51.39% (241) |
| Prescribing error | 
| Yes – lack of dose specification | 17.51% (111) | 32.84% (154) |
| No | 82.49% (523) | 67.16% (315) |

R* – medications dispensed under lump-sum payment
B** – medications dispensed free of charge
(66.09%), and in Lipiany were family medicine specialists (78.46%). A significant difference is also noticeable in the number of prescriptions containing errors: in Szczecin, 17.51% of the prescriptions were incorrectly issued (no dosage), and in Lipiany almost every third prescription (32.84%) was incorrectly issued.

Of the ready-made medications prescribed in both pharmacies, the most frequent route of administration was oral, less often inhalation, ocular and otic or topical (Table 2).

In some prescriptions, the oral form of the medication was not properly adapted to the age of the child (Table 3).

Out of all the ready-made medications on pediatric prescriptions filled in community pharmacies in Szczecin and Lipiany, medications used in respiratory diseases (group R according to anatomic ATC classification), infections (J), and those affecting the gastrointestinal tract and metabolism (A) prevailed (Table 4).

Table 2. Data on the route of administration of ready-made medications on pediatric prescriptions filled in community pharmacies in Szczecin and Lipiany.

| Route of administration | Form                                | Szczecin [% (n)] | Lipiany [% (n)] |
|-------------------------|-------------------------------------|------------------|-----------------|
| Oral                    | Granules and powder for oral suspension | 47.48% (198)    | 25.41% (92)     |
| Oral                    | Capsules                            | 0.96% (4)        | 3.31% (12)      |
| Oral                    | Tablets                             | 24.46% (102)     | 38.40% (139)    |
| Oral                    | Oral drops                           | 4.32% (18)       | 3.04% (11)      |
| Oral                    | Syrup                               | 12.95% (54)      | 23.76% (86)     |
| Oral                    | Oral liquid/solution                 | 4.80% (20)       | 3.59% (13)      |
| Oral                    | Oral suspension                      | 5.04% (21)       | 2.49% (9)       |
| Rectal                  | Suppositories                        | 60% (3)          | -               |
| Rectal                  | Microenemas                          | 40% (2)          | -               |
| Inhalation              | Inhalation aerosol                   | 11.11% (10)      | 27.78% (10)     |
| Inhalation              | Liquid and solution for nebulisation | 47.78% (43)      | 30.56% (11)     |
| Inhalation              | Suspension for nebulisation          | 41.11% (37)      | 41.67% (15)     |
| Ocular and otic         | Eye drops                            | 34.55% (19)      | 40% (10)        |
| Ocular and otic         | Eye and ear drops                    | 61.82% (34)      | 48% (12)        |
| Ocular and otic         | Ear drops                            | 5.45% (3)        | N/A             |
| Ocular and otic         | Ear ointment                         | 3.64% (2)        | 12% (3)         |
| Nasal                   | Nose drops                           | 7.69% (2)        | N/A             |
| Nasal                   | Nasal spray                          | 84.62% (22)      | 100% (8)        |
| Nasal                   | Nasal ointment                       | 7.69% (2)        | N/A             |
| Topical                 | Ointment                             | 43.24% (16)      | 54.55% (18)     |
| Topical                 | Cream                                | 37.84% (14)      | 36.26% (12)     |
| Topical                 | Topical liquid                       | 16.22% (6)       | 6.06% (2)       |
| Topical                 | Gel                                  | 2.70% (1)        | N/A             |
| Other                   | Topical spray                        | N/A              | 3.03% (1)       |
| Other                   |                                     | 0.16% (1)        | 1.07% (5)       |

N/A - not available
The use of off-label medicinal products took place in 16.09% of the prescriptions in the pharmacy in Szczecin and 12.37% in the pharmacy in Lipiany. Table 5 presents information on the use of medications other than those for pediatric indications (off-label use) from among all the ready-made medications on the pediatric prescriptions made in both community pharmacies.

The need to divide the solid form of the medication in order to administer the prescribed dose was noted in prescriptions in both pharmacies (8.26% of the prescriptions for fixed forms of the medication in Szczecin and 5.30% in Lipiany). In Lipiany, all situations with the need to divide the solid form of the medication concerned tablets, but in Szczecin, in 33.33% of the prescriptions, the need to divide the medications concerned suppositories. In 33.33% of the prescriptions in the pharmacy in Szczecin and in 75% of the prescriptions in the pharmacy in Lipiany, the prescribed medications contained information about the possibility of dose sharing in the SmPC.

Table 6 compares data concerning liquid oral forms of the medication for ex tempore preparation with dosing devices, and preparation instructions

Table 3. Data on oral dosage forms incorrectly adapted to a child’s age.

| Oral dosage forms incorrectly adapted to a child age | Szczecin [% (n)] | Lipiany [% (n)] |
|-----------------------------------------------------|------------------|----------------|
| Yes                                                 | 4.80% (20)       | 2.21% (8)      |
| No                                                   | 95.20% (397)     | 97.79% (354)   |

Table 4. Data on the division of medicinal products into groups according to which organ or organ system they affect, according to anatomic ATC classification - analysis of pediatric prescriptions.

| Group according to anatomic ATC classification           | Szczecin [% (n)] | Lipiany [% (n)] |
|---------------------------------------------------------|------------------|----------------|
| Alimentary tract and metabolism (A)                    | 11.04% (70)      | 7.04% (33)     |
| Blood and blood forming organs (B)                     | 0.63% (4)        | 2.56% (12)     |
| Cardiovascular system (C)                              | 0.47% (3)        | 0.21% (1)      |
| Dermatologicals (D)                                    | 5.05% (32)       | 6.40% (30)     |
| Genitourinary system and sex hormones (G)              | N/A              | N/A            |
| Systemic hormonal prep, excluding sex hormones (H)     | 2.21% (14)       | 2.35% (11)     |
| General antiinfectives for systemic use (J)            | 31.23% (198)     | 29.85% (140)   |
| Antineoplastic and immunomodulating agents (L)         | 0.32% (2)        | 1.07% (5)      |
| Musculo-skeletal system (M)                            | 0.63% (4)        | 1.71% (8)      |
| Nervous system (N)                                     | 2.37% (15)       | 1.49% (7)      |
| Antiparasitic products (P)                             | 2.52% (16)       | 1.49% (7)      |
| Respiratory system (R)                                 | 34.38% (218)     | 40.51% (190)   |
| Sensory organs (S)                                     | 9.15% (58)       | 5.33% (25)     |
| Various (V)                                            | N/A              | N/A            |

Table 5. Data on off-label use of medicinal products - analysis of pediatric prescriptions.

| Off-label use of medicinal products                      | Szczecin [% (n)] | Lipiany [% (n)] |
|----------------------------------------------------------|------------------|----------------|
| Yes                                                      | 16.09% (102)     | 12.37% (58)    |
| SmPC lacks information related to children both in the part regarding indications for use and dosage | 54.90% (56)      | 72.41% (42)    |
| SmPC clearly states that the medicinal product must not be used in the pediatric population | 12.75% (13)      | 12.07% (7)     |
| SmPC states that the medicinal product can be administered to children only in the event of absolute need | 14.71% (15)      | N/A            |
| SmPC includes children in indications or dose, but the medicinal product was administered to children younger than SmPC provides | 17.65% (18)      | 15.52% (9)     |
| No                                                       | 83.91% (532)     | 87.63% (411)   |
found in the package leaflets, written on pediatric prescriptions filled in the community pharmacies in Szczecin and Lipiany.

Pediatric compounded medications were prepared only in the pharmacy in Szczecin. Most medications were made for pre-school children (47.36%). Prescriptions for compounded medications for children were most often issued by a different specialist than a pediatrician or family medicine specialist. In this group, we can mainly distinguish between ophthalmologists, laryngologists, and dermatologists. Compounded medications prescribed for children were mostly administered to the skin (38.70%) and eye and ear (26.20%). Of all the prescriptions for compounded medications for children, 13.94% contained a prescribing error in the form of a lack of the dosage manner identified.

Compounded medications for oral administration were divided into mixtures and compounded powders. The compounded powders for children accounted for 98.41% of all the compounded medications for oral administration for pediatric patients in the community pharmacy in Szczecin and were most commonly prescribed for infants. The powders were mostly prepared from ready-made medications (95.16%), and the percentage of powders made with the use of pro recipe substances was 4.84%. The percentage of divided compounded powders that were incorrectly adapted to the child’s age was 91.94%.

According to anatomic ATC classification, the largest group among the divided compounded powders are group C medications (cardiovascular system) – 61.02%, followed by those belonging to group A (gastrointestinal tract and metabolism) – 16.95%, and medications used in infections (J) – 11.86%.

DISCUSSION

The pediatric population is a very diverse group of patients, with the largest number of preschool (in the city) and school (in the town) children. Pediatric prescriptions constituted a small percentage of all the prescriptions for ready-made medications filled in the community pharmacies in Szczecin and Lipiany. Clear differences can be seen in the specialization of physicians and units issuing pediatric prescriptions.
Among the prescriptions filled in Szczecin, they were mostly pediatricians, and in the case of Lipiany, the vast majority of doctors issuing prescriptions were family medicine specialists.

Medicinal products for oral administration, i.e. the most beneficial form for children, were most prevalent in both of the pharmacies as far as pediatric prescriptions for ready-made medications are concerned. In the pharmacy in Szczecin, these were most often granulates and powders for making orally administered suspensions, to lesser extent tablets and syrups. In the pharmacy in Lipiany, most of them were tablets and coated tablets, followed by medications for ex tempore preparation, which may be due to the difference in the number of age groups of pediatric patients in the particular pharmacies. In Lipiany, syrups for children were also more often issued by prescription.

One of the most advantageous routes of administering medication in pediatric patients, i.e. rectal, constituted a very small percentage of all the medications prescribed for children in the pharmacy in Szczecin, and in Lipiany prescriptions for rectal medications did not appear at all. In both of the pharmacies, there were no medications for transdermal administration, due to a lack of preparations in this form intended for children (see Table 2).

In the Netherlands, Van Riet-Nales et al. (14) checked the availability and adaptation of the form of the medications to the age of the child among the medications approved. They found that half of all medications and active ingredients available to people are available for children of different ages. The proportion of authorized medications and dosage forms increases with age. The majority of medications for children in the Netherlands were administered either orally (63%) or parenterally (22%). Most medications for children and adults were found for inhalation (81%), nasal (80%), and rectal (77%) administration, and the fewest for the skin (22%). The percentage of tablets for children was 39% of all the tablets, the percentage of capsules 53%, and the percentage of preparations in the form of granules and powder for oral administration in liquid form was 81%. Tablets for the pediatric population were most often uncoated (71%), and less frequently coated (18%).

The study conducted by Schirm et al. (15) showed that medications for oral administration constitute the most numerous group of pediatric medications (49.5%), yet it is less than the amount found in this study. A similar percentage of all the medications prescribed for children (compared to the Szczecin pharmacy) were preparations for aerosol therapy (13%). A larger group were medications administered to the skin (19%) and to the nose, eye, and ear (10%) (see Table 2).

A form of medication not properly adapted to the age was rare, but such situations were reported, which may pose a serious risk of choking and problems with swallowing the medication. A higher percentage of medication forms improperly adapted to the age of the child occurred among the pediatric prescriptions filled in the community pharmacy in Szczecin, but this may be due to the larger proportion of pre-school children (see Table 3). Out of 19 283 pediatric prescriptions analyzed by Schirm et al. (15), 413 prescriptions for tablets or capsules for children under 2 years of age and 1,108 for children at the age of 2-5 years (pre-school), i.e. for a form of medication improperly adapted to the child’s age, were reported.

According to anatomic ATC classification, the most commonly prescribed medications for children in both of the pharmacies were respiratory medications (group R according to anatomic ATC classification) and medications used in infections (group J). The least numerous group were cardiovascular medications (group C). In the study by van Riet-Nales et al. (14) the availability of medications for children based on the anatomic ATC classification ranged from 11% for medications of the genitourinary system and 19% for medications of the cardiovascular system and medications used in dermatology. On the other hand, the availability of medications for the respiratory system and those used in infections was 86%, and for antiparasitic, insecticidal, and repellent medications 89%.

Off-label medications for pediatric patients were more often prescribed in the pharmacy in Szczecin, which again can be explained by the larger proportion of pre-school children. In the study by Schirm et al. (15), more off-label medications were prescribed for children (22.7%).

Among the solid forms of the medication prescribed for children, it was necessary to divide some of them in order to administer the dose prescribed by the doctor. In prescriptions filled at the pharmacy in Lipiany, this concerned only those tablets whose package leaflets mostly contained information on the possibility of dividing the tablets and guaranteeing the right dose. In the pharmacy in Szczecin, in addition to the cases where it was necessary to divide the tablets in order to administer the prescribed dose, there were also medical recommendations to divide the suppositories prescribed for children, which is considered unacceptable practice.

Granules and powders for oral suspensions constituted a large group of medications ready for oral
administration for children. The analysis of the information in the package leaflets shows that in the vast majority of cases they give information on the type and method of preparation of water needed to prepare the medication. However, only half of the cases mention the possibility of mixing the dose of the medication with beverages or food, including swallowing the medication with water. This poses the risk that the caregiver mixes a medication that should not be mixed with beverages or food. Unfortunately, only in individual cases, the package leaflet mentioned the need to keep constant intervals in the administration of individual doses, which is a condition for effective antibiotic therapy (that is, most medications administered in this form). The most frequently added dosing device for granulates and powders intended for ex tempore oral suspensions was an oral syringe or an oral syringe together with a spoon, i.e. the most accurate liquid dosing device available. However, it is worrying that a number of cases have been reported where it was not possible to administer the dose prescribed by the doctor with the dosing device provided. This may result in the administration of the medication to the child with household spoons and teaspoons, which make it impossible to accurately measure the dose.

Pediatric prescriptions constituted a large part of prescriptions for compounded medications filled at the Szczecin pharmacy. Compounded medications prescribed for children were most often intended to be administered to the skin and to the eye and ear, as well as to the nose. This may indicate an insufficient number of ready-made medications for pediatric patients to be administered by these routes. The study by Schirm et al. (15) showed that a similar amount of prescription medications was used for pediatric patients as in the author’s study (16.6%).

In Poland, there are no restrictions on the use of authorized active substances and there are no specific control tests for a compounded medication. There is also a noticeable lack of an official recipe register that describes how the medication is made and includes the data on its durability.

Of the oral compounded medications prescribed for children, the vast majority were powders divided from ready-made medications. They were prescribed primarily to infants and contained cardiovascular therapeutic substances, based on the anatomic ATC classification. This is due to a lack of appropriate forms of medications from this group for pediatric patients and the need to prepare them from medications for adults. Not a single pediatric prescription for a compounded medication with the use of a ready-made oral suspension with syrups — simple has been reported. Similar results were obtained by Redliński (16). The analysis of master prescriptions showed that divided powders constituted 37% of all the solid preparations made in a community pharmacy in Łódź and they were mostly preparations for children, mainly very young (1–6 years). They were most often prescribed by pediatricians, family medicine specialists, internal medicine specialists, dermatologists, and laryngologists. Of the divided compounded powders that contained off-label preparations, most were pediatric medications, since most of the medicinal substances they contained were not available in the pro recipe form. Based on the anatomic ATC classification, the formulation included substances affecting the respiratory system, cardiovascular system, gastrointestinal tract and metabolism, central nervous system, blood and hematopoietic system, hormonal medications, and medications used in infections (16).

Powders prescribed for young children can pose a serious choking hazard. Caregivers can open the powder capsules and mix them with food or beverages to administer the medication to a child. However, it is unknown how this affects the bioavailability of the medicinal substance. The pharmacy recipe is a very important source of supplying pediatric patients with medications at the right dose. However, the potential and possibilities of pharmacists to prepare medications in a form and dosage that is appropriate to the age of the child are not used.

The outcomes of the studies show how important the role of a pharmacist can be in dispensing medications for pediatric patients and pharmaceutical counseling for their caregivers. A pharmacist is the only person who has the chance to check if there are no prescribing errors on the prescription, inform the caregiver about the correct use of the medication and pay attention to whether the child receives a proper age-appropriate form of the medication.

When dispensing medications in forms that require preparation by the caregivers (granules and powders for suspensions), it is worth checking whether the caregiver will be able to measure the dose prescribed by the doctor with the dosing device attached to the preparation and ask if the caregiver knows how to prepare the medication (ask about the type of water, indicate the need to shake the bottle before each use, indicate the need for constant intervals in the administration of successive doses and appropriate storage).

The study showed that a pharmacy formula is needed for pediatric patients, which allows
preparing medications in doses intended for children in the absence of suitable ready-made medications. Unfortunately, in Poland, it is still uncommon to prepare oral suspensions for children with the use of ready-made forms of the medication, which is why very young children are given medications in the form of powders. Such a solution not only poses a threat to the child but is equivalent to leaving the caregivers alone with the problem of administering the medication in a form improperly adapted to the child’s age.

CONCLUSIONS

The care of a pediatric patient requires exceptional meticulousness. Many medications in this age group were off-label, which require special knowledge in the field of child pharmacotherapy. Medication errors, including those related to abnormalities in prescribing, can pose a serious threat to the health and even life of the youngest patients. This study, conducted in a city and a town in Poland, reveals a significant number of errors on prescriptions for children. For this reason, the role of the pharmacist should be emphasized in instructing caregivers on the proper preparation and administration of medications to children and in creating prescription medications for the youngest.

Due to the specific characteristics of the youngest patients, the assessment of abnormalities or doubtful situations in terms of pharmacotherapy seems very important. Our research showed that almost every third prescription for children was incorrectly issued, which could pose a serious threat to the health and life of children. Further research is needed to evaluate the causes of errors so that they can be minimized.

Conflict of interest

The authors declare no conflicts of interest.

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