

D2 – Summary report of survey results, identifying the reasons for the missing formulations and elements of context and rationale for prioritization of products missing but deemed critical.

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WP Essential Medicines List

Version 2.0

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1. Executive summary: Pilot and Second Wave Surveys

Essential medicines for children are medicines that respond to the urgent needs of pediatric health care. The goal is to ensure that quality assured essential medicines are available in appropriate dosage forms within functioning health systems at affordable prices. Today, approximately 140 countries base their drug procurement on the World Health Organization (WHO) List of Essential Medicines for children (EMLc). However, this list has not been comprehensively reviewed and updated since 2007.

The current EMLc includes more than 300 medicines but multiple products of major clinical importance are missing from the list. Reasons for their absence include lack of proper evaluation, approval for special uses only, or are inappropriate formulations for children, especially for neonates and young infants.

To provide guidance and support the upcoming (in 2023) revision of the EMLc, the opinion of experts and the experience of front-line health care providers was gathered.

Two online surveys were carried out to investigate various aspects of medicines for children: acceptability from a child's perspective, ease of use by caregivers, need for extemporaneous preparation, off-label use, concerns regarding pharmacokinetics (PK), dose selection and safety, need for accelerated paediatric development, lack of child-appropriate formulations and obstacles to access.

This Executive summary highlights the main results of the pilot and the second survey; however, these results need to be analysed in conjunction with the outputs of other ongoing work (i.e., expert review of the products already available and the analysis of the global market of paediatric medicines) before specific products can enter the GAP-f prioritization process.

The results of the preliminary survey that was carried out between December 2020 and February 2021 by the Penta Foundation are briefly summarized in the following tables and figures.

Poor acceptability was related to taste or after taste of the liquid formulation (61%), the large volume of liquid to be swallowed (15%) and tablet size (20%). The most commonly mentioned medicines were anti-infectives (e.g., clindamycin, cefuroxime, flucloxacillin, lopinavir/ritonavir, penicillin, clarithromycin, co-amoxiclav), pain relievers (paracetamol), captopril, omeprazole, and prednisolone

	Paracetamol (N=20)	Clindamycin (N=14)	Cefuroxime (N=13)
Taste/After taste, N (%)	19 (95)	11 (78.6)	11 (84.6)
Tablet size, N (%)	1 (5)	3 (21.4)	-
Volume of liquid, N (%)	3 (15)	3 (21.4)	2 (15.4)
Texture, N (%)	-	2 (14.3)	7 (53.8)
Appearance, N (%)	1 (5)	-	-
Smell, N (%)	3 (15)	5 (35.7)	1 (7.7)
Complexities in using the device, N (%)	-	-	-
Other, N (%)	-	1 (7.1)	-

Table 1: Top 3 medicines reported with poor acceptability

Difficulties in medicine use reported by caregivers were related to the dose determination (43%), the complexity of preparing medicines (42%), and the need to be stored at a certain temperature (17%). The most difficult medicines for caregivers to handle were insulin, omeprazole, amoxicillin, and cardiovascular medicines.

	Antibiotics (N=11)	Insulin (N=8)	Omeprazole (N=8)
Complex preparation, N (%)	7 (63.6)	2 (25.0)	6 (75.0)
Determination of the dose, N (%)	3 (27.3)	3 (37.5)	3 (37.5)
Need for a vehicle, N (%)	-	1 (12.5)	1 (12.5)
Problematic packaging, N (%)	-	-	1 (12.5)
Storage requirement (temperature), N (%)	2 (18.2)	3 (37.5)	2 (25.0)
Other storage requirement, N (%)	-	-	-
Other, N (%)	3 (27.3)	2 (25.0)	1 (12.5)

Table 2: Top 3 medicines reported as difficult to handle by caregivers

Most reasons for off-label use were an unapproved age group (71%), an unapproved indication (38%) and an unapproved dose (29%).

The most commonly used off-label medicines were those used for neonatal care (sildenafil, antibiotics), cardiovascular diseases (sildenafil, carvedilol, amiodarone, captopril, enalapril, flecainide, clonidine), antihistamines, ondansetron, posaconazole, omeprazole, corticosteroids, and ciprofloxacin.

	Sildenafil (N=9)	Antihistamines (N=8)	Antibiotics (N=6)	Ondansetron (N=6)
Unapproved indication, N (%)	4 (44.4)	1 (12.5)	4 (66.7)	5 (83.3)
Unapproved age group, N (%)	8 (88.9)	7 (87.5)	3 (50.0)	1 (16.7)
Unapproved dosage, N (%)	3 (33.3)	1 (12.5)	4 (66.7)	-
Unapproved route of administration, N (%)	-	-	1 (16.7)	-

Table 3 Most mentioned medicines with off-label use

An excessively narrow therapeutic index (34.3%), the need for therapeutic drug monitoring (34%) and a wide range of doses across age or weight bands (30%) made some products extremely difficult to prescribe with confidence. Anti-infectives (vancomycin, gentamicin), cardiovascular medicines (digoxin, enalapril, amiodarone, flecainide), insulin, paracetamol, and medicines for neurological disorders were the most cited.

	Digoxin (N=12)	Vancomycin (N=10)	Gentamicin (N=9)	Insulin (N=9)
Dosing discrepancies between guidelines, N (%)	-	5 (50.0)	1 (11.1)	-
Wide range of dose across age weight and age groups, N (%)	2 (16.7)	1 (10.0)	3 (33.3)	5 (55.6)
Lack of pk evidence for dosing regimen, N (%)	-	2 (20.0)	-	-
Lack of safety data, N (%)	-	1 (10.0)	-	-
Narrow therapeutic index, N (%)	11 (91.7)	9 (90.0)	8 (88.9)	4 (44.4)
Therapeutic drug monitoring, N (%)	4 (33.3)	10 (100.0)	7 (77.8)	1 (11.1)
Other, N (%)	-	-	-	3 (33.3)

Table 4 Medicines that raised most concern in terms of dosing or safety

The formulations most often requiring extemporaneous preparations were omeprazole, cardiovascular medicines (spironolactone, captopril, propranolol, furosemide, acetylsalicylic acid, amiodarone, enalapril, flecainide), ranitidine, corticosteroids (dexamethasone, hydrocortisone, prednisolone), levothyroxine, and phenobarbital.

Across all therapeutic fields, multiple paediatric formulations were reported as missing when an adult product was available on the market. It was reported that the preparation



of extemporaneous medicine is sometimes impossible for several reasons, such as the absence of a facility for extemporaneous preparations in the hospital pharmacy, the unavailability of active product ingredients and/or suitable excipients. Moreover, the lack of international Pharmacopoeia/Formulary specific to

paediatric formulations and, consequently, the lack of guidelines and consensus on formulation excipients and their preparation, raises issues of standardization and quality. Medicines for cardiovascular and neurological disorders and medicines for infants and children less than 24 months of age were particularly problematic. The most desirable innovative formulations were oral-dispersible formulations that do not require water to disperse, nebulized formulation for neonates and patches.

The medicines on the market essentially reflect those available worldwide, with some variations related to local registration or marketing strategies (various brand names) or local epidemiology.



¹ A word cloud (tag cloud or wordle or weighted list in visual design) is a visual representation of text data. Tags, in this case, are single or coupled words, and the importance of each tag is shown with font size or colour. This format is useful for quickly perceiving the most prominent terms and determining their relative prominence based on frequency. A bigger term means higher weight.

In order to obtain further information and additional explanations about the responses provided, individual specialists who previously agreed to be contacted were interviewed by the GAP-f team. In addition, in order to obtain information about the medications used by specialists who were not represented in the pilot survey, personal contacts of the team were also approached to be interviewed.

In total nine interviews were conducted; five interviewees were physicians and four were pharmacists, most of them working in Europe.

Important comments were provided on the use of drug delivery devices, in particular atomizers for intranasal administration of drugs, insulin pumps for continuous administration and inhalers for medicines administered via the respiratory route.

An emergency care specialist reported that there is often a significant delay between the time an opioid for pain relief is needed (i.e., intravenous morphine) and the time the drug is actually administered. In busy wards, it can take more than one hour to start an intravenous line. An intranasal route for analgesics was proposed as one of the alternatives as it reduces the administration time and also empowers the nursing staff to administer effective analgesia very quickly.

As far as inhalers are concerned, their correct use must be clearly explained to patients and parents, but this is rarely the case, as indicated by the paediatric pneumologists interviewed, who stated that the problem is that many doctors prescribing inhalers do not give appropriate or sufficient explanations.

According to a paediatric diabetes specialist, insulin poses serious acceptability problems, related to the complexity of using the device and the stigma associated with the disease. Insulin pumps are complicated to use. They work well enough for paediatric patients but are not designed for toddlers or infants, even though they are approved for use in this population. Unfortunately, insulin pumps are yet not widely used in Europe, compared to the USA, because of the limited health care funding for such devices. Moreover, the rapid-acting insulin needed for insulin pump administration must be in a diluted form, which is only available in the markets of a few countries.

From the pharmacists' perspective, the most important comments relate to the quality of extemporaneous preparations.

A hospital pharmacist reported as an example that clinicians had to prescribe an oral powder formulation of furosemide because of the uncertainties related to the dosing of furosemide as oral suspension prepared by the hospital pharmacy, in particular the high viscosity of extemporaneous formulations.

In general, pharmacists reported that it was challenging to standardize the preparation for oral suspensions and that chemical and microbiological stability data were only available for single ingredients, APIs, and excipients. Indeed, due to sedimentation problems and lack of uniformity, accurate dosing is difficult to guarantee. Moreover, when preparing formulations from adult medicines that are coated or are formulated for sustained release, the manipulations required to dissolve the coating are not standardized, nor studied. There is no assurance that all the API are extracted and transferred to the extemporaneous preparation.

Feedback from a pharmacist working in a low-income country highlighted the need to prepare solid rather than liquid oral formulations because they are more stable, do not need clean water for reconstitution and do not need to be refrigerated.

Finally, it is not always possible to add sugar or other taste-masking ingredients when preparing liquid oral formulations from solid oral formulations thus potentially impacting the child's adherence.

The second survey was developed in May and June 2021, opened live on July 6th, 2021, and closed on September 30st, 2021.

A total of 1,326 people connected to the survey website, 455 gave their opinion on at least one missing or problematic medicine.

Comments were collected on 391 medicines, associated with 666 problematic pharmaceutical forms. The medicines mentioned as most problematic were oral liquid lopinavir/ritonavir, reported 27 times, followed by amoxicillin and clavulanic acid in oral liquid form (23 times) and cefuroxime in oral liquid form (21 times). Lopinavir/ritonavir liquid oral form was considered the most problematic formulation by all health workers, mostly because of its poor acceptability. For salbutamol, the issue was mainly related to poor usability.

Overall, 287 medicines (identified by generic name) for a total of 416 pharmaceutical forms were reported by physicians as problematic: 37% were tablets, 31% oral liquids, 18% parenteral formulations, and 7% capsules. Several pharmaceutical forms of the same product were mentioned. Poor acceptability was mentioned for 45% of the products, poor usability for 25%, off label use for 12%, uncertainty about dosage for 36%, and difficulties related to their use in special populations (patients with co-morbidities and/or co-treatments) for 10% of products. A single product could be problematic for several reasons, for example poor acceptability by the child and complexity of use from the caregiver point of view. The three most mentioned products were lopinavir and ritonavir (41 times), clindamycin and salbutamol (21 times each).

A total of 66 medicines, for a total of 71 pharmaceutical forms, were reported as problematic by the nurses; 40% were parenteral formulations, 27% oral liquid, 25% tablets, 4% topical products and 4% capsules. Many of the medicines were problematic for several reasons. Poor acceptability was mentioned in 52% of the cases, poor usability in 48% of the cases, and use in special populations in 18% of the cases. The three most mentioned products were amoxicillin and clavulanic acid (reported 7 times), benzylpenicillin and metronidazole (reported 4 times each).

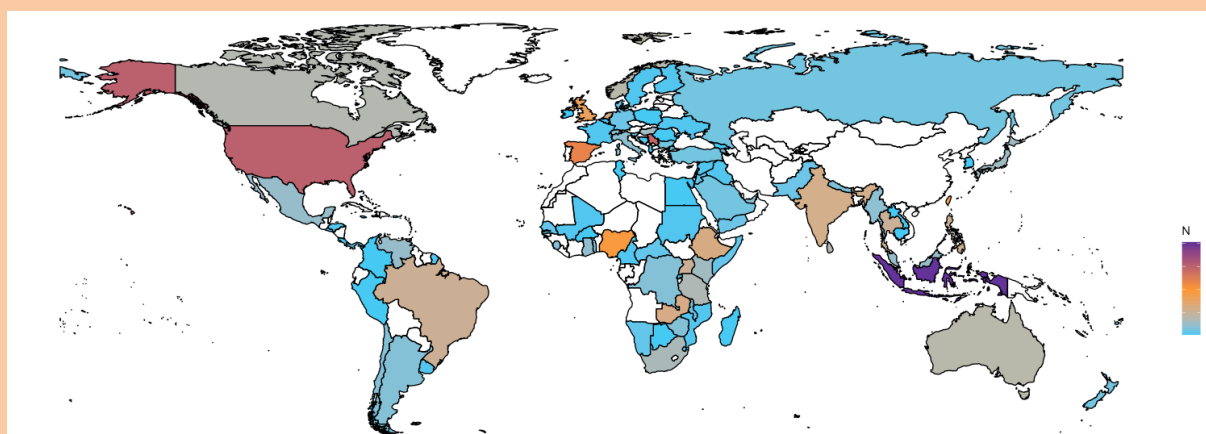
A total of 228 medicines, for a total of 322 pharmaceutical forms, were reported as problematic by the pharmacists; 36% were oral liquid, 30% tablets, 14% parenteral formulations, and 10% capsules. Poor acceptability was mentioned in 52% of the cases, poor usability in 48% of the cases, and use in special populations in 18% of the cases. Again, many medicines were problematic for several reasons. The three most mentioned products were omeprazole (18 times), phenobarbital (12 times) and acetylsalicylic acid (11 times)

Health care workers (physicians, nurses, and pharmacists) were asked which formulations were missing for the treatment of their paediatric patients, for whatever reason, i.e., only the adult formulations were available, the formulation was not marketed in the country, only available in the private sector, was too expensive, missing from the national drug formulary, or was subject to stock-outs.

For example, ciprofloxacin was the most “sought-after” product and was only available as an adult formulation in Australia, Chile, Nigeria, Philippines, Portugal, Serbia, Uganda and Zambia. Although oral granules are available for reconstitution, the use of this drug for children is very restricted due to its potentially serious toxic effects. This is probably the reason why paediatric formulations are not available in many countries. There is a reported lack of paediatric forms of phenobarbital, available in many countries as adult formulations. This very old and inexpensive product is used to treat epilepsy and has a

relatively small market for children. It is the second most frequently cited product to be prepared extemporaneously by pharmacists.

The responses provided show the perspective of healthcare workers working around the world, particularly in Europe, America, and Africa with limited representation from Northern Africa, Middle East, and South-East Asia.



Due to the diversity of national health systems, access to care varies from country to country and medical costs are often not covered or reimbursed, especially in the low-middle income countries. In addition, the scarcity of market formulations for children poses a challenge to the fulfilment of the universal right to health care, including for children.

Authors

This document was prepared by the Penta Foundation members E. Barbieri, M. Lallemand and T.Grossele

Disclosure

This survey is part of the EML project and is receiving funds by WHO via the GAP-f project.

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We would like to thank all respondents and all the international and scientific societies and networks that helped us distribute the surveys. In particular, the Authors would like to thank the specialist who agreed to be interviewed.

Data availability

The data generated for this analysis are available upon written request to the Authors of this report.

Correspondence

Please address all correspondence related to this document to gap-f@pentafoundation.org.

2. Interviews to specialists

2.1 Materials and methods

Twenty specialists were selected from those who agreed to be contacted by the GAP-f team based on the responses to the preliminary survey and their area of specialization. Specialists were contacted by email and a reminder was sent after 5 days in case of non-response.

To target the questions related to medicines used by specialists not represented by the respondents of the preliminary survey, personal contacts of the GAP-f team were interviewed.

Two days before the interview, the interviewees received the executive summary of the results of the preliminary survey, or the survey questions if the interviewee had not responded to the survey.

The interview was organised in two parts: at the beginning of the interview those who had responded to the survey were asked to provide further details and explanations on the answers given, while those who had not responded were given the opportunity to answer the survey questions. In the second part of the interview, general comments were requested on how to improve the responsiveness to the survey and on how to improve its structure. The aim was to better address the specific problems due, on the one side, by the lack of suitability of some paediatric products and on the other one hand, the unavailability of some medicines for children, which are in development and available in an adult form, or inaccessible in their practice setting.

Interviews were conducted by two interviewers and lasted for approximately 45 minutes. The interviews were transcribed and validated by the interviewee.

2.2 Results and discussion

In total nine interviews were conducted; five interviewees were physicians and four were pharmacists working mainly in Europe. The generic data of the interviewees are presented in the Table 1 below.

Table 5. Generic data of the interviewees

Specialty	Sub-specialty	Setting	Country
Physician	Pneumologist	Hospital	Belgium
Physician	Diabetologist	Hospital	Italy
Physician	Neuropsychiatry	Hospital	Italy
Physician	Pneumologist	Hospital	Mexico
Physician	Emergency - Intensive care	Hospital	Ireland
Pharmacist	NA	Hospital	Hungary
Pharmacist	Neuropsychiatry	Hospital	Nigeria
Pharmacist	Paediatrics	Hospital	UK
Pharmacist	NA	Hospital	Croatia

Important comments were provided on the use of drug delivery devices, in particular atomizers for intranasal administration of medicines, insulin pumps for continuous administration and the inhalers for medicines administered by the respiratory route.

An emergency care specialist reported that there were significant delays between the time an opioid for pain relief (i.e., intravenous morphine) is needed and the time the medicine was administered. In busy wards, it could take more than one hour to insert an intravenous line. An intranasal route for analgesics was proposed as one of the alternatives as it reduces the administration time and also empowers the nursing staff to administer effective analgesia very quickly.

Moreover, it reduces the precautions and standard procedures required with the use of intravenous morphine. Furthermore, in the case of intranasal - morphine there has been a reduction in side effects compared to the intravenous route, including less nausea, and vomiting when morphine is administered too rapidly. It is also interesting to consider that the atomizer is cheap and easy to use.

With regard to inhalers, their correct use should be clearly explained to patients and parents, but this is rarely the case as reported by the paediatric pneumologists interviewed, who stated that many physicians prescribing inhalers do not give appropriate or sufficient explanations. The use of inhalers needs to be demonstrated to patients and caregivers. Inhalers are not appropriate for children before the age of 6, but are mainly used from the age of 8/10, on a case-by-case basis. Most children over 10 can use them properly. Sometimes, dry powder inhalers (DPIs) are prescribed in general practice also to very young children, although correct use is virtually impossible.

A paediatric diabetes specialist reported that insulin poses serious acceptability problems, related to complexity of using the device and the stigma associated with the disease. Insulin pumps are complicated to use because, even though they work quite well for paediatric patients, they are complex devices; most of them are not designed for toddlers or infants, even though they are approved for use in this population. Therefore, the other option is subcutaneous insulin administration with multiple daily injections that can be difficult for patients, families, caregivers, as well as schoolteachers. At least one or two administrations must be done at school, which is complicated because insulin is not an emergency medicine and teachers are not trained to administer it. Parents are sometimes forced to take time off from work and go to school to administer insulin to their child. This situation could be avoided if child-friendly insulin pumps were available. Unfortunately, the use of insulin pumps is still low in Europe, compared to the United States, because of the limited funding of the devices by the health-care systems. Moreover, the rapid-acting insulin needed for the insulin pump has to be in diluted form, which is only available in a few countries.

From the pharmacists' perspective, the most important comments relate to the quality of extemporaneous preparations.

An hospital pharmacist reported as an example that clinicians had to prescribe oral powder formulation of furosemide because of the uncertainties related to the dosing of

furosemide as oral suspension prepared by the hospital pharmacy, in particular the high viscosity of extemporaneous formulations. The medicine had to be prepared extemporaneously from the adult formulation and there was no international formulary with harmonized recipes.

In general, it was reported that it is difficult to standardize the preparation for oral suspensions and that the chemical and microbiological stability data were only available for single ingredients, APIs, and excipients. Indeed, due to sedimentation problems and lack of uniformity, accurate dosing cannot be guaranteed.

Moreover, when preparing formulations from the adult medicines that are coated or formulated for sustained release, the manipulations required to dissolve the coating are not standardized, nor studied. There is no guarantee that all active ingredients are extracted and transferred to the extemporaneous formulation.

Comments from a pharmacist working in a low-income country highlighted that preparing extemporaneous solid oral formulations are preferable to liquid formulations. They have better stability, and do not need clean water for reconstitution nor refrigeration. However, as this is a time-consuming process it is not often performed in clinics today. For the solid oral formulations already on the market, dosing according to child weight can be very complex, especially with formulation units of high dosage.

Finally, it is not always possible to add sugar or other taste-masking ingredients when preparing liquid oral formulations from solid oral formulations thus limiting child's adherence.

The complete transcripts of the interviews are reported in the Appendix.

3. Second survey

3.1 Material and methods

A second online survey on the REDCap platform was created to further investigate different aspects of children's medicine formulations and extend the geographic representativity of the respondents.

Based on the preliminary survey and feedback from specialists, a survey exploring problematic and missing formulations was created. Different questions were addressed based on the profession of the specialists: physicians, nurses, and pharmacists.

The survey of physicians explored:

1. Children acceptability,
2. Ease of use for children and caregiver,
3. Off-label use,
4. Dosing and safety issues,
5. Use in special situations or fragile populations,
6. Formulations missing for any reason.

The survey of nurses explored:

1. Children acceptability,
2. Ease of use for children and caregiver,
3. Formulations missing for any reason.

The survey of pharmacists explored:

1. Extemporaneous preparation,
2. Complexity of reconstitution and stability issues,
3. Off-label use,
4. Use in special situations or fragile populations,
5. Formulations missing for any reason.

A complete description of the survey is included in the Appendix.

Prospective respondents comprised two broad categories: general health practitioners taking care of children (family and general practitioners, pharmacists, general paediatricians) and expert representing relevant paediatric subspecialties.

There was no target for the number of respondents, but the aim was to cover a broad geographical area.

For this purpose, a list of all the scientific national and sub-national scientific societies listed members of the International Society of Paediatrics, of the International Council of Nurse, of the World Organization of Family Doctors and the International Pharmaceutical Federation was created and electronic contacts were extracted from websites and publicly available information. In addition, electronic contacts of international scientific societies and networks involved in paediatric research were included in the list.

A complete list of the societies is in the Appendix.

The objectives of the project and the scope of the survey were presented in a newsletter that provided a direct link to the REDCap platform that hosted the survey. The newsletter was written in English and translated into four languages (i.e., French, Spanish, Arabic and Portuguese) in order to increase the number of responses from non-English speaking professionals. Moreover, a guide on how to use the automatic translation option in Google Chrome was created and added as a link to the newsletter and to the survey instructions to facilitate the completion of the survey by respondents from all countries.

The survey went online on 6th July 2021 and was distributed to the societies that had previously registered via the newsletter.

If a Society did not respond, a reminder was sent after 15 days.

Respondents who did not complete the survey in full, but who provided a valid email address, received an automatic reminder to complete the survey 10 days after starting the survey. A final reminder was sent 3 days before the closing date, 30th September 2021.

Data collected from surveys for which valid personal or country information was not provided were excluded from the analysis.

Free text fields were manually validated and, if containing information that could have been included in structured fields, they were incorporated in the correct fields. For example, if a pharmaceutical formulation was flagged as problematic but the free text field indicated that it was not available in the country, the information on the missing formulation was incorporated into the correct field of the question on missing formulations.

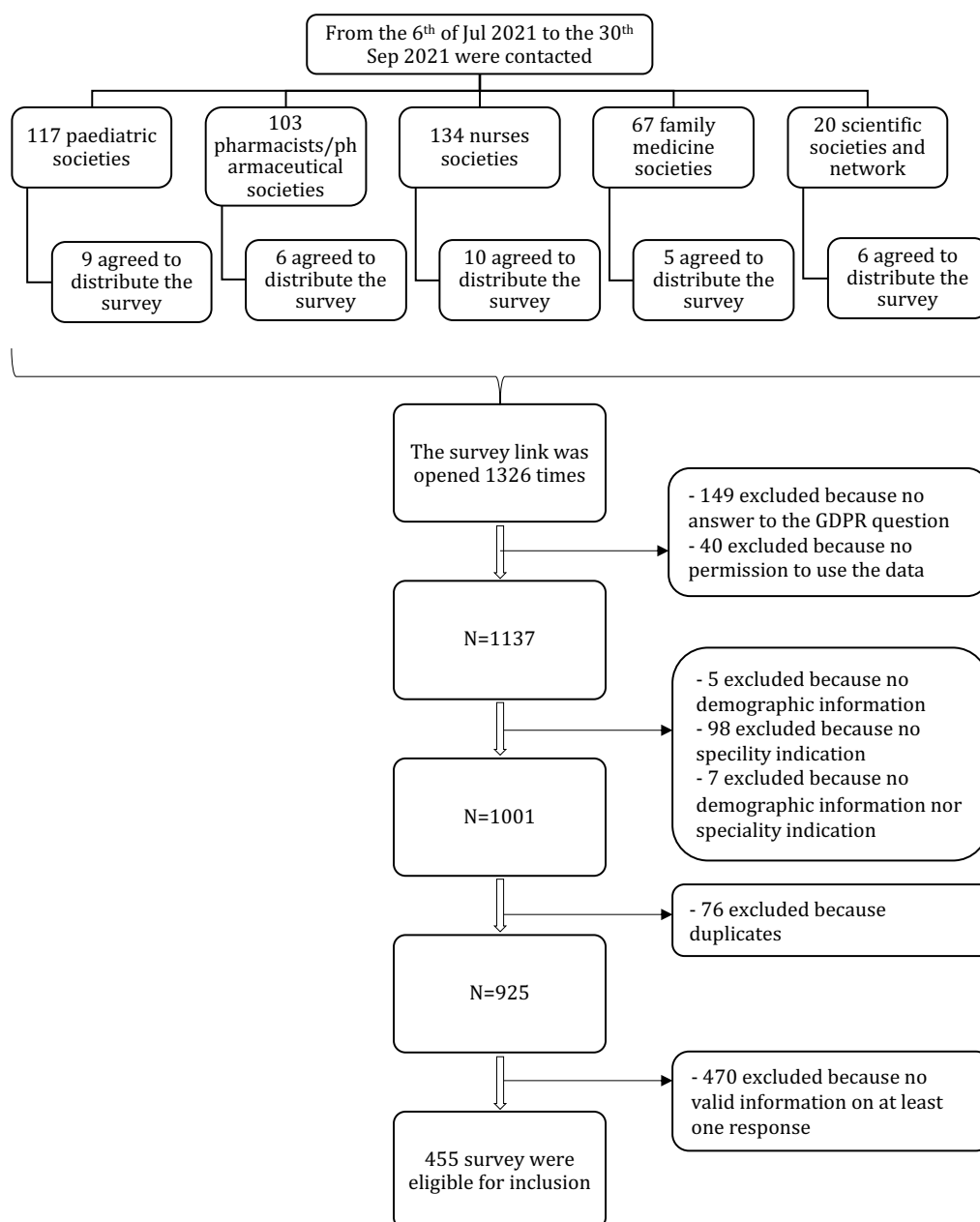
The data were summarized descriptively as numbers and percentages and stratified by medicines and specific pharmaceutical forms, where possible.

3.2 Main results

The second survey was developed between May and June 2021, went live on 6th July 2021 and closed on 30 September, 2021.

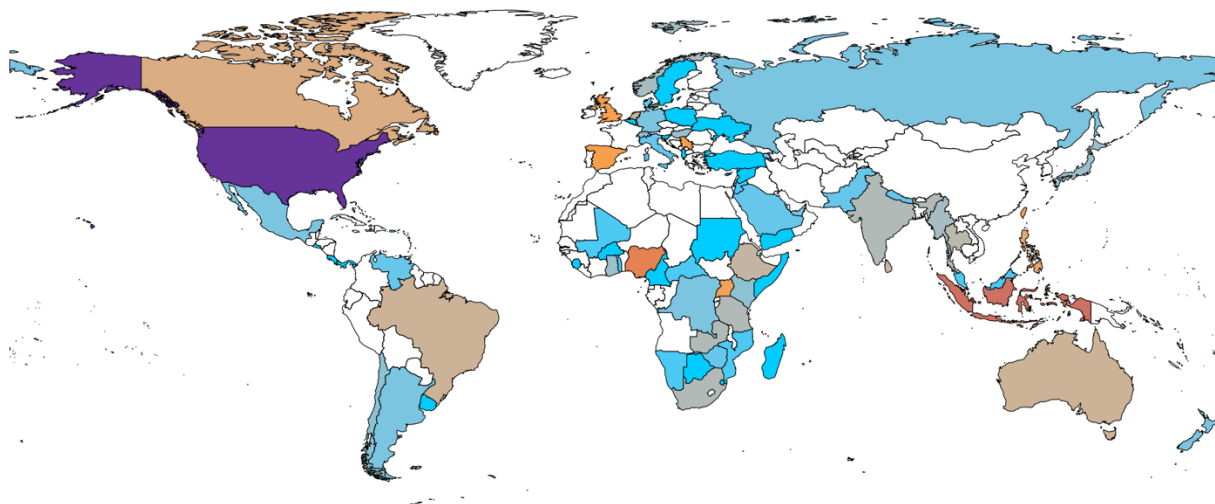
A total of 1,326 people logged on to the survey website, 925 started to provide their demographic data, and 455 responded to the two main survey questions, listing the products or formulations found most problematic and why, and either because they did not exist or because they were not available in their local setting. Please see below the flow chart of respondents with reasons for exclusion.

Figure 3. Flow chart of survey respondents' inclusion and exclusion criteria.



The map below represents the geographical distribution of the 455 respondents who indicated their main country of practice.

Figure 4. Map of the countries where the respondents practice.



A total of 285 physicians, 28 nurses and 142 pharmacists completed the demographic part of the survey and reported at least one problematic medicine. Of these, 237, 21 and 112 worked in a hospital setting and 48, 7 and 30 in a primary care setting. All paediatric subspecialties were represented, with most covering general paediatrics (50%). Emergency and intensive care medicine, infectious diseases, and neonatology were well represented. Haemato-oncology was widely covered among health workers working in hospitals, nutrition among nurses working in primary care units and allergy among pharmacists working in primary care as well.

Table 6. Distribution of the sub-specialties of the physicians, nurses, and pharmacists reporting medicines as problematic.

	Hospital			Primary Care			Overall		
	Physician (N=237)	Nurse (N=21)	Pharmacist (N=112)	Physician (N=48)	Nurse (N=7)	Pharmacist (N=30)	Physician (N=285)	Nurse (N=28)	Pharmacist (N=142)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Allergy and immunology	15 (6)	1 (5)	10 (9)	-	-	4 (13)	15 (5)	1 (4)	14 (10)
Cardiology	10 (4)	1 (5)	14 (13)	-	-	4 (13)	10 (4)	1 (4)	18 (13)
Dermatology	3 (1)	-	5 (5)	-	-	5 (17)	3 (1)	-	10 (7)
Ear nose throat specialist	1 (0)	-	6 (5)	-	-	2 (7)	1 (0)	-	8 (6)
Emergency medicine	9 (4)	6 (29)	17 (15)	3 (6)	-	-	12 (4)	6 (21)	17 (12)
Endocrinology	9 (4)	-	11 (10)	2 (4)	-	5 (17)	11 (4)	-	16 (11)
Gastroenterology	9 (4)	-	12 (11)	-	-	1 (3)	9 (3)	-	13 (9)
General paediatrics	117 (49)	7 (33)	42 (38)	24 (50)	3 (43)	7 (23)	141 (50)	10 (36)	49 (35)
Infectious diseases	61 (26)	2 (10)	24 (21)	16 (33)	1 (14)	3 (10)	77 (27)	3 (11)	27 (19)
Intensive care	23 (10)	5 (24)	26 (23)	-	1 (14)	1 (3)	23 (8)	6 (21)	27 (19)
Neonatology	27 (11)	4 (19)	21 (19)	3 (6)	2 (29)	2 (7)	30 (11)	6 (21)	23 (16)
Nephrology	8 (3)	1 (5)	10 (9)	-	-	1 (3)	8 (3)	1 (4)	11 (8)
Neurology	12 (5)	1 (5)	6 (5)	3 (6)	-	1 (3)	15 (5)	1 (4)	7 (5)
Nutrition	8 (3)	2 (10)	8 (7)	4 (8)	4 (57)	5 (17)	12 (4)	6 (21)	13 (9)
Onco haematology	10 (4)	-	23 (21)	-	-	2 (7)	10 (4)	-	25 (18)
Psychiatry	3 (1)	-	4 (4)	2 (4)	-	2 (7)	5 (2)	-	6 (4)
Pulmonology	10 (4)	1 (5)	5 (5)	1 (2)	-	1 (3)	11 (4)	1 (4)	6 (4)
Surgery	4 (2)	2 (10)	8 (7)	1 (2)	-	-	5 (2)	2 (7)	8 (6)
Other spec	3 (1)	2 (10)	10 (9)	4 (8)	-	5 (17)	7 (3)	2 (7)	15 (11)
Adolescent health	1 (0)	-	-	-	-	-	1 (0)	-	-
Pharmacology	1 (0)	-	-	1 (2)	-	-	2 (1)	-	-
Public health	1 (0)	-	-	2 (4)	-	-	3 (1)	-	-
Rheumatology	4 (2)	-	-	-	-	-	4 (1)	-	-

	Hospital			Primary Care			Overall		
	Physician (N=237)	Nurse (N=21)	Pharmacist (N=112)	Physician (N=48)	Nurse (N=7)	Pharmacist (N=30)	Physician (N=285)	Nurse (N=28)	Pharmacist (N=142)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Other	1 (0)	2 (10)	6 (5)	-	-	1 (3)	1 (0)	2 (7)	7 (5)

Table 7. Distribution of the therapeutic classes of the medicines that physicians, nurses, and pharmacists are prescribing/dealing with

	Hospital			Primary Care			Overall		
	Physicia n (N=237)	Nurse (N=21)	Pharmac ist (N=112)	Physicia n (N=48)	Nurse (N=7)	Pharmac ist (N=30)	Physicia n (N=285)	Nurse (N=28)	Pharmac ist (N=142)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Anaesthetics preoperative medicines and medical gases	19 (8)	6 (29)	21 (19)	1 (2)	1 (14)	4 (13)	20 (7)	7 (25)	25 (18)
Medicines for pain and palliative care	82 (35)	9 (43)	78 (70)	15 (31)	4 (57)	13 (43)	97 (34)	13 (46)	91 (64)
Antiallergics and medicines used in anaphylaxis	76 (32)	7 (33)	36 (32)	20 (42)	1 (14)	9 (30)	96 (34)	8 (29)	45 (32)
Antidotes and other substances used in poisonings	22 (9)	2 (10)	15 (13)			2 (7)	22 (8)	2 (7)	17 (12)
Anticonvulsants antiepileptics	101 (43)	10 (48)	62 (55)	14 (29)	1 (14)	14 (47)	115 (40)	11 (39)	76 (54)
Anti infective medicines	182 (77)	7 (33)	92 (82)	41 (85)	2 (29)	15 (50)	223 (78)	9 (32)	107 (75)
<i>Antibiotics</i>	175 (74)	6 (29)	87 (78)	38 (79)	2 (29)	15 (50)	213 (75)	8 (29)	102 (72)
<i>Antileprosy medicines</i>	7 (3)	1 (5)	2 (2)			2 (7)	7 (3)	1 (4)	4 (3)
<i>Antituberculosis medicines</i>	88 (37)		20 (18)	13 (27)		3 (10)	101 (35)		23 (16)
<i>Antifungal medicines</i>	99 (42)	3 (14)	56 (50)	19 (40)	2 (29)	9 (30)	118 (41)	5 (18)	65 (46)
<i>Antivirals</i>	113 (48)	4 (19)	57 (51)	18 (38)		7 (23)	131 (46)	4 (14)	64 (45)
<i>Antiprotozoal medicines</i>	60 (25)	1 (5)	8 (7)	13 (27)	1 (14)	6 (20)	73 (26)	2 (7)	14 (10)
<i>Medicines for ectoparasitic infections</i>	22 (9)		5 (5)	6 (13)	1 (14)	5 (17)	28 (10)	1 (4)	10 (7)
Antimigraine medicines	21 (9)		18 (16)	8 (17)		7 (23)	29 (10)		25 (18)
Immunomodulators and antineoplastics	40 (17)	1 (5)	41 (37)	1 (2)		5 (17)	41 (14)	1 (4)	46 (32)
Medicines affecting the blood	44 (19)	2 (10)	35 (31)	4 (8)	1 (14)	3 (10)	48 (17)	3 (11)	38 (27)
Blood products of human origin and plasma substitutes	73 (31)	6 (29)	23 (21)	2 (4)		1 (3)	75 (26)	6 (21)	24 (17)
Cardiovascular medicines	71 (30)	6 (29)	59 (53)	10 (21)		15 (50)	81 (28)	6 (21)	74 (52)
Dermatological medicines topical	72 (30)	2 (10)	32 (29)	23 (48)	2 (29)	16 (53)	95 (33)	4 (14)	48 (34)
Diagnostic agents	24 (10)		15 (13)	5 (10)		2 (7)	29 (10)		17 (12)
Disinfectants and antiseptics	50 (21)	3 (14)	15 (13)	9 (19)	2 (29)	6 (20)	59 (21)	5 (18)	21 (15)
Diuretics	83 (35)	11 (52)	61 (55)	8 (17)		9 (30)	91 (32)	11 (39)	70 (49)
Gastrointestinal medicines	87 (37)	6 (29)	64 (57)	17 (35)	2 (29)	14 (47)	104 (37)	8 (29)	78 (55)
Medicines for endocrine disorders	40 (17)	1 (5)	45 (40)	8 (17)		11 (37)	48 (17)	1 (4)	56 (39)
Immunologicals	48 (20)	1 (5)	22 (20)	3 (6)		4 (13)	51 (18)	1 (4)	26 (18)
Muscle relaxants peripherally acting and cholinesterase inhibitors	33 (14)	3 (14)	27 (24)	1 (2)		6 (20)	34 (12)	3 (11)	33 (23)
Ophthalmological preparations	29 (12)	4 (19)	25 (22)	8 (17)	1 (14)	5 (17)	37 (13)	5 (18)	30 (21)

	Hospital			Primary Care			Overall		
	Physician (N=237)	Nurse (N=21)	Pharmacist (N=112)	Physician (N=48)	Nurse (N=7)	Pharmacist (N=30)	Physician (N=285)	Nurse (N=28)	Pharmacist (N=142)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Medicines for perinatal care	49 (21)	2 (10)	24 (21)	9 (19)	2 (29)	4 (13)	58 (20)	4 (14)	28 (20)
Peritoneal dialysis solution	20 (8)		16 (14)			2 (7)	20 (7)		18 (13)
Medicines for mental and behavioural disorders	27 (11)	3 (14)	32 (29)	10 (21)	1 (14)	8 (27)	37 (13)	4 (14)	40 (28)
Medicines acting on the respiratory tract	99 (42)	8 (38)	64 (57)	25 (52)	2 (29)	12 (40)	124 (44)	10 (36)	76 (54)
Solutions correcting water electrolyte and acid as disturbances	97 (41)	5 (24)	58 (52)	17 (35)		9 (30)	114 (40)	5 (18)	67 (47)
Vitamins and minerals	116 (49)	9 (43)	53 (47)	23 (48)	5 (71)	20 (67)	139 (49)	14 (50)	73 (51)
Ear nose and throat medicines	67 (28)	4 (19)	36 (32)	17 (35)	2 (29)	13 (43)	84 (30)	6 (21)	49 (35)
Medicines for diseases of joints	43 (18)	2 (10)	23 (21)	6 (13)	1 (14)	8 (27)	49 (17)	3 (11)	31 (22)

3.2.1 Problematic products reported by physicians

Overall, 287 medicines (identified by generic name) for a total of 416 pharmaceutical forms were reported by physicians as problematic: 37% were tablets, 31% oral liquids, 18% parenteral formulations, and 7% capsules. Several pharmaceutical forms of the same product were mentioned.

Poor acceptability was mentioned for 45% of the products, poor usability for 25%, off label use for 12%, uncertainty about dosage for 36%, and difficulties in relation to their use in special populations for 10% of products. A product could be reported as problematic for several reasons: For example, poor acceptability from the child's point of view and complexity of use from the caregiver point of view. At the top of the table below, lopinavir/ritonavir is listed as problematic for acceptability reasons in 80% of the cases and for usability reasons in 41% of the cases.

Table 8. Problematic products or formulations as reported by physicians

Medicine	N	Formulation									Acceptability	Usability	Off-label use	Dosing issue	Special utilization
		Tablet	Oral liquid	Parenteral preparation	Capsule	Preparation for inhalation	Rectal preparation	Topical	Dispersible tablet	Other					
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
<i>Overall</i>	933	346 (37)	291 (31)	170 (18)	66 (7)	37 (4)	8 (0.9)	8 (0.9)	4 (0)	3 (0.7)	424 (45)	223 (24)	111 (12)	335 (36)	95 (10)
Lopinavir + ritonavir	41	11 (27)	22 (54)	-	4 (10)	-	-	-	2 (5)	2 (5)	33 (80)	17 (41)	-	4 (10)	2 (5)
Clindamycin	21	4 (19)	11 (52)	-	6 (27)	-	-	-	-	-	17 (81)	1 (5)	1 (5)	4 (19)	-
Salbutamol	21	1 (5)	1 (5)	1 (5)	-	17 (81)	-	1 (5)	-	-	5 (24)	12 (57)	-	6 (29)	2 (10)
Cefuroxime	19	-	18 (95)	1 (5)	-	-	-	-	-	-	16 (84)	2 (11)	-	1 (5)	1 (5)
Ciprofloxacin	18	8 (44)	6 (33)	2 (11)	2 (11)	-	-	-	-	-	11 (61)	5 (28)	4 (22)	5 (28)	3 (17)
Omeprazole	18	5 (28)	5 (28)	-	8 (44)	-	-	-	-	-	10 (56)	11 (61)	2 (11)	6 (33)	2 (11)
Amoxicillin	17	4 (24)	9 (53)	-	3 (18)	-	-	-	1 (6)	-	7 (41)	6 (35)	2 (12)	3 (18)	2 (12)
Furosemide	17	13 (77)	3 (18)	1 (6)	-	-	-	-	-	-	6 (35)	5 (29)	-	9 (53)	-
Amoxicillin + clavulanic acid	16	3 (19)	12 (75)	1 (6)	-	-	-	-	-	-	6 (38)	6 (38)	-	6 (38)	-
Acetaminophen	15	1 (7)	12 (80)	1 (7)	-	-	1 (7)	-	-	-	7 (47)	2 (13)	-	10 (67)	2 (13)
Prednisolone	15	11 (73)	4 (27)	-	-	-	-	-	-	-	14 (93)	1 (7)	-	1 (7)	-
Digoxin	14	9 (64)	3 (21)	2 (14)	-	-	-	-	-	-	3 (21)	4 (29)	2 (14)	12 (86)	1 (7)
Flucloxacillin	12	-	12 (100)	-	-	-	-	-	-	-	11 (92)	-	-	2 (17)	-
Isoniazid	12	6 (50)	6 (50)	-	-	-	-	-	-	-	8 (67)	2 (17)	1 (8)	5 (42)	2 (17)
Acyclovir	11	8 (73)	-	2 (18)	1 (9)	-	-	-	-	-	4 (36)	5 (45)	1 (9)	3 (27)	-

Medicine	N	Formulation									Acceptability	Usability	Off-label use	Dosing issue	Special utilization
		Tablet	Oral liquid	Parenteral preparation	Capsule	Preparation for inhalation	Rectal preparation	Topical	Dispersible tablet	Other					
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Isoniazid + pyrazinamide + rifampicin + ethambutol	11	10 (91)	1 (9)	-	-	-	-	-	-	-	5 (45)	7 (64)	-	2 (18)	-
Abacavir + dolutegravir + lamivudine	10	8 (80)	1 (10)	-	1 (10)	-	-	-	-	-	4 (40)	3 (30)	1 (10)	5 (50)	3 (30)

Please find the full table in the Appendix

Poor acceptability of medicines was reported 424 times by physicians. Bad taste/after taste was mentioned in 43% of the cases, excessive size tablet, or capsule in 29%, high volume of liquid to be ingested in 7% of the cases, high number of daily administrations in 10% of the cases, unpleasant texture, appearance, or smell in 9% of the cases, complexity of using a device in 4% of the cases, and 10% for other reasons.

Table 9. Acceptability issues as reported by physicians

Medicine	N	Acceptability						
		Taste after taste	Tablet capsule size	High volume of liquid for a single dose	Numerous daily administrations	Texture appearance smell	Complexities in using the device	Other
<i>Overall</i>	424	184 (43)	123 (29)	31 (7)	41 (10)	37 (9)	19 (4)	41 (10)
Lopinavir + ritonavir	33	28 (85)	7 (21)	3 (9)	5 (15)	4 (12)	1 (3)	1 (3)
Clindamycin	17	13 (76)	4 (24)	2 (12)	1 (6)	1 (6)	-	1 (6)
Cefuroxime	16	12 (75)	1 (6)	1 (6)	-	5 (31)	-	1 (6)
Prednisolone	14	7 (50)	4 (29)	-	4 (29)	1 (7)	-	-
Ciprofloxacin	11	8 (73)	4 (36)	1 (9)	-	2 (18)	-	1 (9)
Flucloxacillin	11	9 (82)	-	3 (27)	5 (45)	1 (9)	-	-
Omeprazole	10	1 (10)	7 (70)	-	-	1 (10)	-	-
Isoniazid	8	-	5 (63)	-	1 (13)	-	-	1 (13)
Azithromycin	8	5 (63)	1 (13)	-	-	-	-	-
Metronidazole	8	4 (50)	1 (13)	3 (38)	-	1 (13)	-	-
Amoxicillin	7	1 (14)	5 (71)	2 (29)	-	-	-	-
Acetaminophen	7	6 (86)	-	-	-	-	-	-
Benzylpenicillin	7	-	-	-	-	-	-	4 (57)
Clarithromycin	7	3 (43)	-	1 (14)	-	4 (57)	-	-

Please find the full table in the Appendix

Difficulty in using a product was reported 223 times by physicians. In 44% of the cases, the problem was determining the correct dose, in 25% it was the complexity of preparing the product, in 14% the need for a device to administer the product, in 9% the need for a vehicle to administer the product, whether liquid, soft food or other vehicle,

and in 8% of the cases the need for low temperature storage. The table below lists the most problematic products and related specific reasons for this.

Table 10. Difficult use of products as reported by physicians

Medicine	N	Usability						
		Complex preparation	Determination of the dose	Need for a vehicle	Problematic administration device	Problematic packaging opening / closing	Need to be stored at a specific temperature	Other please specify usable
<i>Overall</i>	223	56 (25)	98 (44)	21 (9)	32 (14)	12 (5)	18 (8)	19 (9)
Lopinavir + ritonavir	17	6 (35)	2 (12)	4 (24)	3 (18)	1 (6)	4 (24)	2 (12)
Salbutamol	12	-	1 (8)	-	11 (92)	1 (8)	1 (8)	-
Omeprazole	11	3 (27)	6 (55)	1 (9)	1 (9)	2 (18)	1 (9)	-
Isoniazid + pyrazinamide + rifampicin + etambutol	7	1 (14)	2 (29)	1 (14)	-	-	-	1 (14)
Amoxicillin	6	2 (33)	3 (50)	2 (33)	-	2 (33)	1 (17)	1 (17)
Amoxicillin + clavulanic acid	6	1 (17)	4 (67)	1 (17)	-	-	1 (17)	1 (17)
Ciprofloxacin	5	2 (40)	3 (60)	-	-	-	-	-
Furosemide	5	1 (20)	5 (100)	1 (20)	-	-	-	-
Acyclovir	5	3 (60)	3 (60)	-	-	-	1 (20)	-
Digoxin	4	1 (25)	1 (25)	-	-	1 (25)	-	-
Sildenafil	4	2 (50)	3 (75)	-	-	-	-	-
Abacavir + lamivudine + zidovudine	4	1 (25)	2 (50)	-	-	-	-	1 (25)
Budesonide	4	-	1 (25)	-	4 (100)	-	-	-
Abacavir + dolutegravir + lamivudine	3	-	1 (33)	-	-	-	-	1 (33)
Valproic acid	3	1 (33)	2 (67)	-	-	-	-	2 (67)
Caffeine	3	-	2 (67)	-	-	1 (33)	-	-
Artemether + lumefantrine	3	2 (67)	3 (100)	-	-	1 (33)	-	-
Phenobarbital	3	1 (33)	-	1 (33)	1 (33)	-	-	-

Please find the full table in the Appendix

Physicians reported products with dosing problems 335 times. In 16% of the cases, these problems were related to discrepancies between guidelines, in 13% to wide range of doses across age or weight bands, in 10% to a lack of PK evidence to support dosing,

in 10% to a lack of safety data, in 10% to a narrow therapeutic index, in 14% to the need for therapeutic monitoring and in 19% to frequent dosing errors, likely by caregivers. Below is a list of the most problematic products sorted by frequency of problems. For example, digoxin was reported as problematic due to its narrow therapeutic index in half of the cases, the need for therapeutic monitoring a third of the cases, frequent dosing errors by caregivers in 25% of the cases, and wide range of doses across weight bands in 17% of the cases. Again, these percentages add up to more than 100% because physicians may have reported several dosing problems for the same product. When considering digoxin, such problems are clearly interrelated.

Table 11. Products with dosing issues as reported by physicians

Medicine	N	Dosing issue							
		Discrepancies between dosing guidelines	Wide range of dose across age weight bands	Lack of pk evidence for dosing regimen	Lack of safety data	Narrow therapeutic index	Requirement for therapeutic drug monitoring	Frequent dosing errors	Other
Overall	335	53 (16)	45 (13)	33 (10)	32 (10)	33 (10)	46 (14)	65 (19)	47 (14)
Digoxin	12	-	2 (17)	-	-	6 (50)	4 (33)	3 (25)	1 (8)
Acetaminophen	10	3 (30)	-	1 (10)	-	-	-	4 (40)	2 (20)
Furosemide	9	-	-	1 (11)	-	1 (11)	-	4 (44)	2 (22)
Vancomycin	7	-	-	1 (14)	-	1 (14)	6 (86)	-	-
Salbutamol	6	1 (17)	1 (17)	-	-	-	1 (17)	1 (17)	1 (17)
Omeprazole	6	-	-	-	-	1 (17)	-	2 (33)	-
Amoxicillin + clavulanic acid	6	2 (33)	2 (33)	-	-	-	-	1 (17)	2 (33)
Amphotericin b	6	-	1 (17)	2 (33)	1 (17)	-	2 (33)	-	1 (17)
Gentamicin	6	1 (17)	1 (17)	-	-	3 (50)	2 (33)	-	1 (17)
Ciprofloxacin	5	-	-	-	1 (20)	-	-	2 (40)	1 (20)
Isoniazid	5	-	-	-	-	-	-	1 (20)	1 (20)
Abacavir + dolutegravir + lamivudine	5	1 (20)	1 (20)	2 (40)	2 (40)	-	-	-	2 (40)

Medicine	N	Dosing issue							
		Discrepancies between dosing guidelines	Wide range of dose across age weight-bands	Lack of pk evidence for dosing regimen	Lack of safety data	Narrow therapeutic index	Requirement for therapeutic drug monitoring	Frequent dosing errors	Other
Lopinavir + ritonavir	4	-	-	1 (25)	-	-	-	1 (25)	2 (50)
Clindamycin	4	-	-	-	-	-	-	1 (25)	1 (25)
Valproic acid	4	-	1 (25)	-	1 (25)	-	2 (50)	1 (25)	1 (25)
Caffeine	4	-	-	-	-	1 (25)	-	1 (25)	-
Ibuprofen	4	1 (25)	1 (25)	-	2 (50)	-	-	1 (25)	-
Abacavir + lamivudine	4	1 (25)	-	-	-	-	-	-	2 (50)
Hydroxyurea	4	1 (25)	2 (50)	-	-	-	-	-	1 (25)
Epinephrine	4	3 (75)	1 (25)	-	-	1 (25)	2 (50)	-	1 (25)
Diazepam	4	1 (25)	-	-	-	-	1 (25)	-	-

Please find the full table in the Appendix

Problems related to the need for off label use were reported 111 times. In 56% of the cases due to unapproved age group, in 34% for unapproved indication, in 26% for unapproved dose, and in 12% for unapproved route of administration. The products listed in the table below were mentioned more than once.

Table 12. Products prescribed off label as reported by physicians

Medicine	N	Off label use			
		Unapproved indication	Unapproved age group	Unapproved dosage	Unapproved route of administration
Overall	111	38 (34)	62 (56)	29 (26)	13 (12)
Ciprofloxacin	4	1 (25)	2 (50)	-	-
Sildenafil	3	2 (67)	3 (100)	2 (67)	-
Aminophylline	3	-	-	-	2 (67)
Doxycycline	3	1 (33)	2 (67)	-	-
Dexmedetomidine	3	1 (33)	2 (67)	1 (33)	-
Omeprazole	2	-	-	-	2 (100)
Amoxicillin	2	2 (100)	-	2 (100)	-
Digoxin	2	-	-	1 (50)	-
Azithromycin	2	1 (50)	2 (100)	2 (100)	-
Ceftriaxone	2	1 (50)	-	-	-
Ibuprofen	2	-	1 (50)	1 (50)	-
Valaciclovir	2	-	2 (100)	-	-
Chloramphenicol	2	2 (100)	-	-	1 (50)
Ketamine	2	1 (50)	-	1 (50)	-
Ondansetron	2	1 (50)	-	-	1 (50)
Pyrimethamine	2	-	2 (100)	1 (50)	-
Milrinone	2	1 (50)	1 (50)	1 (50)	-
Mometasone furoate	2	1 (50)	1 (50)	2 (100)	-
Tenofovir disoproxil	2	-	2 (100)	-	-

Please find the full table in the Appendix

The last question addressed to physicians concerned difficulties with the use of paediatric products in specific “fragile or special” populations,” i.e., populations with co-morbidities or co-treatments.

This was noted 95 times, 18% because there was a lack of indication for that population, a lack of dosing instructions in 18%, a lack of safety data in 5%, and in 12% of the cases the problem was drug burden when co-treatments are required.

Table 13. Products with administration difficulties when used in “special populations” as reported by physicians

Medicine	N	Special utilization						
		Lack of indication for specific use	Lack of safety data	Lack of specific dosing guidelines	Drug-drug interaction	Lack of pk data	Medication burden	Other
<i>Overall</i>	95	17 (18)	14 (15)	17 (18)	3 (3)	6 (6)	11 (12)	22 (23)
Ciprofloxacin	3	2 (67)	-	-	-	1 (33)	-	-
Abacavir + dolutegravir + lamivudine	3	-	-	-	-	-	-	1 (33)
Caffeine	3	-	-	-	-	-	-	-
Amphotericin b	3	1 (33)	-	1 (33)	-	-	-	1 (33)
Lopinavir + ritonavir	2	-	-	2 (100)	-	-	1 (50)	-
Salbutamol	2	-	-	-	-	-	-	2 (100)
Omeprazole	2	1 (50)	-	-	-	-	1 (50)	-
Amoxicillin	2	-	-	1 (50)	-	-	-	1 (50)
Acetaminophen	2	1 (50)	-	-	-	-	1 (50)	-
Isoniazid	2	-	-	-	-	-	1 (50)	1 (50)
Valproic acid	2	-	-	1 (50)	-	-	-	-
Methylphenidate	2	-	-	-	-	-	-	2 (100)
Trimethoprim + sulfamethoxazole	2	-	-	-	-	-	1 (50)	1 (50)
Aminophylline	2	-	1 (50)	-	-	-	-	-
Chloramphenicol	2	1 (50)	-	-	-	-	-	-
Corticotropin	2	-	-	-	-	-	-	1 (50)
Primaquine	2	-	2 (100)	2 (100)	-	1 (50)	-	-
Atropine	2	-	-	-	-	-	-	-

Please find the full table in the Appendix

3.2.2 Problematic products as reported by nurses

A total of 66 medicines, for a total of 71 pharmaceutical forms, were reported as problematic by the nurses; 40% were parenteral formulations, 27% oral liquids, 25% tablets, 4% topical products and 4% capsules. Many medicines were problematic for several reasons. Poor acceptability was mentioned in 52% of the cases, poor usability in 48% of the cases, and use in special populations in 18% of the cases.

Table 14. Problematic products or formulations as reported by nurses

Medicine	N	Formulation							Acceptability	Usability	Other issues
		Parenteral preparation	Oral liquid	Tablet	Topical	Capsule	Rectal preparation	Preparation for inhalation			
<i>Overall</i>	101	40 (40)	27 (27)	25 (25)	4 (4)	3 (3)	1 (1)	1 (1)	53 (52)	48 (48)	18 (18)
amoxicillin + clavulanic acid	7	2 (29)	4 (57)	1 (14)	-	-	-	-	3 (43)	4 (57)	1 (14)
benzylpenicillin	4	4 (100)	-	-	-	-	-	-	-	2 (50)	-
metronidazole	4	-	-	4 (100)	-	-	-	-	4 (100)	-	-
cefotaxime	3	3 (100)	-	-	-	-	-	-	1 (33)	-	2 (67)
diazepam	3	2 (67)	1 (33)	-	-	-	-	-	3 (100)	2 (67)	1 (33)
gentamicin	3	2 (67)	-	-	1 (33)	-	-	-	-	1 (33)	2 (67)
albendazole	2	-	-	2 (100)	-	-	-	-	2 (100)	-	-
aminophylline	2	2 (100)	-	-	-	-	-	-	1 (50)	1 (50)	-
amoxicillin	2	-	2 (100)	-	-	-	-	-	2 (100)	2 (100)	-
cefuroxime	2	-	2 (100)	-	-	-	-	-	1 (50)	-	-
cloxacillin	2	2 (100)	-	-	-	-	-	-	2 (100)	1 (50)	1 (50)
digoxin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)
ferrous fumarate	2	-	2 (100)	-	-	-	-	-	2 (100)	1 (50)	-
midazolam	2	1 (50)	1 (50)	-	-	-	-	-	1 (50)	1 (50)	-
morphine	2	2 (100)	-	-	-	-	-	-	-	1 (50)	-
vancomycin	2	2 (100)	-	-	-	-	-	-	-	1 (50)	2 (100)

Please find the full table in the Appendix

Poor acceptability of medicines was reported 53 times by the nurses. Bad taste/after taste was mentioned in 53% of the cases, excessive size of tablets or capsules in 17% of the cases, high f liquid to be ingested in 15% of the cases, high number of daily administrations in 30% of the cases, unpleasant texture, appearance, and smell in 17% of the cases, complexities of using a device 4% of the cases.

Table 15. Acceptability issues as reported by nurses

Medicine	N	Acceptability						
		Taste/a fter taste	Tablet/ capsule size	High volume of liquid for a single dose	Numero us daily adminis trations	Texture appear ance/s mell	Comple xities in using the device	Other
<i>Overall</i>	53	28 (53)	9 (17)	8 (15)	16 (30)	9 (17)	2 (4)	6 (11)
Metronidazole	4	4 (100)	1 (25)	-	2 (50)	-	-	-
Amoxicillin + clavulanic acid	3	3 (100)	1 (33)	2 (67)	1 (33)	1 (33)	-	-
Diazepam	3	1 (33)	-	2 (67)	1 (33)	-	-	1 (33)
Albendazole	2	1 (50)	2 (100)	-	-	-	-	-
Amoxicillin	2	1 (50)	-	-	1 (50)	1 (50)	-	-
Cloxacillin	2	-	-	1 (50)	1 (50)	-	-	1 (50)
Ferrous fumarate	2	2 (100)	-	-	1 (50)	1 (50)	-	-

Please find the full table in the Appendix

Difficulty in using a product was reported 48 times by the nurses. In 42% of the case the problem was the determination of the correct dose, in 19% of the cases the complexity of the preparation of the product, in 10% of the cases the need for a device to administer the product, in 4% of the cases the need for a vehicle to administer the product, be it a liquid, a soft food or another vehicle, in 31% of the cases the need for storage a low temperature. Below are the most problematic products with the specific reasons mentioned.

Table 16. Usability issues reported by nurses

Medicine	N	Usability							
		Complex preparation	Need for dilution for dosing	Determination of the dose	Need for a vehicle	Problematic administration device	Problematic packaging/opening/closing	Need to be stored at a specific temperature	Other
<i>Overall</i>	48	9 (19)	19 (40)	20 (42)	2 (4)	5 (10)	2 (4)	15 (31)	5 (10)
Amoxicillin + clavulanic acid	4	1 (25)	1 (25)	-	-	-	-	4 (100)	1 (25)
Benzylpenicillin	2	-	3 (150)	-	-	-	-	-	-
Diazepam	2	-	-	2 (100)	-	-	1 (50)	1 (50)	-
Amoxicillin	2	1 (50)	1 (50)	-	-	-	-	1 (50)	1 (50)

Please find the full table in the Appendix

3.2.3 Problematic products reported by pharmacists

A total of 228 medicines, in a total of 322 pharmaceutical forms, were reported as problematic by pharmacists; 14% were for parenteral formulations, 36% oral liquid, 30% tablets, and 10% capsules. Poor acceptability was mentioned in 52% of the cases, poor usability in 48% of the cases, and use in special populations in 18% of the cases. Many medicines were problematic for several reasons.

Table 17. Problematic formulations as reported by pharmacists

Medicine	N	Formulation										Extemporaneous preparation	Reconstitution and stability	Off-label use	Special use
		Oral liquid	Tablet	Parenteral	Capsule	Rectal preparation	Preparation for inhalation	Topical	Ophthalmological preparation	Fine granules	Other				
Overall	526	190 (36)	160 (30)	73 (14)	53 (10)	12 (2)	9 (2)	4 (0.8)	3 (0)	1 (0)	8 (2)	294 (56)	181 (34)	91 (17)	106 (20)
Omeprazole	18	11 (61)	2 (11)	-	4 (22)	-	-	-	-	-	1 (6)	11 (61)	11 (61)	4 (22)	2 (11)
Phenobarbital	12	3 (25)	8 (67)	1 (8)	-	-	-	-	-	-	-	8 (67)	3 (25)	1 (8)	5 (42)
Acetylsalicylic acid	11	3 (27)	7 (64)	-	1 (9)	-	-	-	-	-	-	8 (73)	4 (36)	1 (9)	3 (27)
Azithromycin	10	8 (80)	2 (20)	-	-	-	-	-	-	-	-	-	8 (80)	1 (10)	-
Ciprofloxacin	9	5 (56)	4 (44)	-	-	-	-	-	-	-	-	7 (78)	4 (44)	2 (22)	1 (11)
Furosemide	9	4 (44)	4 (44)	-	1 (11)	-	-	-	-	-	-	7 (78)	1 (11)	2 (22)	2 (22)
Amoxicillin + clavulanic acid	8	7 (88)	1 (13)	-	-	-	-	-	-	-	-	-	8 (100)	-	-
Captopril	8	3 (38)	5 (63)	-	-	-	-	-	-	-	-	7 (88)	3 (38)	3 (38)	-
Hydroxyurea	8	4 (50)	-	-	4 (50)	-	-	-	-	-	-	7 (88)	4 (50)	1 (13)	1 (13)
Sildenafil	8	4 (50)	2 (25)	2 (25)	-	-	-	-	-	-	-	4 (50)	2 (25)	1 (13)	2 (25)
Abacavir + dolutegravir + lamivudine	7	-	5 (71)	1 (14)	-	1 (14)	-	-	-	-	-	2 (29)	3 (43)	2 (29)	2 (29)
Amoxicillin	7	4 (57)	1 (14)	-	2 (29)	-	-	-	-	-	-	1 (14)	3 (43)	1 (14)	2 (29)
Clonidine	7	6 (86)	1 (14)	-	-	-	-	-	-	-	-	7 (100)	3 (43)	-	-
Digoxin	7	3 (43)	4 (57)	-	-	-	-	-	-	-	-	5 (71)	1 (14)	1 (14)	1 (14)
Prednisolone	7	3 (43)	4 (57)	-	-	-	-	-	-	-	-	5 (71)	2 (29)	-	2 (29)
Tacrolimus	7	5 (71)	1 (14)	-	1 (14)	-	-	-	-	-	-	6 (86)	6 (86)	1 (14)	1 (14)

Please find the full table in the Appendix

Out of a total of 204 occurrences, pharmacists reported the need to prepare extemporaneous formulation. In most cases, this involved modifying the adult formulation, much more rarely formulating the active ingredients with excipients.

Table 18. Products reported by pharmacists to need extemporaneous formulation for use in children

Medicine	N	Extemporaneous formulation	
		Starting from the active ingredients and excipients	Modifying the adult formulation
Overall	294	73 (25)	193 (66)
omeprazole	11	5 (45)	6 (55)
phenobarbital	8	1 (13)	7 (88)
acetylsalicylic acid	8	2 (25)	6 (75)
ciprofloxacin	7	1 (14)	6 (86)
furosemide	7	2 (29)	5 (71)
captopril	7	-	6 (86)
hydroxyurea	7	2 (29)	4 (57)
clonidine	7	3 (43)	3 (43)
tacrolimus	6	3 (50)	3 (50)
digoxin	5	1 (20)	4 (80)
prednisolone	5	1 (20)	4 (80)
topiramate	5	1 (20)	4 (80)
sildenafil	4	1 (25)	3 (75)
calcitriol	4	1 (25)	3 (75)
clindamycin	4	-	4 (100)
bosentan	4	-	3 (75)
clopidogrel	4	1 (25)	2 (50)
hydrocortisone	4	-	3 (75)
propranolol	4	-	4 (100)
baclofen	4	2 (50)	2 (50)
levothyroxine	4	1 (25)	1 (25)
spironolactone	4	3 (75)	1 (25)

Please find the full table in the Appendix

Pharmacists reported that 181 products were difficult for caregivers to use. In 45% of the cases, they reported storage/stability problems, in 39% the need to use the correct

dilution for dosing, in 14% of the cases there was a problem of access to clean water and in 10% of the cases several preparation steps were required. For example, pharmacists mentioned 11 times that omeprazole was a problem. In more than 80% of the cases, they mentioned storage/stability problems, in 20% the need for correct dilution to obtain the dosage and one pharmacist raised the problem of numerous preparation steps. Overall, in almost half of the cases additional difficulties (to be listed elsewhere) were reported.

Table 19. Products reported by pharmacists as difficult for caregivers to deal with

Medicine	N	Reconstitution and stability					
		Access to clean water	Unclear or too complex label instructions	Number of steps	Need for dilution for dosing	Problematic stability	Other please specify
<i>Overall</i>	181	26 (14)	12 (7)	19 (10)	70 (39)	81 (45)	50 (28)
Omeprazole	11	-	-	1 (9)	3 (27)	9 (82)	5 (45)
Azithromycin	8	2 (25)	-	-	2 (25)	3 (38)	1 (13)
Amoxicillin + clavulanic acid	8	4 (50)	-	2 (25)	4 (50)	4 (50)	1 (13)
Tacrolimus	6	-	1 (17)	3 (50)	1 (17)	2 (33)	3 (50)
Acetylsalicylic acid	4	-	-	-	3 (75)	1 (25)	1 (25)
Ciprofloxacin	4	1 (25)	-	-	2 (50)	1 (25)	1 (25)
Hydroxyurea	4	-	1 (25)	1 (25)	2 (50)	2 (50)	2 (50)
Hydrocortisone	4	-	-	-	4 (100)	1 (25)	1 (25)
Phenobarbital	3	-	-	-	1 (33)	3 (100)	-
Captopril	3	-	-	-	3 (100)	1 (33)	1 (33)
Abacavir + dolutegravir + lamivudine	3	-	-	-	2 (67)	-	-
Amoxicillin	3	1 (33)	-	1 (33)	-	1 (33)	-
Clonidine	3	-	-	-	1 (33)	1 (33)	1 (33)
Clindamycin	3	1 (33)	-	-	-	1 (33)	2 (67)
Bosentan	3	-	-	1 (33)	2 (67)	1 (33)	2 (67)
Lopinavir + ritonavir	3	1 (33)	-	-	-	1 (33)	1 (33)
Carbamazepine	3	1 (33)	-	-	-	3 (100)	-
Morphine	3	1 (33)	-	-	2 (67)	2 (67)	1 (33)
Oseltamivir	3	3 (100)	-	1 (33)	2 (67)	1 (33)	-
Quinine	3	1 (33)	1 (33)	1 (33)	1 (33)	1 (33)	1 (33)

Please find the full table in the Appendix

Ninety-one products were reported to be used off-label.

An unapproved age group was reported in 60% of the cases, an unapproved dosage in 37% of the cases, an unapproved indication in 27% of the cases and an unapproved route of administration in 14% of the cases. For the same product reported by the same pharmacist, several reasons for off label use could be indicated, so that the sum of percentages above is greater than 100%. For example, omeprazole was mentioned 4

times by pharmacists and the off-label use concerned the indication in half of the cases, the route of administration in half of the cases, the dosage also for half of the cases and the age group in one out of 4. Captopril was mentioned three times; in all three cases, an unapproved dosage and an unapproved strength were noted, and in 2 of the 3 cases unapproved indication was also detected.

Table 20. Products used off-label as reported by pharmacists

Medicine	N	Off-label use			
		Unapproved indication	Unapproved age group	Unapproved dosage	Unapproved route of administration
Overall	91	25 (27)	55 (60)	34 (37)	13 (14)
Omeprazole	4	2 (50)	1 (25)	2 (50)	2 (50)
Captopril	3	2 (67)	3 (100)	3 (100)	-
Bosentan	3	1 (33)	3 (100)	1 (33)	1 (33)
Esomeprazole	3	-	2 (67)	1 (33)	1 (33)
Ciprofloxacin	2	-	1 (50)	1 (50)	-
Furosemide	2	-	2 (100)	1 (50)	-
Abacavir + dolutegravir + lamivudine	2	-	1 (50)	1 (50)	-
Diazepam	2	-	1 (50)	1 (50)	-
Diclofenac	2	1 (50)	2 (100)	-	-
Levofloxacin	2	-	1 (50)	-	-
Salbutamol	2	-	1 (50)	2 (100)	-

Please find the full table in the Appendix

Pharmacists reported difficulties with some products when administered to children with co-morbidities/co-treatments. Of 106 cases, problems reported were lack of specific dosing guidelines in 29% of cases, lack of safety data in 28% of the cases, lack of PK data in 11% of the cases, drug-drug interactions in 11% of the cases, and medication burden in 19% of the cases. Other situations were reported in 31% of the cases, which will be listed elsewhere.

Table 21. Products reported by pharmacists as problematic for use in children with co-morbidities or co-treatments.

Medicine	N	Special use						
		Lack of indication for specific use	Lack of safety data	Lack of specific dosing guidelines	Drug-drug interaction	Lack of PK data	Medication burden	Other
<i>Overall</i>	106	18 (17)	30 (28)	31 (29)	12 (11)	12 (11)	20 (19)	33 (31)
Phenobarbital	5	-	-	1 (20)	-	-	-	3 (60)
Dexamethasone	5	-	1 (20)	2 (40)	-	-	1 (20)	1 (20)
Acetylsalicylic acid	3	-	1 (33)	-	-	1 (33)	-	2 (67)
Omeprazole	2	-	-	1 (50)	-	-	-	1 (50)
Furosemide	2	1 (50)	1 (50)	1 (50)	-	1 (50)	-	-
Sildenafil	2	1 (50)	1 (50)	-	2 (100)	-	-	-
Abacavir + dolutegravir + lamivudine	2	-	1 (50)	-	-	-	-	-
Amoxicillin	2	-	-	1 (50)	-	-	1 (50)	-
Prednisolone	2	1 (50)	1 (50)	1 (50)	1 (50)	-	2 (100)	1 (50)
Lopinavir + ritonavir	2	-	-	-	-	-	1 (50)	1 (50)
Morphine	2	-	1 (50)	1 (50)	-	-	1 (50)	1 (50)
Artemether + lumefantrine	2	2 (100)	1 (50)	2 (100)	-	2 (100)	-	-
Atenolol	2	-	2 (100)	-	-	-	1 (50)	-
Gentamicin	2	1 (50)	1 (50)	-	-	-	-	-
Ondansetron	2	-	-	-	-	-	-	-
Trimethoprim + sulfamethoxazole	2	-	-	-	-	-	2 (100)	2 (100)
Desmopressin	2	-	1 (50)	-	-	1 (50)	-	1 (50)
Vitamin e	2	-	1 (50)	1 (50)	-	-	-	1 (50)

Please find the full table in the Appendix

3.2.4 Products considered most problematic by physicians, nurses, and pharmacists

Overall, feedback was received on 391 medicines, for a total of 666 problematic pharmaceutical forms.

The table below ranks and lists the most problematic pharmaceutical forms of products reported by physicians, nurses, and pharmacists. As the surveys differed in the type of question according to specialization, we have summarised the results as expressed in the table legend.

The medicines that were mentioned as the most problematic were the liquid oral form of lopinavir/ritonavir in, reported 27 times, followed by amoxicillin and clavulanic acid in liquid oral form (23 times) and cefuroxime in oral liquid form (21 times). For example, the liquid oral form of lopinavir/ritonavir is considered the most problematic pharmaceutical form by all healthcare workers, mostly due to its poor acceptability. For salbutamol, the problem was mainly related to poor usability.

Table 22. Products considered most problematic for physicians, nurses, and pharmacists, stratified by pharmaceutical form

[Legend: (*) Physicians, (**) Pharmacists, (^) Physicians and nurses, (^) Physicians and pharmacists.]

Medicine	Formulation	N	Dosing/Safety *	Extemporaneous preparation n**	Reconstitution and stability issue**	Acceptability ^	Usability^	Off label ^^	Special use ^^
Lopinavir + ritonavir	Oral liquid	27	1 (4)	1 (4)	3 (11)	21 (78)	6 (22)	-	3 (11)
Amoxicillin + clavulanic acid	Oral liquid	23	3 (13)	-	7 (30)	6 (26)	6 (26)	-	-
Cefuroxime	Oral liquid	21	1 (5)	-	1 (5)	17 (81)	2 (10)	-	-
Salbutamol	Preparation for inhalation	19	5 (26)	-	-	3 (16)	11 (58)	1 (5)	3 (16)
Furosemide	Tablet	17	7 (41)	4 (24)	1 (6)	4 (24)	5 (29)	1 (6)	1 (6)
Omeprazole	Oral liquid	17	2 (12)	7 (41)	7 (41)	3 (18)	4 (24)	2 (12)	2 (12)
Amoxicillin	Oral liquid	15	3 (20)	-	2 (13)	4 (27)	5 (33)	2 (13)	2 (13)
Prednisolone	Tablet	15	1 (7)	3 (20)	1 (7)	10 (67)	-	-	-
Azithromycin	Oral liquid	14	1 (7)	-	8 (57)	5 (36)	1 (7)	-	-
Clindamycin	Oral liquid	14	2 (14)	1 (7)	2 (14)	10 (71)	-	-	-
Flucloxacillin	Oral liquid	14	2 (14)	-	-	11 (79)	-	-	1 (7)
Abacavir + dolutegravir + lamivudine	Tablet	13	5 (38)	1 (8)	2 (15)	3 (23)	3 (23)	2 (15)	3 (23)
Digoxin	Tablet	13	7 (54)	4 (31)	1 (8)	3 (23)	4 (31)	2 (15)	1 (8)
Acetaminophen	Oral liquid	12	7 (58)	-	-	7 (58)	2 (17)	-	2 (17)
Amphotericin b	Parenteral preparation	12	6 (50)	2 (17)	-	3 (25)	3 (25)	-	4 (33)
Captopril	Tablet	12	1 (8)	5 (42)	1 (8)	4 (33)	3 (25)	2 (17)	-
Ciprofloxacin	Tablet	12	4 (33)	2 (17)	1 (8)	4 (33)	5 (42)	3 (25)	1 (8)
Gentamicin	Parenteral preparation	12	6 (50)	-	1 (8)	-	1 (8)	-	2 (17)
Lopinavir + ritonavir	Tablet	12	2 (17)	-	-	8 (67)	4 (33)	-	1 (8)
Omeprazole	Capsule	12	3 (25)	3 (25)	3 (25)	5 (42)	5 (42)	3 (25)	2 (17)

Please find the full table in the Appendix

3.2.5 Missing pharmaceutical products and forms, as reported by physicians, nurses, and pharmacists

Health professionals (physicians, nurses, and pharmacists) were asked which formulations were missing for the treatment of their paediatric patients, for whatever reason; either only adult formulations were available, the formulation was not marketed in the country, was only available in the private sector, was too expensive, was missing from the national drug formulary, or was subject of stock-outs.

Overall, 290 medicines were reported missing from a total of 794 pharmaceutical forms. For example, ciprofloxacin was the most “thought after” product and was only available as an adult formulation in Australia, Chile, Nigeria, Philippines, Portugal, Serbia, Uganda, and Zambia. Although there are oral granules for reconstitution formulations, the use of this drug for children is very limited due to its of its potentially serious toxic effects. This is probably why paediatric formulations are not available in many countries. Paediatric forms of phenobarbital are reported as missing, but available in many countries as adult formulations. This very old and inexpensive product is used to treat epilepsy and has a relatively small market for children. It is the second product on the list because it must be prepared extemporaneously by pharmacists.

Table 23. Missing products for paediatric care according to physicians, nurses, and pharmacists

Medicine	N to t	N count ries	Only Available As Adult Formulatio n	Not Marketed In The Country	Only Available In The Private Sector	Overly Expensive	Not In The Drug Formulary	Shortages	Other	NA
<i>Ciprofloxacin</i>	18	9	Australia Chile Nigeria Philippines Portugal Serbia Uganda Zambia	Chile Philippines					Switzerland	
<i>Phenobarbital</i>	18	12	Ethiopia Germany Indonesia Myanmar Philippines Serbia Zambia	Mexico Netherlands Serbia Thailand Zambia		Zambia	South Africa Zambia	Indonesia Philippines South Africa Zambia	Argentina South Africa	
<i>Omeprazole</i>	16	14	Brazil Chile Hungary Indonesia Philippines Saudi Arabia Thailand Zambia	Chile Netherlands Spain Sri Lanka Zambia	Brazil	Australia Germany	Fiji Germany Zambia	Zambia	Australia Germany	
<i>Abacavir + dolutegravir + lamivudine</i>	15	10	Australia Brazil Chile Congo Kinshasa Indonesia Uganda	Botswana Chile Indonesia South Africa			Zambia		Indonesia	

Medicine	N to t	N count ries	Only Available As Adult Formulation	Not Marketed In The Country	Only Available In The Private Sector	Overly Expensive	Not In The Drug Formulary	Shortages	Other	NA
			United Kingdom							
<i>Furosemide</i>	15	9	Brazil Ethiopia Myanmar Nigeria Serbia Switzerland Tanzania Zimbabwe	Philippines Serbia			Rwanda	Ethiopia Rwanda		
<i>Levothyroxine</i>	13	9	Canada Nigeria Palestinian Territory Portugal Taiwan United Kingdom United States	Canada New Zealand Palestinian Territory Taiwan United Kingdom		United States			Portugal United States	
<i>Caffeine</i>	12	9	Tanzania	Nepal Tanzania United Arab Emirates Venezuela	Ghana	Myanmar United States	Argentina Tanzania Thailand United States	Nepal	Argentina Thailand	
<i>Prednisolone</i>	12	10	Ghana Hungary Nigeria Norway Portugal United Arab Emirates	Albania Nigeria Zimbabwe	Zimbabwe	Zimbabwe				Sri Lanka

Medicine	N to t	N count ries	Only Available As Adult Formulation	Not Marketed In The Country	Only Available In The Private Sector	Overly Expensive	Not In The Drug Formulary	Shortages	Other	NA
			Zambia Zimbabwe							
<i>Clindamycin</i>	11	8	Australia Ethiopia Nigeria Portugal	Argentina Spain United States				Switzerland	Switzerland	
<i>Clonidine</i>	10	7	Australia Japan Norway United States	Canada Netherlands						Sri Lanka
<i>Tacrolimus</i>	10	9	Japan Puerto Rico Taiwan United Kingdom	United Kingdom		Indonesia United Kingdom	Taiwan Zambia	Netherlands Sri Lanka	Japan	Sri Lanka
<i>Valproic acid</i>	10	9	Myanmar Tanzania Germany	Indonesia		Fiji Ghana Indonesia Nigeria Sri Lanka	Ghana	Fiji Jordan Sri Lanka		

The table below provides details of specific pharmaceutical forms that are considered missing by physicians, nurses, and pharmacists. The first product listed is abacavir; it is missing in Thailand and Fiji in the liquid oral form. In Thailand only the adult formulation is available and in Fiji the main problem is product shortage. The next product, in brick red, is the association of abacavir + lamivudine + dolutegravir (ALD), currently being developed as a fixed-dose paediatric combination. In most countries of the list the fixed-dose combination for adults is the only product available, while in many cases the form is not indicated at all. Oral granules were considered desirable by the respondent from Indonesia, and a liquid pharmaceutical form was suggested by respondents from the UK and Uganda. In this table, products are listed in alphabetical order and can be found in the appendix.

Table 24. Missing products and formulations for paediatric care according to physicians, nurses, and pharmacists

[illegible]

Medicine	Only Available As Adult Formulation	Not Marketed In The Country	Only Available In The Private Sector	Overly Expensive	Not In The Drug Formulary	Shortages	Other	NA
	United Kingdom							
Oral liquid	Australia							
	Spain							
Tablet	United Kingdom				South Africa			

4. Appendix 1 - Tables supporting the results



Appendix

D2 – Summary report of survey results, identifying the reasons for the missing formulations and elements of context and rationale for prioritization of products missing but deemed critical.

Authors: Elisa Barbieri, Marc Lallemand, Tiziana Grossele - Fondazione Penta Onlus

Date: 10th December 2021

WP Essential Medicines List

Version 1.0



D2 – Summary report of survey results, identifying the reasons for the missing formulations and elements of context and rationale for prioritization of products missing but deemed critical.

Authors: Elisa Barbieri, Marc Lallemand, Tiziana Grossele -
Fondazione Penta Onlus

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Interview 1

Date and time		
04/05/2021 12:45-13:30		
Attendants		
MB, EB, SC		
Agenda		
1. Discuss the results of the survey with MB 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1	Send the contacts for networks in South America and Africa	MB
2	Revise the minutes of the meeting	MB

MB approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

EB: Let's start: thank you very much for answering the survey, your responses were quite impressive. I would like to start with the first question on acceptability: you mentioned that penicillins are medicines that children find very difficult to take. Do you have any particular penicillin in mind? We know from another interview that the taste of penicillin formulations might be due to the excipients used, and these excipients are marketed differently in different European countries. For example, co-amoxiclav with orange taste is not marketed in Italy, and for this reason it's bitter and very difficult to take by kids.

MB: I work in Ireland, and the one that pops to mind immediately is phenoxymethylpenicillin (penV). I think there are two reasons for poor acceptability: the smell and the frequency of administration (4 times a day). I think a child would have difficulties with a medicine administered 4 times/day even if it's a nice medication.

An issue is that we don't have a huge number of clinical trials for common infectious illnesses, concerning frequency of administrations and dosages. I'm referring for example to infections like group A streptococcal tonsillitis, cellulitis and community-acquired pneumonia. There is a lack of clinical trial data, with respect to truly understanding what's the effective dose and dose frequency.

Amoxicillin, generally, tastes nicer and comes as a yellow formulation (I don't know what the excipient is); there's another formulation (Augmentin, which is amoxicillin and clavulanic acid), which is given twice a day and seems to be one of the most acceptable, from the point of view of palatability. More recently, I've noticed colleagues prescribing cefalexin, a cephalosporin, because of its palatability and because it's a twice/day formulation.

Now, I have to say that I am speaking from Ireland, we're not exactly a LMIC; my understanding of these medications is purely from the point of view of working in Ireland.

EB: Yes, thank you. In Italy we are not using that much penV, we're using mostly amoxicillin. During my PhD, I have conducted different antimicrobial stewardship studies, in our emergency department, and we got the same issue you were mentioning: finding the correct balance between



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daily dosages and formulation. I think it's an important thing to have in mind, both in high- and low-income countries.

Another question that I would like to ask you is regarding the IV morphine, that you mentioned as having issues in acceptability. Is it the procedure, or is it the medicine itself? For example, other medicines were mentioned as burning at the site of the injection.

MB: I can give you some of my background: I've been involved in some drug trials, in which I've been either a principal investigator or a co-investigator. We're particularly interested in IV morphine and intranasal fentanyl, but I've also done a prednisolone vs dexamethasone drug trial for asthma and an amoxicillin trial for CAP in the UK and Ireland. Currently, I'm doing a drug trial, as one of the senior investigators, for inhaled methoxyflurane for acute pain.

When I think about IV morphine, there's a couple of issues within my own department: typically, there's a large lag time between the recognition of the necessity of giving an opioid for pain relief and when it's actually administered. In our department, it typically took an hour for someone to start an IV line in a busy department. Also, there is the barrier that you have to use a painful procedure in order to give pain medication. There are alternatives, which are useful to be aware of (I don't know how accessible these medications/routes are used in LMICs): the intranasal route is a fantastic route, by which you can also administer analgesics. In 2013, we completely replaced the administration of IV morphine with the administration of intranasal fentanyl and that was not just for patients with trauma, but also for patients with sickle cell disease, who were presenting with a painful crisis. We found that from a staffing perspective, especially the nursing staff, it empowered them to administer effective analgesia incredibly quickly.

Talking about the side effect profile of morphine, if it's administered too quickly, you may frequently encounter nausea and vomiting, whereas this doesn't happen with intranasal fentanyl. The other thing is acceptability for the patient: with our sickle cell population (it may be surprising to you that in Ireland we have got a large sickle cell population, but because of migration we have over 250 patients that regularly attend, so we would meet a patient in crisis perhaps every 2-3 days), when we started to roll out intranasal fentanyl, they were asking for it instead of the IV morphine. I just thought that was an interesting finding to report.

I think that for severe pain there are alternative routes; some of my colleagues, in Australia particularly, also advocate for the use of intranasal ketamine, since if the formulation is concentrated enough and it's a useful and effective route to administer analgesia.

EB: Thank you, your reflection about your experience and also on nurses' empowerment is quite interesting. In other interviews, it was mentioned that, for insulin, there's the problem that teachers are not trained to administer insulin, so the device use should be thought of in terms of administration by non-healthcare professionals. Do the nurses that are administering the medicine with the intranasal route need a particular training?

MB: It's really simple: the device that you would use is an atomizer, which is relatively cheap. Anybody familiar with over-the-counter inhaled products for congested nose would be able to understand the administration of intranasal medicines. Essentially, you have to apply the device to the nose, and then plunge the syringe, which creates enough pressure to atomize the drug and creates therefore a fine mist. There isn't a training course: once a nurse gets the experience of doing that on one or two occasions, there is no issue. The other thing to acknowledge is that our nursing staff, when they come out of University, have got a huge repertoire of skills, which includes gaining IV access and administration of drugs, and they want to use it. If they recognize



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a patient who is in severe pain, and there is a tool that can allow them to address that, it's incredibly fulfilling for them.

In my department we had another barrier, because nurses were not allowed to administer IV morphine as a bolus and that, again, was a bottleneck logistic: it meant that the IV line had to be sited, the drugs, which are controlled drugs, need to be signed off, prepped, handed over safely to a colleague... There's just so many logistics and complications that you avoid with the intranasal route.

EB: Thank you, I will go on with the second question regarding usability. You mentioned dexamethasone tablets as a medicine that caregivers find difficult to handle, because of the need to be crushed for kids. I am wondering, why are you not prescribing it as a solution? Is it available in Ireland as a liquid formulation?

MB: This is interesting: a liquid formulation is available, but the problem is in primary care, where dexamethasone liquid isn't utilized much. This happens because of the perceived expense of using the liquid and also because the conditions that present to them are infrequent, so they feel that if they get a liquid formulation, it will expire quickly compared to the tablet equivalents.

I actually think that there's a lack of awareness about the utility of dexamethasone versus prednisolone for a lot of conditions. People don't realize that a 5 mg tablet of dexamethasone is relatively easy to crush and administer (added to a yoghurt or something similar), and this way you can avoid the expense of a liquid formulation. The dissolvable tablet of prednisolone on the other hand is rather bitter tasting, and there's a much higher frequency of vomiting after the administration; also, prednisolone needs to be given over three days, versus dexamethasone that is a once-off dose. In our asthma study we found that there was a high rate of vomiting (perhaps 8-10% vomiting for each administration of prednisolone), because of its bitterness.

EB: Talking about dexamethasone: going to question three, related to off label use, you mentioned that it is used off label because of unapproved indication. Apart from asthma, are there other indications that dexamethasone is used for, off label?

MB: We use dexamethasone typically in our department for laryngotracheobronchitis (croup) and for tonsillitis, in case of severe pain, as an adjunct analgesic; we find that the paediatric patients' intake improves within 24 hours. These, with asthma, would be the top three conditions in which we use it.

I have to admit that my knowledge of off label and on label as a clinician is relatively weak. If I had that intrinsic knowledge within me, I would probably be alarmed with everything that I'm prescribing. As you know, we're in this unusual situation in which we really need to push pharmaceutical companies more and more to do paediatric research, so that we can extend indications to those age groups. I think this is valid especially for oncology drugs, but also for simpler drugs that we're using on a day-by-day basis.

EB: Other respondents mentioned that there are issues related to respiratory devices for inhaled medicines. Do you think using dexamethasone orally would improve the acceptability by children, compared to the use of respiratory devices?

MB: Are you talking about budesonide?

EB: Yes, I'm referring to asthma treatment.



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MB: When I talk about dexamethasone, I'm referring to the acute presentation, the exacerbation of asthma; I would use dexamethasone in the context of a child who's working hard to breathe, because of an acute flare-up. I don't see a natural equivalent in that, and I haven't seen studies on inhaling steroids during an acute flare-up of asthma. I think for laryngotracheobronchitis (croup) there have been studies comparing inhaled budesonide and dexamethasone or prednisolone. You encounter the same difficulties we reported, like vomiting for prednisolone.

The thing with using the inhaled route in the acute scenario is that it tends to be nebulized, and in younger children nebulization can cause distress. Also, nebulization does not work well for children with severe respiratory distress, because they've got very low respiratory volumes, they're not moving a lot of air. Nebulization doesn't work in severe, compromised or life-threatening situations. There are lots of drugs that we could be talking about when discussing bronchoconstriction treatment, like iv salbutamol, magnesium sulfate and so on, it's hard to know which one of those is better than the other. Also, I don't really deal with the chronic management of asthma, because of my area of expertise. But I did see that a rather interesting article recently, stating that we need better control of paediatric asthma with inhaled corticosteroids, because there seems to be a dependency on salbutamol inhalers.

EB: Going back to the off-label use: you mentioned that also sub-dissociative ketamine for pain management is used off label, because of unapproved indication and unapproved age group. Can you give us more insight into this use?

MB: Whenever you mention ketamine, people automatically think of sedation, but there's an underappreciation that this is a dosage-dependent response: in much smaller doses, perhaps 0.3-0.5 mg/kg, it's a very good analgesic. We have a hospital paediatric formulary (it's online as well, as an app), and I did try to advocate that some of these drugs have other roles that are not talked about; one of them would be the sub-dissociative use of ketamine. I worked with our pharmacists within the emergency department, and advocated for that to go into the formulary and now it has. They were reviewing the literature and they informed me that it wouldn't be an indication that they were familiar with.

EB: What about comparing the sub-dissociative ketamine to morphine? Ketamine is not in the EMLc for analgesia. Do you think that the use of ketamine is common also in other countries? Why would you recommend having it included in the EMLc?

MB: I think it's a very interesting drug, anybody who works in emergency medicine is very familiar now with ketamine; from a sedation perspective we know that it's a very safe drug and, in most instances, it's probably safer and has fewer side effects than fentanyl or propofol.

The other thing to say is that there has been a direct comparison between fentanyl and ketamine with drug trials in ED settings for paediatric orthopaedic injuries: from a pain perspective, they are equivalent, the only thing that worked against ketamine is that occasionally the children can be a bit more disorientated with it, but that's dose-related in my opinion. In my emergency department, we have not used propofol or fentanyl for procedural sedation in over 10 years, we just use ketamine and nitrous, which however is a gas and also isn't so good for the environment.

EB: I have one last question, related to missing formulations: you mentioned that one that was missing is the nasal route for medications. Which are the medicines that you would use intranasally?



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MB: There are whole articles on this, but typically I would use the intranasal route for analgesics (fentanyl, ketamine...). Another good drug with intranasal route, used for anxiolysis, is midazolam; it has helped me a lot, especially with particularly frightened children. The intranasal route seems like it's the most humane, because it's pretty barbaric to hold the child down in order to insert an IV line: the intranasal route seems the less invasive and distressing medication. I have only direct experience with these three medicines. For the intranasal route, the drug needs to be quite concentrated, with a small volume and lipophilic. What I want to emphasize is that the frequency at which we administer these drugs is relatively high: for us to use an IV line for initial analgesic management in children is rare.

EB: Related to the intranasal route, just to be sure: are you using the IV formulation, administered intranasally with a device, or is it a special formulation?

MB: It's not a special formulation, it is the same formulation that you would use for IV administration: the concentration of it is 100 µg/ml and it comes in 2ml vials.

EB: Okay, thank you. We are having different feedbacks on the important role of devices, especially in the paediatric area; I'm referring both to the oral tools used to administer a formulation (such as oral syringes) and to respiratory devices. Devices are not mentioned on the EML, but this might be a gap to take into consideration, especially in low- and middle-income countries, where they may have essential medications that however cannot be administered properly, because of a lack of the device.

MB: Yeah, you're correct; the atomizer device is important. The other thing to say is that, before the atomizer, people used to drip medicines into people's noses. The idea for the intranasal route came from this: somebody realized that a lipophilic drug might be absorbed if you drip it in the nose slowly, and then someone thought to make it a fine mist. I have also seen studies in which someone has put fentanyl into inhalers, with the purpose of trying to achieve an analgesic response; I think they were trying to come up with an innovative way of giving analgesia, but that's a very interesting concept, that someone would inhale their analgesic with a nebulizer. I agree with you, all the discussion is on the basis that they have a device that's able to atomize the drug. It's very limiting, because if you don't have the atomizer device you just can't deliver that fine mist. This would be a perfect project, for someone to design a tool that could be made out of simple items that most jurisdictions would have. You would need your syringe to create enough pressure to create a mist.

EB: I would like to conclude by asking you for some feedback related to the executive summary and on the survey. How can we improve the survey to better address the gaps in low- and middle-income countries?

MB: From my perspective as a clinician, I probably underappreciate what is approved or not approved, there's a gap in my knowledge; you are a pharmacist and obviously you have an excellent insight into that. I think that if you're targeting frontline clinicians, it would be interesting to present to them some conditions (like CAP, psychosis or major trauma) and ask them how do they usually manage them and, if they could have access to any other drug, what might they use. It would almost be like a case-based discussion; this might just orientate the list to what happens in real life. That would be another way of doing your survey.



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EB: Okay, thank you. And what about the timing? We estimated about 20 minutes to complete the survey. Would you agree?

MB: Yes, I agree; if you are on top of your game and you have baseline knowledge ready to go, 15-20 minutes should be fine. I will say that you would probably need a bit more time to consider your answers, if you're relatively new to the topics but want to contribute.

EB: Okay, thank you. What are the most important acceptability and usability attributes to consider in emergency care? What are the most important things that you have to consider when delivering a medicine in emergency care?

MB: I would mention efficacy and then stability, especially if I'm considering LMICs: for example, does the medicine have to be kept in the fridge? The other thing is: is it governed by laws, such as misuse of drugs acts? This might delay or restrict my access to that drug.

It's difficult to answer you in a succinct answer, because in emergency care there's a great variety of situations. If you're dealing with true emergency care, essentially you want a good safety profile. We do worry a lot about anaesthetic drugs, because you don't want to be making a sick patient potentially sicker. An example of that would be IV fentanyl, which may cause haemodynamic instability, hypotension and potentially arrest: people use it a lot for children who have septicaemia, before intubating them. The clinician needs to be aware of the potential adverse outcomes and trained adequately to deal with them.

EB: Thank you very much, we just finished our time. Your responses are quite impressive and I think they will have an impact on our project.

You already received the email from TG regarding the compensation, if you have any issue on this, please refer to gap-f@pentafoundation.org and also to TG that is in cc.

Also, do not hesitate to contact us if you have any question regarding our project or if you want to be updated.

One final question: do you know how we can contact people with your speciality in low- and middle-income countries? Do you know if there are any particular scientific societies or networks to contact?

MB: I'm involved with a couple of research networks: one is European and the other one is based in UK and Ireland. I do know that there is an equivalent network in South America and there may be one in formation in Africa, but I need to inquire. The rest of those research networks are predominantly based in Australia, America and Canada.

If you email me a reminder, I will provide you with the details of the individual who's the lead for South America, and I'll make inquiries to see if there's anybody in Africa.

EB: Thank you very much, that will help a lot indeed. In one week, we will send you the minutes of this meeting and we will add also the information that we just talked about. I think that's all. It's been a pleasure meeting you.

MB: Thank you, for me too! I look forward to hearing your updates.



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Authors: Elisa Barbieri, Marc Lallemand, Tiziana Grossele - Fondazione Penta Onlus

Version: 1.0

Interview 2

Date and time		
29/04/2021 18:00-18:45		
Attendants		
MN, EB, SC		
Agenda		
1. Discuss the results of the survey with MN 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1	When the second survey is ready, share it with the mentioned colleagues	MN
2	Revise the minutes of the meeting	MN

MN approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

EB: Thank you for accepting this interview, I will quickly present the GAP-f project. This project, mainly focused on the EMLc, aims to gather opinions from healthcare professionals regarding the formulation of paediatric medicines and assess the issues that are related to the formulation, especially related to acceptability, usability, off label use, dosing and safety. This interview is quite particular because you did not complete the first survey, so I would like to complete it with you and then ask some feedback on the responses that we got from other experts. Also, I will ask your opinion on how to improve the survey and the number of respondents. I will now share my screen with the survey.

This was the first question, related to medicine acceptability: in your experience, which medicines do children find difficult to take? When evaluating acceptability, you should think about the child's perspective, so age, neurodevelopment and so on.

MN: In general, children find it difficult to take most drugs; much depends on the parents' ability to talk the kids into taking the drugs or administering them without the kid realizing (mixing the drugs with food or similar strategies). Certainly, taste is one of the main issues with drugs; lately we've had some issues with the taste of lacosamide, which was used off label for age in a patient who had a big issue with its taste. I don't have any other specific drugs in mind with particularly bad taste.

Another issue could be for drugs which have subcutaneous administration, like LMWH, which is obviously hard to administer to children.

EB: Many respondents answered that LMWH is quite difficult, also because of dosing and safety problems, and off label use. Do you have any other specific medicine in mind as related to neurology?

MN: No other specific ones. I don't know what were the most frequent answers from my colleagues.



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EB: Did you get the chance to look at the executive summary? The respondents had different backgrounds and we got different medicines mentioned, mostly used in primary care. One particular premise is that the neurology specialty was under-represented in our survey, so we would like to gather information on possible issues to address in this specialty. We would like to improve the survey, because the second part of the project will have the aim to spread it to the world, mainly focusing on low- and middle-income countries.

We realized that medical devices were not addressed in the survey; we had an interview with AG who mentioned that the insulin pump device and the injection pen were not mentioned, but they are an important issue to address. Another example could be salbutamol, because to use it you need a respiratory device. This is also a problem related to the EMLc, because in the EMLc just medicines are mentioned and not medical devices.

MN: Another issue is with drugs that only come in tablets or capsules: kids have problems swallowing them and parents need to either open the capsules or crush the tablets, which is not the correct use for the medications. This occurs for several different drugs in neurology. For example, to treat epilepsy we often use lamotrigine, which only comes in tablets, and clobazam, which only comes in capsules.

EB: Is it possible, in your experience, to ask the hospital pharmacy to prepare the formulation?

MN: Yes, it is certainly possible to do it; while the patients are admitted, the hospital pharmacist can prepare an oral solution. That is possible also in the private pharmacies, but then they charge the patients for that.

EB: Okay, so it's not reimbursed by the national healthcare system?

MN: When the pharmacy has to prepare a special formulation, parents usually have to pay for it, unless the patient has a rare disease; in this case, they get a treatment plan where they can also include special formulations. This however is a minority of the patients.

EB: Other respondents reported this issue; for example, in France, if a medicine is not pre-packaged and has to be prepared by private pharmacies, parents need to pay for it and it's not reimbursed by the national health care system. This is an issue, maybe not related to the availability of the medicine – because it's available - but not everyone can access these medicines because of the cost. In low- and middle-income countries, it may be not possible to have the medicine formulated by the pharmacy if people have to pay for it.

I will go on with the second question, regarding caregivers' usability. In your experiences, do you know if there are particular medicines that caregivers find most difficult to handle, both in terms of administration to the kids (for example children with disability, that may have a problem swallowing the capsule) and in terms of stability of the formulation (that may need to be stored in the freezer or in the fridge)?

MN: When reading this question, I mostly thought about drugs that come in formulations that are not very practical; for example, clobazam (that we use very often) only comes in 10 mg capsules, but we often need much smaller dosages than that (like 2.5-3 mg). Basically, we tell parents to open the capsule and divide the powder in it, in order to achieve a smaller quantity; this is of course very imprecise and very uncomfortable for parents. Otherwise, as we said earlier, they can get different dosages prepared by the pharmacy, but then they have to pay for it.



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Another one is vigabatrin, which comes in 500mg powder bags: again, we often have to use smaller dosages, so parents dilute it in 5 mL of water and then take up 1 mL, that corresponds to 100mg, or they divide the powder bag in half.

Lacosamide, that is often used off label for age in younger kids, has the same problem: the smallest dose is 50 mg tablets, but we often need smaller dosages, which again is not very practical.

Lamotrigine also has the same issue: the smallest dose is 25mg, although in the past the 5 mg dose was available.

EB: These medicines that you're mentioning are used for chronic or emergency therapy?

MN: These are all for chronic care of epilepsy, but some can also be used in the emergency setting (in case of status epilepticus, which is a prolonged seizure). None of these is first line for status epilepticus, but for refractory status epilepticus lacosamide can be used off label. Coming back to status epilepticus, there is endorectal diazepam, which comes in 5mg or 10 mg tubes.

EB: In which age band is it used?

MN: It is used according to the weight, 0.5-1 mg /kg, so it's basically used up to 20kg of weight, generally up to 4-5 years. It is difficult to administer, of course, because it's an endorectal administration, which is not very practical, especially in social contexts. It's easier to use in younger kids but, as the kid grows older, it's not the right medication any longer.

EB: During the interview with Alfonso, he also mentioned that for insulin, there are quite a few problems with teachers, because they're not trained to administer medicines; do you feel this might be a problem also for epilepsy?

MN: Yes, indeed; teachers also have to administer endorectal diazepam in case of a seizure that lasts longer than three minutes. They have difficulties with the idea of administering any drug in case of a seizure, because it is an emergency situation, but probably endorectal diazepam can be even more difficult than other drugs. In Italy, at least in Veneto region, we release a certificate for schools, explaining what they have to do (when they have to administer the drug and how to administer it). Also, we have been carrying out some meetings with schools, teaching the basics of what to do in case of a prolonged seizure and how to use endorectal diazepam for younger kids and lorazepam for older kids.

SC: Eteplirsen was also named from some experts as difficult to prepare.

MN: Unfortunately, I don't have any experience with that, because in my hospital patients with Duchenne are treated by adult neurologists, that have a very wide experience with the disease: they carry out the treatment for the kids as well, while we do the diagnostic part.

EB: The next question is related to off label use, because of unapproved indication, age group, dosage or route of administration, of which you already gave us quite good examples; does any other example come to your mind?

MN: I thought about this and I listed out a few examples.

Levetiracetam, an anti-epileptic drug, is widely used in paediatrics; it is sometimes used off label as monotherapy in young children, both for focal and generalized seizures. It's licensed as a



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monotherapy after 16 years old, or as an add-on therapy in younger kids, but we often use it as a monotherapy in young kids as well. This is the first off label use of levetiracetam, and the second off label use is as a second or third line for status epilepticus. First line treatment is benzodiazepines, then we usually use phenytoin or phenobarbital; after phenytoin, we sometimes use levetiracetam, because it is quick to administer (you can administer intravenously in 10 to 15 minutes), it usually is well tolerated and it doesn't give respiratory depression. There have been some recent studies comparing the efficacy of phenytoin and levetiracetam and they found that they are quite similar.

EB: Okay, thank you. Actually, other respondents named levetiracetam as a missing medicine that is not in the EMLc. Would you consider it as an essential medicine, to be included in this list?

MN: Yes, I would definitely include it.

EB: Okay, and just to have a few numbers, do you have a gross idea on how many children use levetiracetam, among all the children you're treating?

MN: This is a tricky one, because I'm not sure about percentages, but it is certainly one of the first drugs that we think of in most cases of epilepsy. Its use has been growing dramatically in the last years, and now it's certainly used very much, mostly due to its very favourable safety profile.

EB: Another feedback that we got from people working in other countries is that it is not that easy for them to use medicines as off label. Just to give you an idea of the project: the GAP-f project's aim is also to accelerate the studies finding evidence around medicines, so that they can be included in the EMLc. This way, it will be easier for low- and middle-income countries to purchase medicines and also for doctors to administer them without legal consequences.

MN: Another example of off label use is lacosamide, as I've mentioned earlier, another anti-seizure drug that is increasingly used; it's used off label as a monotherapy or as an add-on in children younger than 4 years. It's not licensed in young kids and we don't use it as often as levetiracetam, but sometimes we use it as off label for age. Again, even if it's certainly not one of the first drugs we use, it can be used for refractory status epilepticus.

Finally, a drug that we use for headache prophylaxis, cinnarizine, is not licensed for this use, but there have been a few studies showing its efficacy.

EB: Is it a monoclonal antibody?

MN: No, it's not; it's an antihistamine and calcium-channel blocker.

EB: Okay, and what about the other medicines for migraine? Do you think there are problems related to formulation for this class of medicines?

MN: The drugs that we mostly use are cinnarizine, flunarizine and pizotifen; I would add them to the EMLc. I don't think we have a big issue with the dosage there, because cinnarizine comes in drops, so it can be modulated easily, whereas flunarizine and pizotifen come in tablets but don't have a dosage issue. Flunarizine is in 5mg tablets.



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EB: Thank you; one of the last questions is related to dosing and safety; related to neurology, phenytoin was mentioned, since it has a narrow therapeutic index and also requirement for drug monitoring. Do you have any experience in issues related to dosing or safety in your area?

MN: I agree phenytoin levels should be checked in blood to reach the adequate dose. Talking about other antiepileptics, they all need monitoring of blood levels, to check whether the patient has actually reached the therapeutic level. This of course is related to safety, because if they are beyond safety levels they are more likely to give toxicity, but it's especially related to their efficacy: if we don't have a good seizure control, we check the blood levels, to verify whether maybe the drug concentration is not high enough. Antiepileptics are in general closely monitored, both for efficacy and safety.

There are anticoagulants that can be a bit tricky as well; we mostly use heparin, which is not so difficult to monitor, but warfarin and oral anticoagulants require a closer follow up.

EB: I'm wondering, what do you use LMWH in neurology for?

MN: For cerebral vascular diseases, like cerebral thrombosis, ischemic stroke. Heparin is usually the first antithrombotic therapy that we use, then, if the stroke has a cardiovascular etiology we continue using heparin, whereas if it has a vascular cause we switch to aspirin. In case of cerebral sinovenous thrombosis patients continue with heparin for three to six months. Heparin can be used also in peripheral systemic issues, like catheter related thrombosis.

EB: Okay thank you. Is it just neurologists who are dealing with this kind of conditions or are intensive care paediatrician dealing more with them?

MN: It's both, because in the acute phase the patient often needs to be in the ICU - not always - but then, after a few days, they are generally moved to the neurology ward; also, we follow them after discharge.

EB: Okay, thank you for these clarifications. Here we have different questions related to which medicines are clearly missing; I would skip these questions and go to the question on medicines that require extemporaneous formulation by the pharmacist. You previously mentioned lamotrigine, do you have any other comments?

MN: Another issue we frequently have in epilepsy, apart from the ones that I have already mentioned, is with ethosuximide. In Italy it only comes as an oral solution, which often causes belly-ache, and it has to be taken three times per day. For older kids, who can swallow a capsule, we generally ask their pharmacy to import the same drug in capsules; that has the advantage that it can be taken twice per day and that it usually causes less gastrointestinal problems.

As I said, having oral solutions and smaller dosages of some drugs would be useful, for example lacosamide, lamotrigine, vigabatrin and clobazam.

Recently we've got cannabidiol, that pharmacies can prepare for paediatric use in epilepsy.

EB: Is it prepared as drops or as a solution?

MN: It's an oily solution that needs to be taken after a fatty meal, twice per day. At the moment we only use it for patients who have a rare disease, because they've got a special certificate that gives them access to this drug. In theory it will soon be released in Italy for patients with Dravet



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syndrome and Lennox-Gastaut syndrome, which are two epileptic encephalopathies. At the moment, patients with these syndromes are certified as a rare disease, so they can access this drug anyway, prepared from the local pharmacy.

EB: The last question on the survey: which are the top three paediatric formulation that you want to be developed or improved in the future?

MN: I was thinking ethosuximide capsules, clobazam oral solution and/or capsules in smaller dosages and vigabatrin, oral solution or different dosages.

EB: Okay, thank you. The part related to the survey is finished, I have just one last question for you: how can we improve the survey? Can you share some contacts that we can send the next survey to, to have a better representativeness of the neurology specialty?

MN: Do you mean in low- and middle-income countries or in general?

EB: The focus will be on low- and middle-income countries, but we didn't get many responses from high income countries regarding neurology, so I would say both.

MN: I'm in contact with other Italian and European paediatric neurologists; also, I can give you some names in Australia, India, China, Singapore, Africa and Turkey.

EB: That would be really nice, thank you. Related to the survey, did you find any questions difficult? Were they too long, too many questions, or too specific?

MN: Well, there was a little bit of overlap between a few questions, so I would find myself giving the same answers to different questions. Also, I was not sure on how to reply to the question beginning with "As you surely know, some medicines already available for adult care, have not been developed for children and can't be prepared by a pharmacist; which are in your opinion the medicines that are missing?". I couldn't think of anything there.

EB: Actually, the PI is coming from HIV background, and they know that there are some therapies that have been developed for adults and not for children and some therapies that have not been developed at all. We were not that sure how to put those questions down. One of the main issues was that the central questions were overlapping, so thank you for your feedback.

Do you think we should add any question, maybe on issues related to low- and middle-income countries? For example, we got feedback saying that, even if it's not our aim, we should also address the issue of market access: medicines that are marketed, but are not in the country because of regulatory issues or because pharma companies do not think that they will gain a lot from these countries. I don't know if you have any other feedback related to the medicines that you're dealing with, maybe problems related to storage?

MN: I'm sure in LMICs, many of newer anti-epileptics are not available; most of antiseizure drugs are old generation, like phenytoin and phenobarbital, some are bit more recent, like valproic acid or carbamazepine. The newer medicines, like lacosamide, levetiracetam, oxcarbazepine, are for sure less available.

Also, I'm interested in neuroimmunology, which is a different field from epilepsy; the drugs used are immunotherapies, which include, for example, corticosteroids. These are usually quite



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accessible, in low-income countries as well, but most of the other medicines used in neuroimmunology are not very accessible. like immunoglobulins, that are very expensive. Also, second line treatments, such as monoclonal antibodies (like rituximab), are certainly very expensive and not easily accessible. For example, in China they're not covered by social insurance, so patients have to pay for it, unless they have a private insurance. These are drugs that are certainly not easily available.

EB: Thank you very much for your feedback and availability. The project manager, TG, has sent you a document to fill for the compensation. We will write the transcription and send it to you. I wanted to ask if, when the second survey is out, you can share it with your colleagues that you mentioned earlier or mention scientific societies and networks that we can reach out to. With MLL we were thinking of doing a special issue on Children journal, I've already said to other researchers of the department if they want to contribute with a manuscript on off label use, acceptability and usability of paediatric formulations. For any other comments and issues, contact us through our email, thank you so much!



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Interview 3

Date and time		
05/05/2021 16:30-17:15		
Attendants		
SGM, EB, SC		
Agenda		
1. Discuss the results of the survey with SGM 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1	Send the contact of the Head of the paediatric division of the Latin American Thoracic Association	SGM
2	Revise the minutes of the meeting	SGM

SGM approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

SC: I wanted to begin with some of your answers to the survey. The first one was related to acceptability from the child's perspective: you mentioned Motrin (ibuprofen) as difficult to take, due to the volume of liquid. Could you tell us more? Is it because the formulation is too concentrated, or too little concentrated?

SGM: From what I understand, the main focus of your investigation is the characteristics of medicines, like acceptability, ease to swallow by children, easy administration by the parents... Maybe the first medicines that I have problems with are antibiotics: many of these have issues with taste, like cefuroxime and clarithromycin.

In Mexico, we have two brands of ibuprofen: the most famous is Motrin and the other brand is new and it's called TemptraFen. Motrin has a low concentration, so we need a big volume: for a child of 15 kg, the volume is approximately 10 mL of ibuprofen, while with the other brand, it's approximately 5 mL. Of course, if you consider that with ibuprofen the child may need also an antibiotic and/or a decongestive, the volume will increase, making it more difficult for the patient to accept all these medicines. Also, sometimes patients have difficulties in swallowing because of inflammation of the throat, and this can impact the acceptability of the medicine.

SC: Talking about acceptability, what do you think about the acceptability of devices, for example for the treatment of asthma?

SGM: I'm a paediatric pulmonologist and in the case of medicines for asthma I don't have particular issues, because we have a wide range of options and concentrations, so we can adjust the dose to the specific needs of the child.

In the new review of the guidelines on asthma (the GINA guidelines), they recommend using less short-acting beta-agonists (SABAs) for the relief of the exacerbation. On the other hand, they recommend a specific combination (that is fixed-dose formoterol + budesonide) in the "SMART



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strategy”. According to this strategy, you are using a specific treatment with a fixed dose and, during exacerbations, you should increase the dose as needed; they claim that this strategy will diminish the use of SABAs and the secondary effects of these medications. There is a problem: we only have one commercial presentation of this combination in my country (and in many other countries as well). Besides, I think that it is a question of perspective: many of the patients I treat are five years old or younger, while many of the guidelines are focusing on kids six years or older, so we have a gap of evidence. We can support many decisions with these guidelines but we must use our experience and the clinical evolution of the patient to achieve better results.

Also, a part of the problem is the communication between doctor and patient: we must take time to explain how to use the device and check that its use by patients or parents is correct. I think that there are no particular issues with devices, because there are many options, even in low-income countries. For example, there are strategies to adapt bottles of juice as inhalers, which have proved to have the same effectiveness as the commercial equipment.

EB: Thank you. Some other experts that we interviewed told us that, regarding medical devices, there are difficulties because, in case of emergency, it's not the caregiver or the parents giving the medicine, but the teachers are. What you're saying is that this might not be the case, because the kids are already trained and able to use the device correctly by themselves?

SGM: Well, first, I believe that we must train all the people involved in the care of the child. I like to say to parents that we are part of a team, and they must know the same things that I know to have better results in the treatment of the patient. I suggest that they train the nanny or the teachers in the school for an emergency.

On the other hand, if the kid has the right age, he can learn to use the device correctly. I think it's only a matter of time: you should take 5-10 minutes to explain the device. Many doctors don't do this, they make a nurse or another assistant do it, but I think it's a mistake.

SC: All right, going on to the next question: we were asking about usability by caregivers and you mentioned some antibiotics, Klaricid and Adel, which are both clarithromycin formulations. Why would you say they have a complex preparation?

SGM: Many people think the result of the dilution should be a very thin medicine, while clarithromycin is kind of grumous, so they think they have made a mistake in the preparation and add more water. The medication therefore has inadequate dilution.

In Mexico we have many brands of clarithromycin, but the two principal brands are Abbott's Klaricid and Adel, made by a generic laboratory called Senosiain. Klaricid preparation requires two steps of dilution: first you must add water up to the sign and mix (not shake, while many people are used to shaking medicines), and then you must add more water and mix again. With Adel, you just add water and mix or shake (they don't have a specific recommendation).

Also, when the parents go to the pharmacy, the person who sells medicines in the pharmacy usually suggests another brand, a generic, with a lower price. The parents usually think that it's the same medicine and decide to buy the generic, but the biochemical characteristics are different between brands; usually generics have a worse taste.

EB: Actually, we have a similar experience in Italy. In the USA or the UK, the pharmacist is the one preparing your medicine (resuspending the powder), while in Italy it's the caregiver who does that. There are different preparations for different brands and often it's not clear how much water to add. Also, sometimes parents are refilling the suspension bottle after every use. This is a gap



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that should be tackled, because with the wrong dilution the suspension won't work and may lead to treatment failure, especially in the case of antibiotics.

SGM: Another common issue is that many times paediatricians say that the child must take the medicine “until the bottle finishes”, without specifying the number of days. This can cause issues, because for example the child might vomit, therefore requiring another dose of the medicine, or some of the medicine might spill out: all these situations might lead to a treatment that is too short.

SC: You also mentioned Macrozit suspension (azithromycin); I noticed that it's sold with a vial of sterile water, which is very unusual for us. Do you think there might be a problem in Mexico, maybe more in rural areas, of lack of access to safe water to use for medicines?

SGM: In Mexico Macrozit (Azithromycin) has 2 commercial options: 600 and 1200 mgs, and they included the vial of water as an added value to ensure that the dilution is correct. We have the same situation with a brand of Cefixime called Biomics, that is sold with the vial of water for the same reason and to offer a more attractive option to the patient. Many rural areas of Mexico have a problem with water supply, but people have learned to live in this situation and buy big jugs of water that they use for everything, from food preparation to milk and medicines. Maybe I haven't encountered this issue because parents haven't communicated it to me; during my volunteer year in rural areas, I haven't seen people complaining about access to safe water.

In the public system, we have several medicines that we can prescribe for the most common situations. I work in a public paediatric hospital, where patients or parents don't have to pay, even for the medicines.

EB: Thank you. What about refrigerators? In your experience, are there any medicines that require to be stored at a determined temperature?

SGM: I live in the southeast of Mexico, which is a very hot area; this has an impact on the chemical processes of degradation of the medicine. Most people have a fresh zone in the house (like in the kitchen or the bedroom) where they put the medicines; solutions and syrups do not require refrigeration. Usually suppositories are not used, because glycerine liquefies at high temperatures.

SC: When we were asking about formulations that are missing, your reported nasal steroids. I was wondering, with which indication would you use them for children?

SGM: I think they are an important step in the treatment of upper respiratory problems, but most of the clinical experience with nasal steroids is for adults. There is a lack of strong evidence and experience for children, but we use them because of necessity. There's a wide range of options, but many of the devices are designed for adults, and of course children's nostrils' size is much smaller. All the medicines that we have – beclomethasone, fluticasone, triamcinolone... – are effective options in the treatment of upper respiratory problems, but without an appropriate device it's hard to use them.

SC: Thank you. Then, later on, we were asking about extemporaneous formulations, prepared by a pharmacist; you said that this doesn't apply to your country. Could you explain this better?



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SGM: In Mexico it's not like in the United States, where the pharmacy sells you the amount of medicine specified in the physician's recipe or where the pharmacist can change the taste of the medicine according to the patients' taste. In Mexico you can buy any number of bottles (in the case of syrup) that you need and the pharmacist doesn't manipulate medicines.

I reviewed the executive summary: in the specific case of medicines like spironolactone, furosemide, captopril or sildenafil there are no preparations for children. Therefore, the tablet needs to be crushed and diluted, but only a couple of pharmacies in a big city would be able to do this. Also, we don't know if these preparations are equivalent, in terms of dosage, to the original medicine. I understand that the chemical characteristics of the medicine don't make it easy to produce it and that there is no economic interest in making these formulations.

There are also difficulties when you have to adapt the dose to the weight band, because for example with oseltamivir you have to explain to the caregivers to open the capsule, dilute it in a specific amount of water and give a specific quantity to the kid.

EB: So, you don't have a hospital pharmacy that can help in preparing these medications?

SGM: No, we don't.

SC: Do you know if it's the same in the rest of Latin America?

SGM: I'm not sure, I think in Central America (Honduras, Guatemala Nicaragua...) they may have the same situation, because their healthcare systems are similar to Mexico's. In South America, the situation is more heterogeneous.

EB: I have some questions related to the EMLc. In the EMLc there is no fixed-dose combination for asthma treatment: do you think it's something that is missing? Would you like for example to have the budesonide/formoterol fixed combination, or is it okay to have the two medications separate?

SGM: I think asthma is similar to diabetes, you can categorize patients as controlled and non-controlled. You first need the patient and the caregivers to understand that the treatment will be long-term: you can't heal from asthma, but you can control it.

In my experience, I have used all the options that we have in the market for asthma, and all of them reduce symptoms and improve the patient's quality of life. In my work in the public hospital, I usually use beclomethasone, because it's the free option that we can offer to patients, and with this treatment the majority of the patients has good disease control. In my private practice, I use the combinations formoterol/budesonide and salmeterol/fluticasone, or only budesonide, and I have the same results; sometimes patients can get good control with antihistamines, like loratadine, or montelukast. As I said, every patient requires specific treatment. Having more options of course is useful; for example, tiotropium is recently having a role in treatment for non-controlled patients; biologics are emerging as well in the market, but I don't have experience with those.

However, I rarely have patients with severe asthma. In Mexico the racial mix has an impact on the clinical presentation of asthma: in literature it's reported that patients in Latin America – where there's a mix of races – have a milder presentation of asthma than Caucasian or African American patients.



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EB: Thank you. I would like to have one last feedback from you on the essential medicines list. The three medicines acting on the respiratory tract that are listed in the EMLc are budesonide, epinephrine and salbutamol. Do you think that with these three, if you're maybe working in Africa or Asia, you could cure your patients?

SGM: In this specific case of asthma, which is an inflammatory disease, we must use a specific treatment, inhaled corticosteroids. The problem is that people tend to use only relievers, not control medicines, but you shouldn't just try to resolve the emergency; you need to address also the chronic treatment.

In Mexico they are reselling a drug that was in the market many years ago, called Berodual, a combination of fenoterol and ipratropium bromide, that I think could be a good option in LMICs. The brand is Boehringer Ingelheim and they are using the GINA recommendations to sell this medicine. Also, I believe that access to medicines is a problem not only in LMICs: in the USA for example there is low access to medical attention and patients are usually treated only with beclomethasone and salbutamol.

EB: Could you give us one last feedback, regarding how we can improve the survey? Many respondents did not finish the questionnaire, so maybe there were some difficult questions, too focused on formulations...

SGM: I think the survey is the reflection of the perspective of who made it: as a pharmacist, you are doing the preparation etc, but a clinician is more focused on the daily use of medicines, chronic treatment of patients, easiness of administration...

Also, the questions were too "big", it was sometimes hard to understand the goal. I am referring for example to the question where you ask "What are the paediatric formulations that are clearly missing?" and later on you say "please write the generic or the name of the brand"; I think you are asking two different things. Also, when you say "if you're not able to respond, please go to the next question" it gives an easy way to not answer.

I think that the questions are very interesting, I wouldn't change them, just rephrase them.

SC: Do you think there might be a language barrier?

SGM: Maybe the language could be more colloquial; my English is not great but I understood the questions, even though sometimes I felt that I was missing the orientation.

Also, usually the healthcare professionals are overwhelmed and not in the right mood to answer this kind of surveys. I enjoy answering surveys and I also learn a lot by answering them, but sometimes there's no time.

EB: Thank you. Do you know any scientific society that we can contact for the second survey, which will be more focused on LMICs and on the EMLc?

SGM: I am in contact with the Latin American Thoracic Association, which has contacts with many representatives in all Latin American countries. You can send me an email and I will give you the email of the Head of the paediatric division.

EB: Thank you very much, that will help indeed. In one week, we will send you the transcription of the interview for a double-check. If you want to be in touch or ask something related to the



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project you can contact us via email; also, now there's a page on the WHO website (<https://www.who.int/initiatives/gap-f>) with updates.

SGM: That's great, I would be happy to receive your newsletter and be in contact.

EB: Thank you very much and thank you for your time; have a nice rest of the week!



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Interview 4

Date and time		
26/04/2021 16:30-17:15		
Attendants		
AG, MLL, EB, SC		
Agenda		
1. Discuss the results of the survey with AG 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1	Send the contact of the colleague in Chile and indication on how to contact ISPAD/be the contact point to ISPAD research board	AG
2	Revise the minutes of the meeting	AG

AG approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

EB: I wanted to start with your responses to the survey, question by question. I'm going to share my screen with your survey.

The first question was regarding acceptability. You mentioned that insulin has acceptability issues, related to complexities in using the device. Do you have any specifics on this?

AG: Firstly, in case of patients who are on MDI (multiple daily injections), subcutaneous administration is quite difficult for patients, families, caregivers, as well as school teachers. At least one or two administrations are expected to be done at school, which is obviously quite complicated. Secondly, using insulin pumps is complicated as well, because even though they are quite well performing for paediatric age, they are still complex devices; most of them are not designed for toddlers or infants, even though they are approved for this use.

EB: At what age are children or teenagers able to use the device by themselves?

AG: Most of the devices are meant to be used by teenagers, which is not easy because the device is something visible in your body. The major concern is for the younger ones.

EB: Okay, thank you. You also mentioned diazoxide and growth hormone.

AG: Diazoxide is the first-line treatment for congenital hyperinsulinism; it's an oral medication. It is labelled for use in paediatrics, but there are no paediatric formulations, so, every time you need to use it for neonatal hypoglycaemia, you're forced to go to a hospital pharmacy. There is no commercial formulation that is able to provide you the dose you need for that age group and this makes it quite complicated; besides, it is a drug we use 3-4 times per day, which again means that you need to administer the drug at day-care.



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EB: The preparation by the pharmacy, is it an oral formulation?

AG: Yes, it's an oral formulation.

EB: I have one question related to the stigma of injection. Do you think that there's a stigma around insulin injection? For example, patients that are uncomfortable in injecting insulin in a public space, even though it's a medicine; may this be an issue also in LMIC?

AG: Yes, definitely there is an issue both in high- and low-income countries. We experience it in our geographic area, and I believe that this issue is relevant also in LMIC. The stigma is experienced both by adolescents and younger patients. We have a problem in the scholastic system, at least in Italy (I'm not sure about the other European countries), because formally, no one in Italian public schools is supposed to administer drugs subcutaneously to patients. In Italy you are forced to administer emergency drugs, but insulin is not an emergency drug. Sometimes you can rely on local services which can provide you with nurses at school, but most of times parents are forced to take time off from work and go to school to administer insulin. It is very complicated for families.

EB: What you have completed is a preliminary survey, and for the next one the target will be LMICs. Do you think we should change the survey to capture also these issues?

AG: Yes, you should, because administering drugs such as insulin in those countries I think is even more challenging than in high-income countries.

EB: Okay, thank you. I will go on to the second question related to usability: you mentioned that glucagon needs to be stored at a determined temperature. Which temperature is it?

AG: Actually, that was quite complicated to explain in the survey. There are two formulations: inhaled glucagon, that can be maintained at room temperature, and the traditional formulation (that is an intramuscular injection). The latter is generally covered by the majority of the European healthcare systems, and needs to be stored at 4°C.

EB: I imagine that this might be a problem in locations where there is no access to fridges.

AG: Yes, for sure. In this specific case, the right formulation exists: in terms of efficacy, there is enough evidence for the inhaled formulation to be used in paediatric ages, although it's not approved for all the age-groups. There is only one manufacturer for this formulation; unfortunately, it's quite expensive, to the point that even in Europe it is not covered by the majority of the healthcare systems.

EB: Okay. For sure that's an issue that should be taken into consideration, since when experts are revising the essential medicines list, they also consider the costs and this is quite important.

AG: This is an emergency medication.

Elis: Okay, so it's a medicine that needs to be stored in the pharmacy or in the local health unit, ready to be administered?



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AG: Correct.

EB: Does insulin require a determined temperature to be stored?

AG: Yes, it can be stored at 4°C, but it is still stable at room temperature, at 25°C. This can be an issue in some countries, where room temperature is not 25°C during summer. In this case we have a stability problem, when storing insulin out of the fridge.

EB: I've also read that with insulin there may be a problem with administering devices, because since it's a protein, it is tricky to administer it not through injection.

The next question was related to off label use. The first group of medicines that you mentioned, SGLTi, are used off label because of unapproved age group. Which age group are you referring to?

AG: It is used for adults, so patients 18 or older. In Europe, it has been approved as adjunct therapy for obese adults with type 1 diabetes. However, even though there is a substantial amount of literature for these drugs in lower ages and obesity is a problem below the age of 18, these drugs have not been approved and they're not on the way for approval.

EB: Going on, why did you mention Tresiba in particular?

AG: Tresiba is a long-acting insulin, and there is only one manufacturer for this insulin. It's a long-acting formulation that has never been approved for the paediatric age. This is quite annoying personally, because we have a very limited number of insulins for our paediatric patients, especially long-acting; we are talking about three drugs, probably. The fact that one is not approved in paediatric age and is not on the list for approval makes it very complicated. Besides, according to the literature, this type of insulin is quite effective in adult patients with poorly controlled diabetes, because it has a longer half-life. It finds an indication for patients with poor control and poor compliance. Therefore, for LMICs a long-acting insulin, with basically the longest half-life out of all the available formulations, that is not approved for paediatric use is a problem.

EB: You know, the insulins that are mentioned in the EMLc are just the insulin injection (soluble) and the intermediate-acting insulin. Do you think that also the long-acting insulin should be added to the EMLc?

AG: In high income countries, intermediate-acting insulin (and what we mean by that is NPH insulin) is never used; probably 2-3 of the paediatric patient in high-income countries is using intermediate insulin. For more than 95 of our patients we use long-acting insulin: the two approved drugs are glargine and detemir. It's quite bizarre that they are not included as essential medicines.

EB: I think this is quite interesting. Actually, if there is a value to the treatment with long-acting insulin in terms of disease control and compliance, they could consider adding it to the EML. Just to say that these reflections that you're making are valuable and might have an impact. So, thank you for these thoughts.

AG: To make it more compelling, long-acting insulin is the only drug that can prevent DKA in type 1 diabetes. If you don't have a long-acting insulin available for patients with T1D, you can be sure you're risking an episode of DKA, which is the main cause for hospitalization in these patients,



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both in low- and high-income countries. That's why I think there is also a compelling economical reason on adding long-acting insulin to the EML.

EB: Thank you. I have just one last question regarding the off-label use: how often are the medicines you mentioned used off label?

AG: Unfortunately for Tresiba, GLP1 analogues and SGLT2-inhibitors the off-label use is very limited, because if you use them off label they are not reimbursed, and they're quite expensive. So, I would say almost never.

EB: Okay. Thank you. The next question was regarding dosing and safety. Insulin was one of the most mentioned medicines overall, because of the wide range of doses across age-bands and also different states and conditions.

AG: For insulin the dosing issue is quite relevant, especially for the younger ages, because between 1 and 5 years old we need to use 0.1/0.2 units, including for patients using an insulin pump. Insulin could be available in the form of diluted insulin, because there are quite good studies around the diluted form of insulin provided by the main manufacturers (Novo Nordisk and Eli Lilly) for these age groups. Unfortunately, these formulations are not available on the market, but they could really improve the use of medical devices like pumps if they were. Diluted insulin would be quite important for paediatric ages, however it's a little market (1 child out of 300 needs insulin, and of these, around 1 out of 10 is very young and requires these low dosages). For insulin pumps we don't use expensive insulins, we mainly use rapid-acting analogues like Aspart or Lyspro, whose price is quite low in Europe. This is a big difference with the USA.

EB: Is the insulin pump used in LMIC?

AG: Their use in LMIC is very limited, because they are quite expensive. In the USA, according to the expertise of the centres, from 50 up to 90 of paediatric patients with type 1 diabetes use an insulin pump. In Europe, overall a high-income region, we use an insulin pump in 20-30 of the patients. It's less than a half than the USA, because our healthcare systems consider insulin pumps an expensive therapy. Also in Italy, in high-income regions there is a larger use of insulin pumps, compared to low-income regions.

The price of insulin pumps is a challenge, however today we may say that insulin pumps are acknowledged as the preferred therapy for type 1 diabetes. I'm currently working with ISPAD (International Society for Pediatric and Adolescent Diabetes) and in our next guidelines we will consider this problem: we have enough literature to say that insulin pumps really make a difference for the paediatric age.

EB: How do you think we should incorporate this question in the next survey? You mentioned that medical devices were not considered a lot in the survey. Which question would you like to ask your peers?

AG: I would ask if they use any medical device in their area of expertise and, secondly, if they consider the medical device as an essential part of the treatment. Again, for type 1 diabetes (and not only for type one), some medical devices are essential to the treatment.



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EB: Do you think that in the EML the medicine should be listed with the medical device? Insulin in the EMLc is just listed as “injection, 100 IU/mL”, and there's no mention of a device, either the syringe or the insulin pump. If you were an expert discussing with WHO, would you like to add the medical device?

AG: Yes, I would. I do understand that we do not have today insulin, specifically for insulin pumps. The same formulation of insulin that is used for MDI treatment is used also for refilling insulin pump. Do we need a specific formulation for insulin pump? Yes, but it's more an industrial problem to me. The actual problem is to acknowledge that the medical device by itself is part of the treatment. And again, we've been talking about insulin pumps, but we can add also the glucose sensors, as part of the story.

EB: I finished the questions regarding the survey. I would like to ask a feedback on the responses that we got from your peers.

Hydrocortisone was often reported as difficult to handle by caregivers due to difficulties in the determination of the dose. Do you have any thoughts on this?

AG: On this one I think you already got a lot from my colleagues; this is something we are aware of and it has been known for decades. It is usually used in a limited number of patients, we are talking about less patients than type one diabetes.

EB: Related to other medicines use for endocrine disorders, such levothyroxine, hydrocortisone and fludrocortisone, there are quite a few interactions with medicines for HIV therapy. How do you think we should address this issue in the survey? I realize that it's a quite difficult question because it is mainly related to area where HIV it's endemic, so maybe not Europe; however, it might be an issue to be considered when clinicians in LMICs are prescribing.

AG: Personally, I would add a general question on drug interactions. For the drugs we've been talking about I don't see any real interaction.

EB: Last question is related to challenges in neonates. Do you think we should have a specific question for neonates' formulations?

AG: I believe that the neonatal area deserves a specific question.

Glibenclamide is an oral anti-diabetic drug, essential for neonatal diabetes. Only in France they're pursuing the approval for the neonatal formulation. It's quite remarkable that only in France they are addressing this issue.

So yes, I do believe a neonatal question is important.

EB: Thank you for sharing. One of the aims of the GAP-f project is to have a common stakeholder that is trying to address different issues related to formulation. GAP-f is not dealing just with clinical development but also with market access and regulatory issues. I think what you said is a perfect example on the diversity of different healthcare systems, but I believe that all the countries should pursue the same objective together, related to paediatric formulations. I think it will also be easier for the different countries, because the things that they do in France are mostly applicable in the rest of Europe.



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SC: Regarding the devices, do you usually explain how to use the device to parents and patients or is it someone else that does it?

AG: Yes, in my working area we do. I may also say that when I was working in the USA there was dedicated personnel – generally a nurse – to explain how to use the device. We personally don't like representatives from companies to be the only people teaching the device, so we usually have a representative of the company AND a nurse or a physician – in Italy mostly physicians, in USA mostly nurses.

MLL: What we have found difficult in the survey is the fact that it's very hard to think about what you don't have. It's a very complicated intellectual exercise to say “what should I have that I don't have?”.

AG: I think diabetes is quite a privileged observatory because, especially for type one diabetes, we usually confront ourselves with colleagues from the adult medicine and from other countries, so we may have a sense of what we would like to have in our pockets.

EB: Do you have suggestions on how to spread the survey to your peers in low- and middle-income countries? Do you have any connection with colleagues in Africa, South America and Asia and South Pacific Asia? Because we tried to contact different societies...

AG: In South America, I have a colleague from the ISPAD network working in Chile, I can forward you the contact. And again, ISPAD is a good network for type one diabetes, and they are absolutely supportive. It's a big network.

EB: Thank you for your feedback and your time. I will contact TG for your compensation and SC will send you the minutes in a week or so to double check.
If you have any question regarding the survey or the project, just drop us an email.

AG: I will send you the contacts of my colleague and the ISPAD network, I think they will be interested in participating.



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Interview 5

Date and time		
13/05/2021 12:00-12:45		
Attendants		
JDK, MLL Lallemand, SC		
Agenda		
1. Discuss the results of the survey with JDK 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1		JDK
2	Revise the minutes of the meeting	JDK

JDK approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

SC: Good morning, I am SC, a general doctor; I'm currently working at PENTA as a consultant for this project, and also doing other studies on infectious diseases in children.

MLL: I'm MLL Lallemand: I'm a clinical researcher working essentially on paediatric HIV and HCV and I represent PENTA at the WHO.

SC: I would like to start with your answers to the survey. The first question was related to acceptability by the child and you mentioned three antibiotics, due to their taste or aftertaste. I was wondering if you think there are other classes of medicines that have issues regarding acceptability, other than antibiotics.

JDK: I think the taste is an issue mainly with these antibiotics; a part of the ones I mentioned, also the generic erythromycin syrup has a bad taste. I would add Gaviscon, which is available as a syrup in Belgium; before it was available as a powder, which was easier to add to the formula for babies, while now it has to be given at the end of the bottle and doesn't have a good taste. I don't see particular issues with taste in other medications.

SC: Okay, thank you. What about devices for respiratory diseases like asthma? I was reading that many patients and parents find it difficult to use inhalers; do you experience this with your patients?

JDK: I think the major issue is to explain very well to patients and parents how to use them; also, explaining is not enough, you have to show it to them. This way there shouldn't be problems. The main issue is that many doctors prescribing inhalers don't give explanations, but as a paediatric pulmonologist this is a core part of my practice.

I see some issues with Qvar, which has a valve that closes when you inhale, and sometimes children would be surprised by this and stop inhaling. For this reason, I haven't used it a lot. I usually use a MDI with a small volume spacer or a DPI.



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SC: Would you say these are appropriate for all ages? From which age do you usually use them?

JDK: For sure not before the age of 6, but mainly they are used from the age of 8-10. You also have to evaluate the single patient and see how capable he is to take them. Most children older than 10 years are able to use them properly. I prescribe MDIs until they can use DPIs; however, DPIs are prescribed in general practice also to young children, without the possibility of proper use. I see a problem in prescribing these inhalers, either MDIs or DPIs, only when it's not well explained and when the child hasn't shown the capability to take it properly.

SC: Thank you. On the next question we were asking about caregivers' usability: since we're talking about devices, is it usually the children administering themselves the medicines or are the parents doing that? In that case, do you think there are issues at school, where teachers might have to administer medicines?

JDK: I think if patients have to take a SABA, they shouldn't go to school because they are really ill, especially with Covid. For younger children it's obligatory that parents are the ones giving the medication, but also in adolescents parents need to coach them. Especially with DPIs, adolescents know how to use them but they get negligent and don't do it properly anymore, so parents need to be positively coaching (not only reminding them to take them but also being there when they do and encourage them to do it properly). Regarding the MDI with spacer, parents for sure have to be there.

SC: You also reported omeprazole capsules as having issues with the determination of the dose; actually, omeprazole was one of the most mentioned medicines overall, both for caregivers' usability and as produced extemporaneously. I was wondering, do you haveesomeprazole in a more suitable formulation? In Italy we have it as granules for oral suspension, approved for children older than 1 year.

JDK: We don't have esomeprazole or anyway we don't use it, because there isn't a lot of literature on its use in children.

Regarding omeprazole, we usually prescribe it in the syrup formulation, but sometimes for economic reasons we prescribe omeprazole capsules, which are a lot less expensive. This however makes it hard to give the proper dose: there are like 30 granules inside the capsule and parents should count them all the time, which is difficult and long; usually they are simply advised to give half of the capsule, which is never really the correct dose. The other way is to give the granules with dimethicone polystyrene, which we import from France (I don't know if it's available in Italy). It's an antacid that comes like a sticky paste formulation and has a good taste. If you put the granules with the paste on the pacifier, they can swallow the granules as well. The issue again is that parents should count the granules to give the proper dose, and they usually don't.

SC: Thank you. We're about to release a second survey, which will be focused on LMICs: you didn't mention any medicine with issues related to stability, like need for refrigeration or need for dry environment. These might be relevant issues in LMIC. Do you have any drug in mind that might have these issues?



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JDK: I'm not very familiar with the healthcare systems in other countries, especially with specific climates. I have no experience with that, in Belgium we don't have a problem with temperature requirements.

SC: Thank you. In the next question, we asked about off-label use and you didn't mention any medicine. Other pulmonologists reported prescribing antihistamines for children or combinations of corticosteroids and LABA, which are not approved for paediatric patients.

JDK: In Belgium the combination of steroids and LABAs is approved. On the other side, we don't use antihistamines in younger children (<2 years), except if older than 1 year as an extemporaneous solution for post-nasal drip, given once a day before going to bed.

SC: You reported digoxin as having concerns around dosing and safety due to the narrow therapeutic index, and it was mentioned also by many other paediatricians. For what indications would you use it?

JDK: It's used for arrhythmias in children, after consultation with a paediatric cardiologist. It's not used regularly, just for a short time, for heart failure or supraventricular arrhythmias. I haven't been prescribing it recently.

SC: Okay, thank you. You also mentioned glycopyrronium bromide: are you referring to the inhaled form?

JDK: No, it's in a capsule. We prescribe it for bronchorrhea, both in children with swallowing problems or psychomotor retardation and in children with a lot of mucus, if the reason is not known or if it's a viral infection. We prescribe it orally, as a capsule, 3 times a day. It's also an anticholinergic but it's not available for inhalation and it's not used for asthma; for that we use ipratropium bromide.

SC: Then, there were two questions to which you didn't answer; actually, we had some issues with these questions, because people were not clearly understanding what we were asking. Did you have the same problem, or was the survey getting too long to answer?

JDK: I think it's because I didn't know how to answer.

MLL: After asking about formulations that exist or that have to be modified or prescribed off-label, we go to more fundamental questions: medicines that you know should exist but are not available for children for two reasons, because they existed and have stopped producing them or because development in adults is just proceeding but there is nothing yet available for children.

JDK: What is getting less available in the last years is a good solution for stomatitis, which has been used in a lot of oncological patients; it's still available as an extemporaneous preparation. The cream for anal fissures is also not available anymore, because one of the components is not available and there is no good alternative; the same happens for antihistamine solution for post-nasal drip. There is a tendency in pharmaceutical companies to stop producing medicines if they don't have the patent and the market is too small.

As far as adult medications, I'm not so familiar except for respiratory medicines, but most adults' pulmonary diseases are not prevalent in children and the other way around. I think that what is



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still missing is a good medication for RSV infections but there are a lot of studies for RSV vaccination in pregnant women.

Biologicals are medications that will become more important in children, but the conditions requiring them (autoimmune and autoinflammatory diseases) are not very frequent. I guess the work in adults will be preceding what we will be using in children.

MLL: What you said about biologicals and autoimmune diseases is very interesting. If you take the top ten conditions that you have to treat, putting aside viral and bacterial infections, what are the most important? Do you see a disease, among those, in which you don't have much to offer?

JDK: In practice, the things we see the most can be treated quite well.

We still need more medicines for one of the major congenital diseases, cystic fibrosis; there is some work being done there. Also, for primary ciliary dyskinesia, which is not really frequent. Since two years ago we have in Belgium the neonatal screening for trypsinogen, so CF patients are picked up much earlier than before and hopefully that will give us more solutions. I'm not very familiar with this, but perhaps also IBD treatment needs more progress. Autoimmune and systemic diseases are not really frequent, so it's less important that we get medications for these conditions.

SC: Talking about the Essential Medicine List for children, you mentioned some medicines for chronic asthma treatment. You probably noticed that there are only three medicines for respiratory diseases: salbutamol, budesonide and epinephrine. In 2017, they considered adding to the EMLc the combination of budesonide and formoterol, but they didn't add it because of safety concerns on corticosteroids' use in children. Would you agree, or do you think it's should be added anyway, as an essential combination for asthma treatment?

JDK: I see a problem with this combination, because both have different indications: budesonide is prescribed for acute laryngitis. In young children, SABAs and LABAs are not really important in the control of asthma.

Nowadays we see quite often GPs prescribing fluticasone and salbutamol for an acute event, which is not good because it takes at least a week for fluticasone to work. On the other side, giving the SABAs for a long time is not really helpful.

I don't think the combination budesonide-salbutamol is good, because it's usually adolescents that need it: almost all my adolescent patients with asthma use this combination and they do better than when they only take inhaled corticosteroids. However, only a very small part of primary school children needs the combination of LABAs and fluticasone in my experience: fluticasone-salmeterol is available in Belgium, but we don't have a big need for primary school children to use it. Most of them will be good with inhaled steroids, and SABAs when needed.

SC: So, to you, this list would be enough to treat asthma in younger children, while for adolescents you would add the combination, correct? You would add a LABA for older children?

JDK: Yes, salbutamol for acute treatment and budesonide for chronic treatment. I would add a LABA for older than 12 years; also, there is the combination of fluticasone and vilanterol (an extreme long-acting beta-agonist), which needs to be taken once a day.

MLL: Thank you. I would like to have your feedback on the executive summary that we sent you on this survey. You can see immediately that it's essentially representative of Italy, Spain, the UK



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and some other European countries, while LMICs are not really represented. What was your feeling when you read it? Did you feel that some things were missing?

JDK: It was a very extensive report; I read all the tables and I was surprised to see that there are so many medicines from the same class, for example there were quite a lot of cephalosporins that I haven't even heard of. I saw that cefadroxil was mentioned as highly important and I agree, we usually use it in urinary tract infections as 2nd line treatment. However, in Belgium cefadroxil syrup is not available anymore and none of the first-generation cephalosporins anyway, which is a concern because we see quite some resistance to other antibiotics. Probably in Italy and other countries the syrup is still available, and that struck me because it's not in Belgium; we do it extemporaneously from capsules, but of course it's more expensive this way.

I think it's a very extensive report, also with medications for parasitic infections which we don't see frequently. I don't think there are any gaps in the report, on the contrary, it's very complete, with a lot of medications. I wonder whether it's good to have such a variety of medicines of the same class (there are for example at least 15 cephalosporins of 1st and 2nd generation in the report).

SC: As I previously said, the next survey will be more focused on LMIC. Do you think we should change the questions to make them more context-specific?

JDK: Perhaps you should ask about how practical it is to get the medicine: how far are they from any hospital or pharmacy, what are the storage and the transportation facilities. It's not related to the medication itself. Also, I think it would be good to ask what is not available because of the cost and what is the possibility of the pharmaceutical companies to get certain medications at a lower cost; maybe off-patent medicines could be a solution for LMIC.

I'm also not sure whether everybody will read the EML, because I must confess that I read the whole report just because of the interview, I don't think I would have even opened it otherwise because it's so long. It's good to have it as a reference work, but not as something informative.

SC: Thank you. Do you maybe have in mind networks or scientific societies that work in LMIC?

JDK: I am a member of the ERS (European Respiratory Society) and I'm familiar with the ATS. During the pandemic, there were webinars organized together with the Pan-African Thoracic Society, which might be interesting for you. I wasn't aware of any African society before this. I'm sure there is also societies of gastroenterology and infectious diseases but I'm not familiar with them.

SC: Thank you, that would be really useful. In about a week I will send you the transcription of the interview so you can double-check it. Thank you for your time, it was a pleasure to meet you.



D2 – Summary report of survey results, identifying the reasons for the missing formulations and elements of context and rationale for prioritization of products missing but deemed critical.

Authors: Elisa Barbieri, Marc Lallemand, Tiziana Grossele - Fondazione Penta Onlus

Version: 1.0

Interview 6

Date and time		
11/05/2021 12:00-12:45		
Attendants		
ML, EB, MLL, SC		
Agenda		
3. Discuss the results of the survey with ML 4. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1	Get contacts from neighbouring extra-EU countries	ML
2	Revise the minutes of the meeting	ML

ML: approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

EB: I would like to start with your responses to the survey. The first question was on acceptability of formulations: you said that there are problems with furosemide suspension, especially related to complexities in using the device. In Italy we have furosemide suspension, used without a particular device; why did you mention this medicine in particular?

ML: We tried to do a preparation with furosemide in liquid form, but the suspension had a too high viscosity: when using oral syringes, we were not sure that children were getting the correct dosage. We did this for a month and then decided with the clinicians to go back to the traditional dosage form, which is an oral powder (2mg). We don't have any national regulations or special formularies with acceptable formulas for furosemide suspension.

EB: You were preparing extemporaneously the furosemide suspension with a different dosage, correct?

ML: Yes, and when I say extemporaneous, I mean compounded from market available medicines for adult patients. We don't have active ingredients, which is a great problem.

EB: Yes, I noticed that you reported in the extemporaneous question that in your country you are adapting medicines from adult formulations. In Italy it's a bit different, we usually have the possibility to buy the active ingredients, but it's still quite tricky and depends on the market. You also mentioned imatinib suspension, which was discussed during the last EML consultation and is listed in the EMLc as a tablet. You mentioned that you have a suspension, with problems in acceptability. Can you discuss these issues?

ML: We are usually compounding this suspension from market available medicines for adults, which is Accord's 400mg tablets. The formulas are standardized on 40 mg/mL concentration, and we are doing 20 or 50 mL of preparation for a patient. We have issues with sedimentation and uniformity and accuracy of dosages, because the container is multidose and in such a high



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concentration the dose is 1.5 mL. Also, there are issues with the coating of the tablets. We are dealing with a risk, because no one can take responsibility for this preparation, but it's the only way to administrate this drug. We are trying to standardize our preparation, maybe to check stability data, but there is information of preparation only from active ingredients, from the producers of the medicine and the vehicle.

EB: In Italy, the SmPC for imatinib states that the tablet can be dissolved in water or apple juice, if the patients have problems in swallowing; of course, in this case the dose is fixed. I'm not aware of reconstituting the suspension. Are you doing the suspension because of a problem with dosages? Why aren't you using the fixed-dose, reconstituting the tablet?

ML: We are compounding the tablets in suspension with a sweet vehicle. The dosage is 12.5 mg twice a day, as prescribed by the paediatricians.

EB: Thank you, I will go to the next question related to usability. As regarding esomeprazole suspension, why did you mention that it's complex to prepare?

ML: We are compounding 6mg/ml suspension from pills with prolonged-release (the pill inside has little pellets); we disperse it in sodium hydrogen carbonate in a percentage of 8.4. Our technicians are doing this, while the pharmacist is a supervisor: their opinion is that this compounding takes too much time. Also, we are dealing with something that isn't in the indications, because on the SmPC it's recommended for patients older than 12 years, while we compound it for patients that are much younger than that. We have the same issues with pantoprazole.

EB: So, it's the pharmacy's technician preparing the suspension, not the parents, right?

ML: Yes, I'm giving you my experience and the one of my colleagues; we are all in a laboratory and not so connected with caregivers, so we don't have information on administration, appropriateness of device and so on.

EB: You also mentioned that esomeprazole suspension should be stored at a determined temperature; which temperature is it?

ML: I'm not entirely sure if it's for esomeprazole or pantoprazole, but in some formulary, it's recommended to store it between 2 and 8°C. Sometimes, in big hospitals, some departments don't have a fridge. We are responsible from compounding to applying, but there is a step between pharmacy and department in which we don't know what's happening, so there's a risk in that.

EB: The next question is regarding the off-label use; you mentioned three medicines related to the cardiovascular speciality and we got many feedbacks on this category of medicines, especially on clopidogrel, captopril and furosemide. You mentioned that clopidogrel is prepared extemporaneously from adult tablets, correct?

ML: Yes, it is.

EB: And you mentioned that it's used off-label for unapproved age group, indication and dosage. Could you give us more insight?



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ML: We are compounding clopidogrel oral powder in 15 mg dosage and also acetylsalicylic acid oral powder in 15 or 30 mg. We compound it for the Paediatric Cardiology department, again in the dosage that they are asking for. There is no indication for paediatric patients in the SmPC.

EB: As related to these formulations, are you preparing them just for the hospital or also for patients treated at home?

ML: We are compounding everything just for the hospital; our patients never take medicines home, and if they have a prescription for a longer time, the health system should assure them that they will get the medicine in the community pharmacies. I believe that there they are dealing with the same issues and I'm afraid of situations where they are maybe taking a risk without knowing.

EB: Actually, another interviewee pointed out that formulations prepared at the community pharmacy need to be paid out of pocket by the caregivers; in some cases, doctors were not prescribing extemporaneous formulations because parents had to pay for it, and instead they were instructing parents to prepare the dosages themselves (by opening a capsule and dividing its content). Is this something that happens also in Croatia?

ML: Maybe I'm not the right person to answer this question, but I can give you an example of an issue that we had. Rapamune (sirolimus) is available on the market as an oral suspension; one time it happened that doctors asked us to prepare an oral suspension from adult tablets, because the hospital pharmacy was out of the commercial suspension. However, the child had been previously treated with the commercial oral suspension, and there is a big difference in dosages between the two, mainly because bioavailability is 30 higher when you dissolve the tablet.

EB: In the question related to missing paediatric formulations, you mentioned the need for a European paediatric formulary; some projects have been pursuing this, and pharmacists preparing the formulary are part of the FIP (here is the link: <https://paedform.edqm.eu/home>). I agree that this is a relevant issue, that there are no specifics on formulations and excipients, and there is still a lot of uncertainties in preparing these formulations.

However, this question was more focused on formulations that are needed, meaning for example formulations developed for adults but not for children or formulations that are available for children but just in tablet form, not suitable for young children. All the medicines that you're preparing extemporaneously might represent clearly missing formulations. Can you think of other formulations? Maybe some fixed-dose antiretrovirals, cardiovascular medicines (captopril, enalapril...) or omeprazole suspension.

ML: We don't have issues with that group of medicines; we do propranolol suspension, bisoprolol powder, enalapril powder, hydrochlorothiazide suspension 5mg/ml and spironolactone suspension 5mg/ml. Omeprazole is on our market but it's not often prescribed, we are usually asked for pantoprazole, esomeprazole and ranitidine, before the nitrosamine issue.

EB: You are preparing the missing formulation extemporaneously, right?

ML: Yes, we are making everything from market available medicines for adults. We have active ingredients only for erythromycin and theophylline.



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EB: In your region, every pharmacy is able to prepare all the formulations extemporaneously? Not just for example in your university hospital that may have bigger laboratories, but also in secondary-care hospitals?

ML: We are compounding a representative number of extemporaneous preparations, trying to comply with a resolution from 2011. We're trying to compound high-risk preparations with GMP guidelines, but we're completely safe just in situations where there are market available medicines for children: we are always choosing this option, if it's possible. We usually get some prescriptions for medicines that I mentioned from commercial pharmacies, because those are patients discharged from this hospital. Maybe somewhere someone is preparing something, like the paediatric European formulary or other regulations, that will make it possible to organize pharmaceutical compounding just in one place, compliant with all the requirements.

MLL: I suppose that all medications approved by the EMA are theoretically available in Croatia. How does it actually work? Do you have access to the same products that some may have in Italy or Spain for example, or is your drug policy restricting access to some medicines?

ML: You're talking about a centralized way to get some medicines, available on other markets. The Ministry of Health every year produces a list of approved medicines for hospital patients; a hospital committee has to approve everything that is not on the list. Sometimes we are dealing with financial problems, asking if something is cheap enough or appropriate to get from other countries' market.

MLL: So, the list that you use to order the products is based on the WHO EML, or is it discussed at the Ministry of Health level? From what I understand, if you want something out of the list you have to make a special request and have a committee approve it, correct?

ML: Yes, we need to go to a committee, and the main list is approved by the Ministry of Health.

MLL: It would be interesting if you can send us the list of approved products, so that we can see if it's very restricted.

ML: The lists are available on the internet, on the Croatian health insurance website; those are medicines that are in every moment available.

MLL: Okay, thank you. You received the summary of the preliminary survey, what did you think of it? Was it telling you information applicable to where you are? Was there information missing?

ML: I realized that other specialists have the same problems that we have, with off label use and extemporaneous preparations. I hope that we will be able to get more commercial drugs, to avoid making extemporaneous preparations, or at least to do them from active ingredients and with standardized and validated procedures. We need a special approval also to get active ingredients.

EB: So basically, you're saying that in Croatia, if the Ministry of Health is not purchasing a formulation, they say that you can prepare it in the pharmacy since there is a lab, so it might not represent a problem for them.



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ML: I think that we are still dealing with financial questions more than risk questions, because people maybe are not aware of risks; we need a more progressive “filling of gaps” in Croatia. There is no standard, they just say “find the best way and hope that it will work”.

EB: Thank you; I would ask you a final feedback on how we can improve the survey, focusing especially on LMIC. From other interviewees, we found out that we did not dedicate enough space to devices.

ML: I think that you are doing a great job; those are problems that should be recognized.

EB: Thank you; we will send in about a week the transcript of the interview, so you can double-check it, and we will insert some suggestions, like the formulary I was talking about. If you can think about groups or research networks working in LMICs, maybe related to what you’re doing – hospital pharmacy – please tell us, so we can gather a broader opinion and do a better analysis of the gaps. Maybe we can follow up via email on this.

If you have any questions or want to share something, you can contact us through our email.

ML: Thank you. Do you think that the situation I described to you is happening in other European countries?

EB: I have worked in the hospital pharmacy laboratory and we were preparing a few formulations (not so many); in Italy we are able to purchase lots of medicines, even though not as much as in the UK. One issue is that only hospital pharmacists are able and willing to prepare extemporaneous preparations, while in the community pharmacies they are not (they just prepare dermatological formulations such as creams). Another issue in Italy is that amoxicillin suspension is reconstituted by the caregivers, and there are a lot of errors because the instructions are not that clear.

Surely, other countries experience gaps in formulations and are preparing medicines extemporaneously as you’re doing.

MLL: You are close to countries that are not part of the EU, so probably their access to medicines is different; if you know about it and can maybe give us contacts of colleagues that work in non-EU countries, it would be really interesting.

ML: Thank you, I will speak with some colleagues and get some answers.

EB: Thank you very much for your time, have a nice day!



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Interview 7

Date and time		
26/05/2021 13:30-14:15 CET		
Attendants		
KAB, EB, SC		
Agenda		
1. Discuss the results of the survey with KAB 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1	Revise the minutes of the meeting	KAB

KAB approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

SC: We would first like to ask you some information on your answers to the survey; the first question was related to acceptability from the child's perspective. You did not answer this question, so I was wondering: did you think it was not applicable in your setting?

KAB: I'm a pharmacist working in the hospital, I prepare and distribute the medicines; I don't know so much about taste or similar issues.

SC: Next, we were asking about caregivers' usability; again, probably you don't have many interactions with parents. When you answered Rocaltrol (calcitriol) as having issues, did you mean that it is difficult to prepare for a pharmacist?

KAB: Yes, and for nurses too. Sometimes we have to give Rocaltrol to infants, that can't swallow the capsules: in the past, nurses extracted the active ingredient from soft capsules with a syringe, but now we prepare a solution.

EB: Are you preparing this solution just for inpatients of your hospital or also for outpatients?

KAB: We prepare it just for patients in our hospital; we prepare it from the capsules, so it's difficult and not precise.

SC: So if the patients are outside the hospital, can they find the extemporaneous solution prepared in community pharmacies?

KAB: Local pharmacies can prepare the solution, but in most cases, they give them special medicines.

EB: Do you have any other medicine in mind that caregivers or children find difficult to take? For example insulin (used with the insulin pump) or respiratory devices.



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KAB: I don't have so much experience in this; I mainly talk with doctors and nurses and I know that insulin has issues for example, but I don't really know the parents' problems.

SC: What about stability? Other pharmacists were mentioning issues with refrigeration, since some wards don't have a fridge, or other storage problems. Do you have similar issues?

KAB: We don't have issues with refrigeration.

SC: Going on to the off-label question, you mentioned pentoxifylline as used for neonatal sepsis; could you tell us more?

KAB: It is an adjunctive therapy for neonatal sepsis, since it improves the blood flow and has anti-inflammatory action; neonates receive pentoxifylline for three days besides antibiotics. It's an evidence-based therapy but I believe it has low efficacy.

SC: Many clinicians reported that they are not really aware of off-label vs on-label use. As a pharmacist you probably know this, but do you agree that doctors prescribe medicines without really knowing if they are off-label?

KAB: Yes, I agree; sometimes they don't know which indication is off-label, but they have to use these medicines to treat their patients.

EB: Do you have to require a permission for medicines used off-label? Do you have to fill a form or is it a normal prescription?

KAB: We have to fill a form; doctors do it for outpatients, but for hospitalized children they sometimes forget about it.

SC: Are off-label medicines reimbursed or do parents have to pay for them on their own?

KAB: They have to pay for them, but they can receive some economical support for it.

SC: Many respondents reported the use of levetiracetam as off-label for neonatal seizures. Is this something that you do as well in your setting?

KAB: Yes, we use levetiracetam. Its use for neonatal seizures is not off-label, but in our SmPC it is recommended as a second line, after phenobarbital, while sometimes we use it as a first-line therapy or in higher dosages.

SC: What about caffeine citrate for neonates? It was reported many times, as prepared extemporaneously and used off-label.

KAB: We use caffeine and we don't have it in Hungary: we have to import the IV ampoules and we prepare an oral solution in the pharmacy.

SC: Do you have to have special approval to import from other countries?

KAB: Yes, we need a permit to import anything.



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SC: Going to the next question, we were asking about dosing and safety. Heparin and cardiovascular medicines were reported by many clinicians; you mentioned issues in adapting the dosages for patients with renal impairment. Is this common in your experience? Do you have this issue also for other medicines, or just the two drugs you mentioned in the survey?

KAB: It is a common problem in intensive care; in our country heparin is available only for adults, but of course we have to use it in children as well. Sometimes we have to search on the Internet for information about heparin dosing.

SC: Thank you. We asked two questions on missing medicines that were not completely understood by responders; the first one was asking about medicines that have already been developed for adults, while the second one was about medicines that are still in development. Did you have issues like other responders, in not understanding these questions?

Also, we realized that while clinicians are completely aware of what is available to use and its issues, it's hard for them to imagine what they would want to be developed.

KAB: Yes, I found these questions difficult to answer as well.

EB: Do you have suggestions on how to improve these questions? Maybe for example by reducing the length?

KAB: Maybe I misunderstood these questions. I don't have any suggestions, I'm sorry.

SC: Talking about extemporaneous preparations, you mentioned three formulations. We had different feedbacks from pharmacists in Europe, some (from the UK) mentioned that they prepare less than 10 extemporaneous formulations in the hospital pharmacy, while another pharmacist from Croatia reported that they prepare much more formulations in their laboratory, from adult medicines. What is your experience? Do you do many different preparations?

KAB: Yes, we produce a lot of solutions, suspensions and powders. Also, our lab is in a different building than the wards so it's complicated, because in the hospital pharmacy they don't have a place for preparations.

EB: Do you prepare the medicines from adult formulations or using active ingredients?

KAB: We have recipes from active ingredients; sometimes we prepare medicines from the original drugs because we can't afford the active ingredients.

EB: Do you use a common pharmacopoeia? Do you share the recipes of your formulations with other centres or other pharmacists, or is it just in your centre?

KAB: We only have local recipes and we don't share them.

EB: That's interesting; we got feedback from other pharmacists, especially one from Croatia, who was asking if other pharmacists were replying to the survey to share their experience and their recipes for some extemporaneous preparations. They reported issues in quality and stability of formulations. She reported that it's the pharmacist who's bearing the burden of quality.



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KAB: I think sharing our experience and knowledge would be really good. Sometimes we try to copy recipes; for example, there is a vehicle named SyrSpend for compounding oral liquids that is too expensive for us, so we try to make a similar version in our lab.

SC: Thank you. Going on to the next question, we asked what are the top 3 formulations that you want to be developed or improved in the future, and like many other respondents you mentioned cardiovascular drugs – especially anti-hypertensives – in liquid form.

EB: You also mentioned calcitriol syrup as a missing formulation, but calcitriol as drops is available in other countries. Just to confirm, it is not available in Hungary and you're not importing it, correct?

KAB: Exactly, it's not available.

SC: You then mentioned many medicines that you would include in the EMLc. Is there one or two that you think are more important than the others you mentioned?

KAB: If I had to choose, I think it would be norepinephrine and dobutamine injection, because they are used in life-threatening situations.

SC: Okay, thank you; I think we're done with your answers to the survey. I was wondering, do you have other suggestions for us on how to improve the survey? For example, you already gave us important feedback, saying that as a pharmacist you don't have much access to information on children acceptability or parents' experiences.

KAB: It would be better to write two different questionnaires for pharmacists and users.

EB: Do you have any feedback on medications that require special attention because of stability that might be a problem in resource-limited settings?

KAB: I don't know, I think that there are a lot of uncertainties. When we prepare suspensions from tablets, we don't really know the stability, we say that it's good for one month but we aren't really certain of it.

EB: When you're thinking about resource-limited settings, do you think we should focus on some particular issues that were not addressed in the survey?

KAB: You should focus on prices: liquid formulations are very expensive, so probably access to them is quite limited. Also here we have this kind of issues, for example we don't have the parenteral formulation of lorazepam because we can't afford it, even though it would be really useful.

EB: That's interesting; we realized that one of the main reasons for gaps in medicine availability is market access, basically because of the prices, and it's important to address this problem.

SC: The survey was disseminated through scientific societies, and we mainly got responses from European healthcare professionals. Do you know any scientific society or research network that



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works in low- and middle-income countries or anyway countries outside of Europe, to broaden our geographic coverage?

KAB: I don't really know, I'm sorry.

EB: No worries. You have already been contacted by TG for the compensation; in about one week we will send you the transcript of this interview. If you have any issues or questions for us, please don't hesitate to send us an email. Have a nice day!



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Interview 8

Date and time		
18/05/2021 18:00-18:45 CET		
Attendants		
AD, EB, SC		
Agenda		
1. Discuss the results of the survey with AD 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1		AD
2	Revise the minutes of the meeting	AD

AD approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

EB: I would like to ask you some details about the responses you gave to the survey. The first question was regarding acceptability, and you mentioned different medications for epilepsy, such as sodium valproate and carbamazepine. You state that they have issues related to taste and after taste and also tablet size: can you give us more insight on this?

AD: Good morning, I'm AD, public health and supply team pharmacist; I work with a humanitarian organization, FHI360, in the north-east of Nigeria. We collaborate with WHO in some projects related to mental health for displaced people, affected by the war. The majority of the drugs that we use are antipsychotics and prescription drugs; there are many children under five years old, and some of them have epilepsy while others have psychiatric illnesses.

Most of the time we come across 200 mg sodium valproate tablets, which, from my experience, are difficult to break and often the breaking is not perfect; we don't have a suspension (I'm not sure if it exists, but in general suspensions are difficult for us to import, transport and store). Most children have problems taking this medicine, sometimes they complain of the taste, so we have to keep on pushing for adherence. Tablets can be compounded in dosages like 50 or 100 mg, so that we can administer them to children according to their weight band and their medical condition; however, due to the nature of our work, we find it difficult to compound, because of lack of time and of a dedicated space. In general, we mostly use adult tablets, even though we're treating children.

EB: Thank you. You are using tablets in children and you're reconstituting them to make suspensions in your pharmacy, correct? Doing an extemporaneous preparation, do you have issues related to stability – like temperature stability - or to the excipients?

AD: Yes, we're reconstituting the tablets into suspensions. We have problems with stability, because of the high temperature in our area and the lack of storage facilities, so when you compound you have to administer the medicine within 24 hours, and then patients have to come



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back again: we work in remote areas, there aren't great facilities. Also, we run a primary care centre with a mental health project, so most of the times patients don't sleep in the facility.

Let me be honest with you: we compound only once in a while, if the need arises or for infants (<6 months), because they can't take tablets and mother find it difficult to give them an accurate dose: most times we just give to the caregivers the medicine and tell them to divide it according to our instructions. Compounding is optimal for young children, younger than 6 months, but when you do you have to compound the minimal dose possible to avoid wasting.

EB: Thank you; so, every time a medicine needs to be administered, they need to come to the ambulatory, that's interesting. Is it the same for ciprofloxacin? You mentioned issues related to taste and tablet size.

AD: We use ciprofloxacin for children with shigellosis (an infection of the gastrointestinal tract), because sometimes we don't have other options. In primary healthcare we work according to the essential medicine list, we are limited to the number of medicines we can use, so sometimes we don't have other choice than to use it, even though is not supposed to be used in children younger than 12 years. Also, some bacteria are only sensible to ciprofloxacin, for example in joint or soft tissue infections: we don't have any option than to use it off label, for children less than 6 years, and most of the times we get results; for shigellosis, they are usually better in 3 days, but they have to complete the treatment of course.

Ciprofloxacin doesn't come as a suspension in Nigeria, just as a tablet, which has a dose of 500 mg (not even 250 mg!). Dividing this tablet according to body weight is something very difficult for young children, that's why the size is an issue. Also, the formulation is for adults, so it's not palatable; when we have to compound for infants, we cannot add sugar and mask the taste. We have to push for adherence, for the caregiver to make sure that their children take the medication: sometimes we will tell them to come back every day and we do direct-observation therapy, because for antibiotics it's very important to be sure of adherence.

EB: I'm wondering, why aren't you instructing the parents to crush the tablets and prepare a suspension?

AD: We work in a humanitarian context, people live in tents and getting clean water is an issue. Also, sometimes parents themselves have mental health issues, so we have to do the best as possible; sometimes we go to their houses to give them the medication ourselves. We try to make it as easy as possible due to the nature of the setting we work in.

EB: As regarding clean water, do you have issues also for other formulations, such as amoxicillin? Is amoxicillin suspension available in your country?

AD: Yes, we have it; even though getting suspensions is generally difficult for us, we can usually get amoxicillin suspension, it's very common. We normally use our water because we have clean water in the clinic, so we shake it and we give it to the parents and tell them to shake it again before giving it. We have more concerns about the caregivers, because they don't always have access to safe water. When we run out of stock of the suspension, we use 250mg dispersible tablets, which can be used for children and even infants.

EB: As regarding the administration of amoxicillin, which device do you usually use? An oral syringe, a metered cup or a normal spoon?



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AD: Amoxicillin suspension comes as a dry powder, which is compounded with clean water; it comes with a cup cap, which is marked at 2.5, 5, 7.5 and 10 ml. Sometimes there are children that need a smaller dose, and in that case, if you have time, you can get a 2ml syringe so that the dose can be accurate; sometimes we just use the cup and tell the parents to fill it up to a certain level. When we use the oral syringe, we give it to the parents and tell them to use warm water after each administration to flush the syringe, so they can reuse it.

EB: Actually, here in Italy we have a similar experience: we have different formulations available but the problem is the administering device, because most of the formulations come with a cup. We have a formulation that comes with an oral syringe but it's not commonly used. I will go on with the second question, regarding usability; you mentioned that sodium valproate preparation is complex for caregivers, but also that you're the ones preparing it. Could you give us more insight?

AD: As I told you earlier, we compound it; sometimes we find the dose calculations to be difficult and time-consuming, it's a complex process to do, especially for a great number of children. Also, you have to document the calculations and have someone confirm it, and only then you can compound. Probably I should have selected determination of the dose instead of complex preparation as an answer.

EB: Thank you. Regarding other medicines that caregivers find difficult to handle, we had some feedbacks from other specialists related to device use, such as medicines for asthma treatment (salbutamol metered dose inhalers, epinephrine) or insulin (which has issues both with device use and determination of the dose). What is your experience related to this?

AD: We work in a limited setting, where most of the products we use are made for adults. We have Ventolin, a regular salbutamol inhaler for adults; what we do for young children that can't use well the inhaler is to compromise and use a plastic water bottle that we cut, and then we show the parents how to use it. We usually get results this way. We don't have epinephrine because it's an emergency injection and we work in a primary care centre.

EB: What about medicines that need to be stored at a determined temperature? Is it an issue in your setting, and are caregivers usually compliant with the storage requirements?

AD: It's an issue actually, because in our setting we have some items that require cold temperatures. We have oxytocin and some lab reagents that we use in our test kit that have to be stored in the fridge. I think these are the two things that we use. For the oxytocin injection, we have a refrigerator in the hospital but it doesn't always work, so what we would do is order only limited stock, that will last us less than one month, to minimize waste and spoilage if the fridge does not work. I read in a journal from MSF that oxytocin injections can be out of the cold chain for one month without losing its efficacy. This is also why we hardly produce suspensions and prefer dispersible tablets, because where we work the average temperature is 40°C. When the suspension is reconstituted, it has to be stored at less than 25°C, and if this is not done the stability can be affected within days; most times, since antibiotic treatment lasts 5-7 days, we tell parents to look for any colour change, precipitation or smell and if they notice it, we tell them to come back to the hospital.



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We avoid cold chain as far as possible; we only do it for oxytocin. We're also pushing to use carbetocin, which is a heat-stable alternative to oxytocin. It's not only in our environment, also in other places in Nigeria electricity and cold chain is not guaranteed. We hardly use insulin.

EB: Thank you; going on to the next question, we were asking about off-label use and you mentioned nortriptyline as used off label because of unapproved indication. What do you use it for?

AD: We use some tricyclic antidepressants off-label for enuresis, in children that are 8-10 years old and still wet their bed; because of the mental health situation in our setting, this is quite common. Its use is off-label both for unapproved indication and age group, since it's only approved for adults. Parents have to give their consent for off-label use: we explain everything to them and they have to fill a form.

EB: Thank you; do you always use a consent form for off-label use?

AD: Yes, we do. We designed an appropriate form to prevent future litigations, even though these are not common in Nigeria; parents have to sign it or use their thumb, if they are illiterate. It's signed by the parents because if the children are younger than 18 years old, they can't make their own decision. The Nigerian government doesn't require it, but it's very important for us. Also, we have to follow up in case of adverse drug reactions, we have a pharmacovigilance unit: we follow up side effects, both new and old, and we report new side effects with an online form to the NAFDAC (the Nigerian regulatory agency). Most of the times we don't have rare side effects, but we have to report them for research purposes and post-market surveillance.

EB: Thank you for sharing, I worked previously in pharmacovigilance so I know what you mean related to all the forms to fill etcetera. Let's go on to the next question, related to dosing and safety. Other experts mentioned antibiotics like vancomycin and gentamicin as raising concerns, especially in neonates, and also insulin, both for dosing and changing dosing regimens. Do you have the same problems?

AD: We use gentamicin, but we don't have vancomycin. In Nigeria we had gentamycin 280mg/2ml vials, but it was later banned because of the indiscriminate use and the reported side effects on kidneys and ears. There were many reported cases of overdosing in children, because when you use 280 mg there's a high risk to overdose. Now we have the 160mg/2ml ampules and 80mg/2ml ampules. We have experience with it because it's a broad-spectrum antibiotic and we use it in sepsis and in UTIs (like pyelonephritis). For dosing, we have experienced nurses that take their time to calculate the dose; to be on the safer side, we avoid using it in very low-weight neonates, because from my experience using it in low-weight neonates that are less than 2 weeks old is not safe, because of side effects, as indicated by the manufacturer. Two years ago, we recruited a new nurse and we lost two babies because of an overdose; after that, we avoid using gentamicin for unexperienced nurses. Sometimes we try to go for ceftriaxone (?), which has a wider margin of safety than gentamicin, even though it can cause deposition of calcium in the kidneys. Gentamicin is used for all the neonates that have better weights; only experienced nurses are allowed to use it for sepsis and other broad-spectrum infections in neonates.

EB: Thank you. Related to safety and dosing, what's your experience regarding dosing challenges in malnourished children?



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AD: In the clinic we also run a nutrition program. With malnourished children, we try to be on the safer side and use the minimal effective dose: most antibiotics have a dose range, so we try to use the lower dose. Sometimes however malnourished children over- or under-dose: we don't have the technology to monitor drug levels, so we just give the drug according to assumptions and based on clinical presentation. Malnourished children have lower protein levels, especially albumin, they have a different absorption and, since they don't have adipose tissue, drugs distribute differently. For these reasons, the way they react to drugs might be different from normal children; when giving them a regular dose, we might see a higher response because of different protein binding, but sometimes we get no response at all to the treatment. We do a collaboration teamwork between the health team, the nutrition team and the pharmacist. We keep monitoring the patients based on signs and symptoms, we use assumptions and our experience and this way we tend to be successful.

EB: Okay thank you. Is it the pharmacist that follows the patients related to the medication? Don't you have for example other healthcare professionals such as nurses?

AD: We mostly use our pharmacist assistants and nurses; nurses are involved as well in therapeutic monitoring, follow-up and adherence, but in the team, pharmacists are the key when it comes to drug therapy. Doctors had a more central role, but because of their experience they are very busy with emergencies; pharmacists, that are less busy, can leave the dispensing activities to other trained staff and dedicate their time more to therapy and drug monitoring, adherence and pharmacovigilance.

EB: Do you need to have a pharmacy degree to sell medicines at the local pharmacy – not in the hospital?

AD: No, you don't need a licence. Pharmacy is evolving, from industry to the hospital, and now it's more clinical, focused on therapies and research. Less clinical activities are left for other staff, like pharmacist technicians that do a 2 years program and can compound and dispense when being guided; even some trained nurses can. This way the pharmacist has more time in monitoring the drug response and doing pharmacovigilance.

EB: Thank you. I will go on to the question asking about formulations that are clearly missing, to which you did not answer; was it too difficult?

AD: I think it was because of time constraints or network issues, since I work in the field. There are definitely preparations for children that we need. Like I told you, for example, we use ciprofloxacin tablets for children even though they are not recommended for children below 12 years and may lead to tendon damage. We use it because the benefits outweigh the risks. Due to the work I'm doing, most of the formulations also have stability issues. Also, there are a lot of formulations available for adults and not for children, I don't know if it's due to our location or the country I come from – you know, development, importation etc may be relevant factors.

EB: Thank you, I'm actually asking about this because we did not get many responses to this question and we felt like it was too difficult. It's difficult to ask someone to imagine the new medicine that you want to be formulated, usually clinicians are aware of what they have but not of what they could have.



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Now we are reviewing the survey and simplifying the questions, so I would like to ask you if you have any feedback on how we can improve the survey, especially if we missed something related to the EML itself or to specific issues in LMIC (like access to safe water or stability issues that you mentioned).

AD: Maybe I can think about it more and respond later, but I think the survey is not too difficult, the questions are very clear, self-explanatory, except for the last ones where you have to type; it's easier to pick if you have options. If the questions are very open, I have to think.

I'm wondering if organisations or companies can, instead of making a drug in a suspension that has stability issues, make it as an oval or round formulation that is like a collapsible package, that can be administered 1-2 times a day; chewable or dispersible tablets are also a good option. For the caregivers it would be very easy to administer. Also, suspensions should be made as smaller packages so that the mother can just press it on the tongue. If most medications can be made like that, then I think it would be easier to come in any container or package.

EB: That's really interesting; we are doing just a part of a bigger project, and we're trying to assess the gaps perceived by healthcare workers. Other parts are related to developing better formulations, also related to dosing; they're especially working in medications that are not available for children or not available in LMIC, and they are taking into consideration different aspects, such as the ones you mentioned, like stability and taste. They're collaborating with partners that have been developing excipients to reduce bitterness and improve acceptability. And this is important not only for LMIC, but also high-income settings, because for example amoxicillin is bitter everywhere.

SC: I would like to ask if you know any scientific society or research network that we could contact to distribute the next survey, especially working in your country or other African countries.

AD: There is this Indian company, the Empower school of Health, collaborating with Kent State University in the US; they have an office in Geneva and in India. They have anything you may need in terms of medicines: consultants, supply chain, IT, logistic management and even distribution and storage. I am one of their student counsellors. I can send them an email and copy you or send you their email so you can communicate directly, I think they can support you.

EB: Thank you very much, that would help a lot. The interview is now over, we will send you the transcript so you can review it and maybe we can add some questions; if something came up to your mind after this interview, please send us an email. TG will be in touch for the compensation. It was very nice to meet you, let's keep in touch.



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Interview 9

Date and time		
26/04/2021 12:30-13:15		
Attendants		
CB, MLL Lallemand, EB, SC		
Agenda		
1. Discuss the results of the survey with CB 2. Get inputs on how to improve the questions for the next survey		
Actions		
#	Actions	Owner
1	Contact WHO for the call for experts for the EMLc	EB
2	Revise the minutes of the meeting	CB

CB: approves the registration of this meeting, both audio and video; the registration will be permanently deleted at the end of GAP-f/EMLc project, on 30th November 2021.

CB: I thought it might help if I started by introducing myself. So, I'm CB, and until the end of MLLh I have been, for 9 years, the Chief Pharmacist at the Alder Hey Children's Hospital in Liverpool. I'm also a member of the Paediatric Medicine expert Advisory Group (PMEAG) of the Medicines and Healthcare Regulatory Authority (the MHRA) and I'm continuing to stay in that group. I have been the past chair of the joint Standing Committee on Medicines between the Royal College of Paediatrics and Child Health and Neonatal and Paediatric Pharmacists Group (NPPG), which is the only joint group with pharmacists and clinicians; I'm continuing on the board of the Medicines for children project but not as chair of the committee. My career in paediatrics has spanned over 36 years, I was born and brought up at the Alder Hey under Tony Nunn (some of you may know him, I think he still has some involvement in Europe, and he was my predecessor).

I've had some previous experience of WHO EML and also with HIV antiretroviral dosing: in 2006 we looked at standardized dosing of combination products and how we might manipulate solid dose forms to provide age-appropriate dosages for children, essentially weight-bounded doses for HIV. Later in 2011, we made a contribution to the EML as well from Alder Hey. So, I do understand PENTA and the clinical trials environment that they work in and I have a relevant background. I am pleased to be able to help.

EB: Thank you very much, that's quite impressive. I'm a pharmacist by training, I just finished my PhD mainly focused on antimicrobial resistance and antimicrobial stewardship, I'm currently working as a postdoc fellow at the University of Padova, which is in the northeast of Italy. I am a consultant for PENTA for this project related to the EMLc.

SC: I'm SC and I'm a doctor, I recently graduated and I'm a consultant as well for PENTA on this project, while doing some other pharmacoepidemiology projects as well.

EB: We decided to reach out to you because you gave quite impressive responses to the survey. We would like to have a chat about the responses you gave and also to have your feedback on the



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answers of other respondents, if you were able to have a look at the executive summary that we sent you.

CB: I don't think I've had the summary. Do you want to try and resend that? Whichever is easiest for you.

EB: I will send it again; maybe it's easier if we start from your responses and then look at the executive summary.

The first question was regarding acceptability. We realized that one point we did not touch in the survey was medicines used with medical devices, such as medicines for the respiratory tract or for example insulin. What do you think about the acceptability of medicines used together with a medical device?

CB: I think that could be particularly important actually; some products may be device-dependent on both the delivery and on their dosing as well, so I think including devices is an important thing to do.

EB: Do you think we should pay particular attention to medical devices in low- and middle-income countries? What do you think would be the issues in this setting in particular?

CB: What's interesting to me is that I would actually regard some medical devices as medicines. In the UK - I don't know how widely marketed this particular product is - there is a product called PosiFlush: it's 0.9 sodium chloride and it's intended for flushing intravenous catheters or cannulas. It is a medical device, but essentially it replaces a medicine in the UK, because we would have used ampoules of sodium chloride 0.9 for intravenous injection to flush our cannula. Now, with the advent of PosiFlush into the market, we have a medical device not regulated in the same way as a medicine, but yet used in place of a medicine to maintain the patency of catheters. I think there may be one or two more products of that nature which may be available in the UK market in the future, but perhaps in other markets too, and I don't know how they compare cost-wise. I suspect they are more expensive than the injection which, of course, may be a restriction for your resource-limited settings. In terms of safety, the company would argue that you're removing the risk of needle-stick injuries and the need for needles and other consumables because the product is ready to use and doesn't require anybody to draw it up and measure it. It depends on the nature of the healthcare service delivery: if you're using non-qualified or non-regulated individuals to deliver some of your health care services (so not nurses, doctors or pharmacists), they could use PosiFlush to flush the cannula, whereas they couldn't actually draw an injection and administer it in the UK. We use healthcare assistants to provide some of these products, particularly if they've had cannulation training.

I appreciate that may be different in different settings, so I think they've got a place, but I worry that the cost may be prohibitive for some of the resource-limited settings.

EB: What do you think of the use of medical devices to administer oral formulations, such as spoons instead of oral syringes? Do you think it would be interesting to address this when asking about acceptability?

CB: Oral syringes are routinely used in the UK and certainly if you're talking about doses smaller than 5 ml then really they are imperative; also, thanks to a global safety initiative we've moved to a system where those oral syringes can be connected appropriately to enteral feeding setups but



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not to intravenous setups. Syringes certainly have got an important place when you're measuring very small doses, for neonates and infants in particular. Also, you have to consider the variable size of syringes; we usually use 5 ml, 3 ml and 1 ml syringes. I think if you don't use the 1 ml syringe (and we still have to do it sometimes), you're in danger of having to do manipulations to get a measurable dose of injectable products, but also oral products in some cases. I think the preference is to have the right devices available where needed, particularly for small doses, to try and avoid having to do any sort of manipulation to get a measurable dose. This is relevant particularly if you're using people who aren't qualified healthcare professionals, which may be the case in some of the resource-limited clinical settings, for example.

EB: Talking about caregivers' usability: you mentioned temozolomide, an anticancer medicine, saying that there's no licensed liquid formulation in the UK. Why did you mention this particular medicine?

CB: I suppose because that's one of the ones we have most experience of in our own practice. It's quite commonly used in brain tumour settings in clinical trials across the UK and possibly wider. Temozolomide would be a common component of those clinical trials, but without providing a liquid formulation, we have to treat the patients on the protocol but outside of the trial. Also, I think it's commonly used in the palliative management of brain tumours: at the end of the line, when there is no further formal treatment, temozolomide is used to maintain a reasonable quality of life for the patient. Again, if we're not able to offer it in a liquid formulation that's a challenge, not just based on the age of the patient, but potentially on the capability of the patient to swallow as their disease progresses. It's the one that we've seen most manipulated into liquid formulation in the UK.

EB: Talking about off-label use, you mentioned LMWH is used with unapproved indication. What is the unapproved indication?

CB: The use of LMWH is widely established in adult orthopaedic surgery as a prophylaxis, and we're seeing increasing use of LMWH in orthopaedic surgeries in children. The license however doesn't include children, so we often see it used off label; there is some dosage guidance in the British National Formulary for children.

The choice of LMWH is somewhat dependent on the available assays in the different hospitals, but it seems that it's largely enoxaparin and dalteparin, and some centres use tinzaparin as well. I think enoxaparin is more widely used. Again, I think there's some value in using it, perhaps in resource-limited settings where you don't have to do the same degree of monitoring as you would with unfractionated heparin in terms of APTT etc.

Just to add to that as well, I think you know patients and families can be taught to self-inject LMWH, so again another advantage over the intravenous unfractionated heparin.

For children, the use is off-label and we don't have many patients who receive it at home by self-injecting but it certainly would be possible, if you think that patients can be trained to administer subcutaneous insulin; certainly, families can be trained if the child isn't old enough.

EB: One question of the survey was regarding extemporaneous formulation, and we realized that one of the most mentioned medicines prepared extemporaneously is omeprazole, which you did not mention. How is omeprazole marketed in the UK?



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CB: We use omeprazole extensively in the UK and have done for many years, and before it was even licensed to use in children, we were using it off label. We now have a commercially available omeprazole suspension in the UK, which is why I didn't include it as off label use. We use it for a wide age range. On the other hand, there's quite a bit of interest in the excipients in the omeprazole suspension because it's been brought to market in 2 strengths in the UK, one intended for under six and one intended for over six (I may not be correct on those age ranges). Ideally, from a dose volume point of view, we would prefer to use a higher strength for the smaller patients to minimize the dose volume. The manufacturers are telling us that that's off license because it's only marketed for the older age group; they're also suggesting that some of the phosphate buffering within the component might be lost if we started to take smaller volumes than the intended doses. We haven't been able to confirm that, but it's certainly been a topic of conversation that's happening at the moment in the UK.

Because of the pan-european withdrawal of ranitidine, which has happened over the last 18 months or so, we need to be very careful not to move directly from ranitidine to omeprazole, but to either consider firstly de-prescribing, since it's a good opportunity for review of somebody's gastroesophageal reflux disease, and then to explore other H2-antagonists as well, things like Nizatadine off label use. There are some concerns around that, since we're seeing issues in adults with omeprazole like low magnesium and osteoporosis. I wonder whether we are storing up problems for the future in children if we have this very open approach to using omeprazole, which really does seem to be given out in very significant amounts in the UK, to quite young children.

EB: Thank you; we can now discuss the executive summary. I will share my screen.

The first box is regarding acceptability: the most mentioned medicines were anti-infectives, pain-relievers, captopril, omeprazole and prednisolone. The issues were mainly related to taste and after taste, volume of liquid to swallow and size of tablets. Do you have any comments, seeing these medicines mentioned?

CB: Certainly, in the ones you've mentioned clindamycin, flucloxacillin and clarithromycin are the ones that stand out the most to me.

We don't regard paracetamol as having a problem in terms of taste: it's usually quite pleasant in the UK brands that we can get. There are dispersible tablets available as well in the UK, not just solid dose form so if you're at a dose of 500 mg or 1 g you can obviously use the dispersible tablets. Regarding prednisolone, we certainly recognize that to be an unpleasant tasting dispersible tablet; there was a lot of work in the UK to look at cost-improvement plans around prednisolone, because since the standard 5 mg solid dose form is dispersible, not soluble, a number of people were suggesting that if you disperse it in water for administration you couldn't take a proportional dose because it's not soluble. The taste and also the texture are very off putting. We've actually done some work at the hospital looking at acceptability of prednisolone through our colleagues in the paediatric medicines research unit, I could certainly share that with you, if you'd be interested. We've also looked at the oral liquid prednisolone formulations available which are reported to be better tasting, I think they are orange-flavoured; again, they subjected those to paediatric taste-panels to get a view on the acceptability.

EB: Talking about orange flavour, Augmentin (amoxiclav) in Italy is not marketed for children under six years of age just in the specific orange flavour, because it has excipients that shouldn't be used in children. In the Italian market it is not possible to use some excipients for children that might improve the taste.



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Just so you know, we got responses mainly from Italy, UK and generally the European Union; in Italy, paracetamol drops are super bitter and that might explain these results.

CB: That's interesting; we tend not to use the paracetamol drops in the UK, largely because of the risks of overdose and incorrect dosing with them. In the UK we tend to use oral suspension of 120mg/5ml or 250 mg/5ml.

EB: Talking about caregivers' usability, the most mentioned medicines were antibiotics, insulin and omeprazole. The main reason reported for poor usability was the complex preparation. Do you have any feedback regarding other issues, like storage requirements, need for a vehicle or problematic packaging, especially in LMIC?

CB: Clearly, once reconstituted many antibiotics need fridge storage, which in itself could be a particular problem. Just looking at your list of cardiovascular medicines: sildenafil is now available as a commercial product in the UK (in a concentration of 10mg/1ml), which would be very difficult to measure without oral syringes, so the consumables that you were talking about before. It does have a long shelf life because it's commercially formulated, it is licensed for children from one year upwards and it's stored at room temperature. So that has some advantages and some disadvantages associated with it for resource-limited settings: advantages in terms of storage, but disadvantages in terms of measurement of dose. Salbutamol is an interesting one, are you referring just to inhaler technique?

EB: Also to the intratracheal administration in neonates.

CB: I think that's another medicine where the dosing is completely unclear as well, isn't it? We don't have a NICU at the hospital since we're not a maternity hospital, our neonates tend to be surgical neonates who are largely full term, with reasonable weights and otherwise well, apart from the surgical intervention.

EB: The next question was related to off-label use. As you mentioned, sildenafil is used off label quite often, as well as antihistamines, antibiotics and ondansetron. Do you have any feedback on this?

CB: Certainly sildenafil poses a problem: we did actually use a an extemporaneous product, (I can't quite remember now the strength of the extemporaneous preparation) but we felt it was a risk to have two formulation strengths available in a single hospital, possibly in the same ward, so we took the decision to withdraw the extemporaneous formulation and everybody was switched over to the commercial formulation. So, because it's only licensed for one year upwards, we're using it off label in neonates.

I haven't seen carvedilol used so much.

Amiodarone and flecainide pose problems from an extemporaneous point of view as well, so we make those extemporaneously.

I'm not sure about the use of antihistamines, unless you're referring to H2 receptor antagonists rather than H1.

EB: Some primary care paediatricians reported the use of antihistamines to help patients fall asleep.



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CB: Perhaps they're using promethazine in some of the intensive care settings; I see that us in our older intensive care patients, but I'm not seeing special care baby population so I'm not able to comment on that one.

We certainly use as off label steroids and ciprofloxacin; posaconazole not so much, but we're doing a large piece of work at the moment on antifungal stewardship in the organization and I don't know whether, in due course, we might see more of that. At the moment we're using more caspofungin and micafungin rather than posaconazole, and that may be on the basis of cost.

When talking about dosing and safety, if we talk about therapeutic drug monitoring there are two issues: the cost of doing it and getting people to do it correctly, which is really quite challenging.

EB: The last question we would like your feedback on is related to extemporaneous preparations. The most mentioned medicines were omeprazole, cardiovascular medicines (this may be biased because we approached cardiovascular paediatric scientific societies and we got quite a few responses from them), ranitidine, corticosteroids, levothyroxine and phenobarbital.

CB: Like I just mentioned, omeprazole is now commercially available in the UK. Similarly, we've got spironolactone, propranolol, enalapril and furosemide commercially available. We tend not to formulate anything; we'd rather use a licensed product off label or an unlicensed special. Sometimes when we needed extemporaneous preparations in the department, we would contact medicines manufacturers and specials unlicensed medicines manufacturers, who are authorized by the MHRA and have special licenses to produce products on our behalf. There's a number of those available in the UK.

Levothyroxine is an interesting one, I think there's a commercially available liquid there.

We still use phenobarbital as an unlicensed special, we don't extemporaneously prepare it in the pharmacy, largely because we want to use the 50mg/5ml strength with no alcohol in it, while the commercially available product is 15mg/5ml and contains alcohol. On both counts that's undesirable, both because of the alcohol content and also because of the strength, that makes the dose volume quite considerable.

More of those than you might imagine we have available as commercial formulations in the UK, either as licensed products or as unlicensed specials. Extemporaneous compounding is probably restricted to about 10 common medicines.

EB: Oh okay, here actually pharmacists prepare lots of medicines extemporaneously, especially cardiovascular medicines.

CB: I'm not sure if it's already available through WHO, but for sure there is a need for an extemporaneous formulary for how to prepare these things through a standardized method, using simple but standardized suspending agents or dilution vehicles.

EB: We actually got some feedback on this, because there is a lack of an international paediatric formulary. There are different projects to prepare this international formulary, but there are some problems related to excipients' marketing in different countries.

Our last question is regarding how we can improve the survey. We realized that some of the questions were quite tricky, especially those where we were getting feedback on the medicines that the respondents would like to be developed for children.

Also, we sent the survey throughout different scientific society.



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CB: Just in terms of your circulation of the actual survey, I can't remember how I picked it up; was it through the Neonatal and Paediatric Pharmacists Group or the EuPFI? Probably I picked it up from the EuPFI, through Catherine Tuleu. Are you asking in terms of how you'd improve the survey or how you'd extend the coverage?

MLL: Both.

CB: Okay; I think the Neonatal and Pediatric Pharmacists Group would be the obvious group; you've got your PENTA group as well. I believe that, if you hadn't done that, going to the Royal College of paediatrics and child health would also be sensible; they have the standing committee on medicines, and they would have a particular reach to clinicians.

I'm not sure how you captured nurses' perspectives, because that would also seem to me quite important; it would strike me that, as those who administer medicines most commonly, they would have very valuable comments on ease of administration, measurability, acceptability by children. Have you captured many nurses in your survey?

EB: We were able to capture just a couple of nurses from Norway. I tried to reach out to paediatric nurses in the USA without any response.

CB: I'm not familiar with the wider network for nursing staff in the way that I am with pharmacists, but one of the ways might be through the specialist children's hospitals that exists; did you go to Great Ormond Street Hospital, Alder Hey, Sheffield? Through the chief pharmacist of those organizations, you could ask them to distribute it to the nurses within those organizations. I would stick with the standalone children's hospitals, there are four in the UK that that you could reach out to, and that would give you at least a population of paediatric nurses that are regularly dealing with children's medicines and only children's medicines.

EB: Thank you for your feedback and your suggestion. Do you think that the same survey can apply to nurses or should we restrict the question just to acceptability and usability?

CB: I think that if you start talking about extemporaneous formulations or off label to nursing staff there will be a smaller number for whom that will be understandable; it is around acceptability and measurability where you'll get your best responses from the nursing staff.

EB: In the next survey we would like to collect information from LMIC, since the EML is mainly applicable to these countries, because in high income countries there is an expanded list that includes more formulations because of the market access. Is there any way we could change the questions to make them more appropriate for LMIC?

CB: You might need to add some complementary questions; perhaps if you have a list of products that you think are extemporaneously prepared, you should ask whether in fact those are available as commercial formulations or as specially manufactured formulations.

Your extemporaneous question in particular would provoke different responses from certain Western countries, where they've got access to special unlicensed formulations and they're not doing extemporaneous preparation within the pharmacy itself.

EB: What about malnourished children, or children in treatment for HIV? Should we address issues like drug interactions?



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CB: I think it depends what other resources your users have got access to; clearly, if they've got limited resources, then those things won't be addressed because they wouldn't be able to access the resources that have that information. It may be very important, but why not include the interactions of other medicines? Cardiovascular medicines for example, which could be quite significant, particularly talking about long QT syndrome, etc. I think it's difficult when you try to simply limit to just talk about interactions with those particular products, when you're talking about products outside of your specialist area. If you could signpost people to other sources of information around interactions etc, there's a very good resource on the Tropical school of the University of Liverpool website around interactions for antiretrovirals, or at least it used to be. I don't have a lot to do with HIV, because we don't have many patients. In Liverpool, we were really lucky many years ago in spite of having a large number of intravenous drug users, because we operated a syringe exchange scheme through our Community pharmacies. As the consequence of that, we were able to limit the number of drug abusers that developed HIV and so subsequently we don't have large numbers of children who are affected by maternal transmission.

EB: Thank you. MLL, do you have any questions?

MLL Lallemand: No, but I think it was a very helpful conversation; maybe when you'll share the transcripts other ideas will come to mind, which may be things which are missing in this report. This was the first survey, which is mainly focused on UK, Italy and Spain. If things come to mind, please do not hesitate to add to this to make it richer. It's very good that you've been involved with the EML work, because you understand immediately where we come from.

CB: Certainly, I'd be very happy to continue to be involved in this agenda or in fact the bigger EML agenda if there's an opportunity to do that, in spite of having retired I'm still an advocate for children's medicines and access to medicines so I'd be very happy to collaborate or be involved.

EB: I think that in a couple of weeks WHO will send out a call for experts to review the EML; if you want, we can ask when will this call be open, it could be interesting. It's not part of this project, but if you want to participate in this conversation with other experts, you have a really interesting background and you already have the right mindset to address the conversation.

CB: I'd be really interested if you could let me have the details of that or pass my name to somebody.

Can I just say thank you very much for your absolutely excellent English, I am always incredibly embarrassed when I join any international groups at the finesse with which my colleagues speak English and I'm afraid I'm barely fluent in any other language, I speak a little French. Thank you very much indeed.

EB: Thank you very much. As regarding the compensation, I don't know if you were already contacted by TG, the PM of the project, but I can double check if she has already sent you the email with the document to fill out. If you have any problems, please just email gap-f@pentafoundation.org. In around one week we will send the minutes, if you have any comments just write us an email and we'll be happy to reply. Thank you very much.



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REDcap online survey template

Paediatric formulation gap survey

We thank you for agreeing to participate in our survey!

Our first objective is to collect your personal experience with medicines for children in your field of expertise, identifying gaps in the paediatric formulations that you think are the most important.

You can save the survey and come back to it at any time.

If you would like to know more about the WHO **Global Accelerator for Paediatric Formulation (GAP-f)**, please click [here](#).

Before starting the survey, we need your consent to process your data in compliance with Regulation (EU) 2016/679 General Data Protection Regulation (GDPR) and the Legislative Decree n. 196 of 30 June 2003 "Personal data protection Code" (please read the Privacy Notice). Do you agree?

(Please note, if you do not give your consent, you will not be able to take part in the survey.)

- Yes
- No

First Name

Last Name

Email address

Country where you are working (Drop-down list)

Please indicate if you are collaborating or conducting work/research in another region/country

Do you work mainly in the hospital or the primary care setting?

- Hospital
- Primary care

Please indicate your specialty

- Pharmacist
- Medical Doctor
- Nurse



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Please indicate your sub-specialty or specify the clinical fields in which you practice

- Allergy and immunology
- Cardiology
- Dermatology
- Ear-Nose-Throat specialist
- Emergency medicine
- Endocrinology
- Gastroenterology
- General paediatrics
- Infectious diseases
- Intensive care
- Neonatology
- Nephrology
- Neurology
- Nutrition
- Onco-haematology
- Psychiatry
- Pulmonology
- Surgery
- Other _____

In your practice, what are the medicine classes you prescribe/deal with the most?

Please tick all that apply from the list.

For your information, we have listed the medicines classes as per WHO EMLc



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Please select at least three paediatric formulations that you find problematic and provide the

reasons. [ONLY FOR MEDICAL DOCTORS, repeated 7 times (3 compulsory and 4 optional)]

1) Medicine (drop down list with general name)

Formulation:

- Tablet
- Capsule
- Oral liquid
- Parenteral preparations
- Rectal preparations
- Preparation for inhalation
- Topical
- Other _____

Main reasons – please tick all that apply:

- **Poor acceptability** – children find it difficult to take
 - Taste/aftertaste
 - Tablet/capsule size
 - High volume of liquid for a single dose
 - Numerous daily administrations
 - Texture/appearance/smell
 - Complexities in using the device (i.e., respiratory device, insulin pump)
 - Other – please specify _____
- **Difficulties in handling by parents**
 - Complex preparation (i.e., problematic suspension reconstitution)
 - Determination of the dose
 - Need for a vehicle (i.e., soft food or liquid/water)
 - Problematic administration device (i.e., respiratory device)
 - Problematic packaging opening/closing
 - Need to be stored at a specific temperature
 - Other _____
- **Off-label use**
 - Unapproved indication
 - Unapproved age group
 - Unapproved dosage
 - Unapproved route of administration
- **Dosing and safety issues**
 - Discrepancies between dosing guidelines
 - Very wide range of dose across age/weight bands
 - Lack of PK evidence for dosing regimen
 - Lack of safety data
 - Narrow therapeutic index
 - Requirement for therapeutic drug monitoring
 - Frequent dosing errors (i.e., the formulation is too concentrated)
 - Other _____



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- **Use in special situations** (such as malnourished patients or children with comorbidities)
 - Lack of indication for specific use
 - Lack of safety data
 - Lack of specific dosing guidelines
 - Drug-drug interaction
 - Lack of PK data
 - Medication burden (the child is taking too many medicines daily)
 - Other _____

Other specifications: if you selected off-label use or special situations as issues, please provide further explanation



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Please select at least three paediatric formulations that you find problematic and provide the reasons. [ONLY FOR PHARMACISTS, repeated 7 times (3 compulsory and 4 optional)]

1) Medicine (drop down list)

Formulation:

- Tablet
- Capsule
- Oral liquid
- Parenteral preparations
- Rectal preparations
- Preparations for inhalation
- Topical
- Other _____

Main reasons – please tick all that apply:

- **Requirement for extemporaneous preparation:** The formulation is prepared
 - Starting from the active ingredients and excipients
 - Modifying the adult formulation
- **Concerns regarding reconstitution and stability**
 - Access to clean water for formulation reconstitution
 - Unclear or too complex label instructions
 - Numerous steps required for reconstitution
 - Need for dilution to enable the correct dose to be accurately measured
 - Problematic stability (i.e. flocculation, rapid deterioration/oxidation)
 - Other – please specify _____
- **Off-label use**
 - Unapproved indication
 - Unapproved age group
 - Unapproved dosage
 - Unapproved route of administration
- **Use in special situations** (such as malnourished patients or children with comorbidities)
 - Lack of indication for specific useLack of safety data
 - Lack of specific dosing guidelines
 - Drug-drug interaction
 - Lack of PK data
 - Medication burden (the child is taking too many medicines daily)
 - Other _____

Other specifications: if you selected off-label use or special situations as issues, please provide further explanation



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Please name at least three paediatric formulations that you find problematic and provide the

reasons. [ONLY FOR NURSES, repeated 7 times (3 compulsory and 4 optional)]

1) Medicine (drop down list)

Formulation:

- Tablet
- Capsule
- Oral liquid
- Parenteral preparations
- Rectal preparations
- Preparations for inhalation
- Topical
- Other _____

Main reasons – please tick all that apply:

- **Poor acceptability** – children find it difficult to take
 - Taste/aftertaste
 - Tablet/capsule size
 - High volume of liquid for a single dose
 - Numerous daily administrations
 - Texture/appearance/smell
 - Complexities in using the device (i.e., respiratory device, insulin pump)
 - Other _____
- **Usability issues**
 - Complex preparation (i.e., problematic suspension reconstitution)
 - Need for dilution to enable the correct dose to be accurately measured
 - Determination of the dose
 - Need for a vehicle (i.e., soft food or liquid/water)
 - Problematic administration device (i.e., respiratory device)
 - Problematic packaging opening/closing
 - Need to be stored at a specified temperature
 - Other – please specify _____
- **Other issues - please specify** _____



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Missing formulations - What are the paediatric formulations that are clearly missing? [FOR EVERYONE, repeated 5 times]

Please give three examples and indicate the reason(s).

1) Medicine (drop down list)

Formulation:

- Tablet
- Capsule
- Oral liquid
- Parenteral preparations
- Rectal preparations
- Preparations for inhalation
- Topical
- Other _____

Formulation strength (if relevant) _____

Reasons – please tick all that apply

- Only available as adult formulation (i.e. tablet, capsules)
- Not licensed in my country
- Only available in the private sector
- Overly expensive
- Not available in my setting because it's not in institution's drug formulary
- Not available in my setting because of frequent shortages
- Other – please specify _____

If you have any other comments on missing formulations or related issues, please write them here

Can we contact you to further discuss some of the shortcomings you have noted?

- Yes
- No

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Table 1a. Physicians societies contacted

Society name	Country/area
Afghan Pediatric Association	Afghanistan
Egyptian Pediatric Society	Egypt
Iranian Society Of Pediatrics	Iran
Jordan Pediatric Society	Jordan
Lebanese Pediatric Society	Lebanon
Pediatric Society Palestine	Palestine
Sudan Association of Paediatricians	Sudan
Italian-Arabic Pediatric Society	Italy-Arab countries
Societe Beninoise de Pediatrie	Benin
Pediatric Society of Burkina Faso	Burkina Faso
Cambodian Pediatric Association	Cambodia
Societe Camerounaise de Pediatrie	Cameroon
Societe Congolaise de Pediatrie	Congo
Society Pediatric Congo Democratique Republic	DRC
Association des Pédiatres d'Afrique Noire Francophone	Francophone Africa
Societe Haitienne de Pediatrie	Haiti
Societe de Pediatrie du Laos	Laos
Association Nigerienne de Pediatrie	Niger
Societe Senegalaise de Pediatrie	Senegal
Societe Togolaise de Pediatrie	Togo
Vietnam Pediatric Association	Vietnam
Pediatres du Monde	Global
Societe Algerienne de Pediatrie	Algeria
Libyan Pediatric Society	Libya
Societe Marocaine de Pediatrie	Morocco
Societe Tunisienne de Pediatrie	Tunisia
Sociedade Angolana de Pediatria	Angola
Sociedade Brasileira de Pediatra	Brasil
Sociedad Argentina de Pediatra	Argentina
Sociedad Boliviana de Pediatria	Bolivia
Sociedad Colombiana de Pediatra	Colombia
Asociacin Costarricense de Pediatra	Costa Rica
Sociedad Cubana de Pediatra	Cuba
Sociedad Ecuatoriana de Pediatra	Ecuador
Asociacion de Pediatria de El Salvador	El Salvador
Asociacion Pediatrica de Guatemala	Guatemala
Honduran Pediatric Association	Honduras
Asociacion Mexicana de Pediatria	Mexico
Confederacion Nacional de Pediatria de Mexico	Mexico
Sociedad Nicaragense de Pediatra	Nicaragua
Sociedad Paraguaya de Pediatria	Paraguay
Sociedade Peruana de Pediatria	Peru
Philippine Pediatric Society	Philippines
Sociedad Dominicana de Pediatra	Republica Dominicana
Sociedad Venezolana de Puericultura y Pediatra	Venezuela
Sociedad Latino Americana de Cuidados Intensivos Pediatricos	Latin America
Asociación Latinoamericana de Nefrología Pediátrica (ALANEPE)	Latin America
Latin American Thorax association (ALAT)	Latin America
Sociedad Latinoamericana de Emergencias Pediátricas (SLEPE)	Latin America
Red de Investigacion y Desarrollo de la Emergencia Pediatrica Latinoamerica (RIDEPLA)	Latin America

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Latinamerican Society for Pediatric Gastroenterology, Hepatology and Nutrition (LASPGHAN)	Latin America
Paediatric Association of Jamaica	Jamaica
PATS pediatric working group	Africa
Kenya Paediatric Association	Kenya
Latin American Pediatric Association	Latin America
Malaysian Paediatric Association	Malaysia
Myanmar Pediatric Society	Myanmar
Paediatric Association of Nigeria	Nigeria
Zambia Paediatric Association	Zambia
Sociedad Mexicana de Neurologia Pediatrica	Mexico
International Association for Child and Adolescent Psychiatry and Allied Professions	International
International Society for Pediatric and Adolescent Diabetes (ISPAD)	Global
Commonwealth Association of Paediatrics Gastroenterology and Nutrition (CAPGAN)	Commonwealth
Asia Pacific Association of Allergy, Asthma and Clinical Immunology (APAAACI)	Asia
Paediatric Cardiac Society of South Africa	South Africa
Pediatric Emergency Research Networks (PERN)	Global
ASPAE (African Society for Pediatric and Adolescents Endocrinology)	Africa
Asian Pan-Pacific Society for Pediatric Gastroenterology, Hepatology and Nutrition (APPSPGHAN)	Asia
Pan-Arab Society for Paediatric Gastroenterology, Hepatology and Nutrition (PASPGHAN)	Panarab
Federation of International Societies of Pediatric Gastroenterology, Hepatology and Nutrition (FISPGHAN)	Global
Albanian Pediatric Society	Albania
Armenian Pediatric Association	Armenia
APPA (Asia Pacific Pediatric Association)	Asia
Bangladesh Pediatric Association	Bangladesh
Botswana Pediatric Association	Botswana
Chinese Pediatric Society, Chinese Medical Association	China
Ethiopian Pediatric Society	Ethiopia
Paediatric Society of Ghana	Ghana
The Indian Academy of Pediatrics	India
Indonesian Pediatric Society	Indonesia
Pediatric Society of Republic Kosovo	Kosovo
Malawi Pediatric Association	Malawi
Mongolian Academy of Pediatrics	Mongolia
Association of preventive pediatrics of Montenegro	Montenegro
Nepal Paediatric Society	Nepal
Pakistan Paediatric Association	Pakistan
Union of Paediatricians of Russia	Russia
Paediatric Association of Serbia	Serbia
South African Paediatric Association	South Africa
Sri Lanka College of Paediatricians	Sri Lanka
Association of Pediatric Surgeons, Anesthesiologists, and Reanimatologists the Republic of Tajikistan	Tajikistan
Paediatric Association of Tanzania	Tanzania
Pediatric Society of Thailand	Thailand
Paediatric Association of The Gambia	The Gambia
Turkish National Pediatric Society	Turkey
Turkish Pediatric Association	Turkey
Uganda Paediatric Association	Uganda
Association of Ukrainian Pediatricians	Ukraine
Uzbekistan Pediatric Association	Uzbekistan
Paediatric Association of Zimbabwe	Zimbabwe
African Paediatric Nephrology Association (AFPNA)	Africa
Asian Pediatric Nephrology Association (AsPNA)	Asia



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International Pediatric Nephrology Association (IPNA)	Global
Turkish Child Neurology Association	Turkey
Pediatric and Child Health Association (PACHA)	Malawi
International Society of Tropical Pediatrics	International
UNICEF - Copenhagen	Global
Foundation for Advancement of International Medical Education and Research	Global
International Society of Pediatric Dermatology	Global
World Federation of Associations of Pediatric Surgeons	Global
National Neonatology Forum of India	India
United South African Neonatal Association	South Africa
Sociedad IBEROAMERICANA de Neonatología	Latin America
VIETNAM INSTITUTE OF APPLIED MEDICINE	Vietnam
Perinatal Society of Cambodia	Cambodia
Angkor Hospital for Children	Cambodia

Table 2a. Family medicine physician societies contacted

Society name	Country
Chinese Society of General Practice	China
Cross-Straits Medicine Exchange Association Committee of International and Premium Medicine	China
Fiji College of General Practitioners	Fiji
Indonesian Association of Family Physicians	Indonesia
Indonesian Society of Teachers in Family Medicine	Indonesia
Japan Primary Care Association	Japan
Korean Academy of Family Medicine	Korea
Academy of Family Physicians of Malaysia	Malaysia
Family Medicine Specialist Association of Malaysia	Malaysia
Mongolian Association of Family Medicine Specialists	Mongolia
Philippine Academy of Family Physicians	Philippines
College of Family Physicians Singapore	Singapore
Chinese Taipei Association of Family Medicine	Taiwan
Royal Australian College of General Practitioners	Australia
Royal New Zealand College of General Practitioners	New Zealand
The General Practitioners/Family Physicians Association of Thailand	Thailand
The Hong Kong College of Family Physicians	Hong Kong
Academy of Family Physicians of India	India
Bangladesh College of General Practitioners	Bangladesh
College of Family Medicine Pakistan	Pakistan
College of General Practitioners of Sri Lanka	Sri Lanka
Federation of Family Physicians' Associations of India	India
Indian Medical Association College of General Practitioners	India
Pakistan Society of Family Physicians, Lahore	Pakistan
Association of General and Private Medical Practitioners of Nigeria	Nigeria
College of Primary Care Physicians of Zimbabwe	Zimbabwe
Kenya Association of Family Physicians	Kenya
Medcamer Family Medicine	Cameroon
National Postgraduate Medical College of Nigeria, Faculty of Medicine	Nigeria
South African Academy of Family Physicians	South Africa
Rural Doctors Association of Southern Africa	South Africa
The Society of Family Physicians of Ghana	Ghana
WONCA Africa Region	Global
Wonca Asia Pacific region	Asia
Association of General Practitioners of Russian Federation	Russia
Armenian Association of Family Physicians	Armenia
<i>Association of Doctors of General Practice/Family Medicine of North Macedonia</i>	North Macedonia
Association of Family Physicians of Kosovo	Kosovo



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Association of Family Physicians of Republic of Srpska	Bosnia and Herzegovina
Association of Family Physicians of the Federation of Bosnia & Herzegovina	Bosnia and Herzegovina
<i>Bulgarian General Practice Society for Research And Education</i>	Bulgaria
Family Group Practice and Nurses Association of Kyrgyzstan	Kyrgyzstan
Georgia Family Medicine Association	Georgia
Israel Association of Family Physicians	Israel
Kazakhstan Association of Family Physicians	Kazakhstan
Public Organization National Association of Family Medicine Staff of Tajikistan	Tajikistan
Serbian Medical Association / Section of General Practice	Serbia
Turkish Association of Family Physicians	Turkey
Ukrainian Family Medicine Association	Ukraine
<i>Caribbean College of Family Physicians</i>	Caribbean
Brazilian Society of Family and Community Medicine	Brasil
Federacion Argentina de medicina familiar y general	Argentina
Chilean Society of Family Medicine	Chile
Colombian Society of Family Medicine	Colombia
Sociedad Cubana de Medicina Familiar	Cuba
Sociedad Boliviana de Medicina Familiar	Bolivia
Costa Rican Association of Specialists in Family and Community Medicine	Costa Rica
Sociedad Dominicana de Medicina Familiar y Comunitaria	Dominican Republic
Sociedad Ecuatoriana de Medicina Familiar	Ecuador
Mexican Federation of Family Medicine Specialists and Residents	Mexico
Nicaraguan Association of Family Medicine	Nicaragua
Panamanian Association of Family Medicine	Panama
Paraguayan Society of Family Medicine	Paraguay
Peruvian Society of Family and Community Medicine	Peru
Salvadorean Family Physicians Association	El Salvador
Uruguayan Society of Family and Community Medicine	uruguay

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Table 3a. Nurses societies contacted

Society name	Country
Bahrain Nursing Society	Bahrain
Egyptian Nurses Syndicate	Egypt
Iranian Nursing Organization	Iran
Order of Nurses in Lebanon	Lebanon
Oman Nursing Association	Oman
Palestinian Nursing and Midwifery Association	Palestine
Saudi Nurses Association	Saudi Arabia
Emirates Nursing Association	United Emirates
Association Professionnelle des Infirmiers/ères du Burkina	Burkina Faso
Ordre National des Infirmiers de la RDC	DRC
Association Nationale Française des Infirmières et Infirmiers Diplômés et des Étudiants (ANFIIDE)	France
Association Nationale des Infirmières et Infirmiers d'État du Sénégal	Senegal
Rwanda Nurses and Midwives Union (RNMU)	Rwanda
Nurses Association of the Republic of Seychelles	Seychelles
Association Marocaine des Sciences Infirmières et Techniques Sanitaires	Morocco
Nursing Council Of Angola (ORDENFA)	Angola
Ordem dos enfermeiros	Angola
Conselho Federal de Enfermagem	Brasil
Federación Argentina de Enfermería	Argentina
Colegio de Enfermeras de Chile	Chile
Asociación Nacional de Enfermeras de Colombia	Colombia
Colegio de Enfermeras de Costa Rica	Costa Rica
Sociedad Cubana de Enfermería	Cuba
Colegio Dominicano de Profesionales de Enfermería	Dominican Republic
Federación Ecuatoriana de Enfermeras/os	Ecuador
Asociación Nacional de Enfermeras de El Salvador	El Salvador
Asociación Guatemalteca de Enfermeras Profesionales	Guatemala
Colegio de Profesionales de Enfermería de Honduras	Honduras
Colegio Nacional de Enfermeras	Mexico
Federación Mexicana de Colegios de Enfermería	Mexico
Asociación de Enfermeras Nicaragüenses	Nicaragua
Asociación Nacional de Enfermeras de Panamá	Panama
Asociación Paraguaya de Enfermeras	Paraguay
Colegio de Enfermeros del Perú	Perù
Philippine Nurses Association	Philippines
Colegio de Enfermeras del Uruguay	Uruguay
Nursing and Midwifery council of Nigeria	Nigeria
Myanmar Nurse and Midwife Association	Myanmar
Association Suisse des Infirmières/Infirmiers	Switzerland
Malaysian Nurses Association	Malaysia
Sierra Leone Nurses Association	Sierra Leone
Nurses and Midwives Association of Slovenia	Slovenia
Sri Lanka Nurses Association	Sri Lanka
Association nationale des infirmiers/ères du Togo	Togo
Uganda Nurses & Midwives Union	Uganda
Zambia Union of Nurses Organization	Zambia
Turkish Nurses Association	Turkey
Tanzania National Nurses' Association	Tanzania
Lithuanian Nurses Association	Lithuania
American Nurses Association	USA

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Australian College of Nursing	Australia
Colegio de Enfermeras de Bolivia	Bolivia
Norwegian Nurses Organisation	Norway
East Timor Nurses Association	East Timor
Collegi d'Infermeres i Llevadores d'Andorra	Andorra
Österreichischer Gesundheits- und Krankenpflegeverband	Austria
Nurses Association of the Commonwealth of the Bahamas	Bahamas
Bangladesh Nurses Association	Bangladesh
Barbados Nurses Association	Barbados
Fédération Nationale des Infirmières de Belgique (FNIB)	Belgium
Nurses Association of Belize	Belize
Bermuda Nurses' Association	Bermuda
Botswana Nurses Union	Botswana
Bulgarian Association of Health Professionals in Nursing	Bulgaria
Canadian Nurses Association	canada
Chinese Nursing Association	China
Cook Islands Nurses Association	Cook Islands
Croatian Nurses Association	Croatia
Cyprus Nurses and Midwives Association	Cyprus
Danish Nurses' Organization	Denmark
Eritrean Nurses Association	Eritrea
Estonian Nurses Union	Estonia
Swaziland Nursing Association	Swaziland
Ethiopian Nurses Association	Ethiopia
Finnish Nurses Association	Finland
National Association of Gambia Nurses & Midwives	Gambia
DBfK -Bundesverband	Germany
Ghana Registered Nurses and Midwives Association	Ghana
Ghana college of nurses and midwives	Ghana
Hellenic National Nurses Association	Greece
Grenada Nurses Association	Grenada
Guyana Nurses Association	Guyana
College of Nursing Hong Kong	Hong Kong
Icelandic Nurses Association	Iceland
Indian Nursing Council	India
Persatuan Parawat Nasional Indonesia	Indonesia
Irish Nurses and Midwives Organisation	Ireland
National Association of Nurses in Israel	Israel
Consociazione Nazionale delle Associazioni Infermiere-Infermieri	Italy
Nurses Association of Jamaica	Jamaica
Japanese Nursing Association	Japan
Jordan Nurses and Midwives Council	Jordan
National Nurses association of Kenya	Kenya
Korean Nurses Association	Korea
Kuwait Nursing Association	Kuwait
Lesotho Nurses Association	Lesotho
Liberia Nurses Association	Liberia
Association Nationale des Infirmiers & Infirmières du Luxembourg	Lusembourg
Nurses Association of Macau	Macau
National Organisation of Nurses and Midwives of Malawi	Malawi
Malta Union of Midwives & Nurses	Malta
Mauritius Nursing Association	Mauritius
Association nationale des infirmières de Monaco	Monaco
Mongolian Nurses Association	Mongolia
National Association of Nurses and Midwives of Montenegro	Montenegro
Namibian Nursing Association	Namibia



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Nursing Association of Nepal	Nepal
Nieuwe Unie'91 -NU' 91	Netherlands
New Zealand Nurses' Organisation	New Zealand
North Macedonian Nurses and Midwives Association	North Macedonia
Pakistan Nurses Federation	Pakistan
Polskie Towarzystwo Pielęgniarskie	Poland
Ordem dos Enfermeiros	Portugal
Romanian Nursing Association	Romania
The Order of Nurses, Midwives and Medical Assistants in Romania	Romania
Russian Nurses Association	Russia
Samoa Registered Nurses Association	Samoa
Associação Nacional dos Enfermeiros y parteiros de São Tomé e Príncipe	Sao Tomé e Príncipe
Association of Health Workers of Serbia	Serbia
Singapore Nurses' Association	Singapore
Solomon Islands Nurses Association	Solomon Islands
Somaliland Nursing and Midwifery Association	Somaliland
Democratic Nursing Organization of South Africa	South Africa
South Sudan Nurses and Midwives Association	South Sudan
Consejo General de Enfermería de España	Spain
St. Lucia Nurses Association	St Lucia
Suriname Nurses Association	Suriname
Joint Virtual Swedish Nurse Organisation-for international work	Sweden
Taiwan Nurses Association	Taiwan
Nurses Association of Thailand	Thailand
Tonga Nurses Association	Tonga
Trinidad & Tobago Registered Nurses Association	Trinidad and Tobago
Zimbabwe Nurses Association	Zimbabwe
Asia Pacific Paediatric Nurses Association	Asia
World Federation of Critical Care Nurses	Global
Council of International Neonatal Nurses (COINN)	Global
North American Nursing Diagnosis Association (NANDA)	Global
International Family Nursing association	Global
International Council of Nursing	Global

Table 4a. Pharmacists/pharmaceutical societies contacted

Society name	Country
Emirates Medical Association: Emirates Pharmacy Society	Arab emirates
Lebanese order of Pharmacists	Lebanon
Syndicate of Iraqi Pharmacists	Iraq
Jordan Pharmacists Association	Jordan
Conseil National de l'Ordre des Pharmaciens de Côte d'Ivoire	Côte d'Ivoire
Conseil National de l'Ordre des Pharmaciens de la République Démocratique du Con	DRG
Conseil National de l'Ordre des Pharmaciens du mali	Mali
National Council of Pharmacists in Cameroon	Cameroon
Ordre National des Pharmaciens de Madagascar	Madagascar
Ordre national des Pharmaciens de la République du Congo	Congo
Ordre National des Pharmaciens du Burkina Faso	Burkina Faso
Ordre National des Pharmaciens du Tchad	Tchad
Pharmaceutical Association of Mauritius	Mauritius
Pharmaceutical Society of Sierra Leone	Sierra Leone
Syndicat National des Pharmaciens Praticiens Hospitaliers et Universitaires	France
Vietnam Young Pharmacists Association	Vietnam
Conseil National de l'Ordre des Pharmaciens d'Algérie,	Algerie
Conseil national de l'Ordre des pharmaciens du Burundi	Burundi
Ordre des pharmaciens du Cambodge	Cambodia
Ordre national des pharmaciens, médecins, chirurgiens-dentistes et biologistes médicaux des Comores	Comores
Ordre national des pharmaciens du Gabon	Gabon
Conseil national de l'Ordre des pharmaciens de Guinée	Guinée
Association des pharmaciens d'Haïti,	Haiti
Conseil national de l'Ordre des Médecins, Chirurgiens-dentistes et Pharmaciens Niger	Niger
Ordre des pharmaciens de Nouvelle-Calédonie	Nouvelle-Calédonie
Ordre des pharmaciens du République Centrafricaine	Central Africa Republic
Ordre des pharmaciens du Rwanda	Rwanda
Ordre des Pharmaciens du Sénégal	Senegal
Conseil national de l'Ordre des pharmaciens du Togo	Togo
Ordre national des Médecins, Pharmaciens et Chirurgiens-dentistes - Section des pharmaciens de Mauritanie	Mauritanie
Fédération Algérienne de Pharmacie	Algerie
Liberia Pharmacy Board	Liberia
Conseil national de l'Ordre des pharmaciens du Maroc	Maroc
Conseil national de l'Ordre des pharmaciens de Tunisie	Tunisie
Colegio de Farmacéuticos de Costa Rica	Costa Rica
Colegio de Químicos Farmacéuticos y Bioquímicos Farmacéuticos de Pichincha	Bolivia
Confederación Farmacéutica Argentina	Argentina
Farmaceuticos sin Fronteras Argentina	Argentina



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Sociedad Boliviana de Ciencias Farmaceuticas	Bolivia
Asociación de Química y Farmacia del Uruguay,	Uruguay
Colegio Nacional de Farmacéuticos de Panamá,	Panama
Colegio Nacional de Químicos Farmacéuticos de Colombia,	Colombia
FEDERACION FARMACEUTICA SUDAMERICANA	Global
Cyprus Turkish Pharmacist Association	Turkey
Brazilian Federal Council of Pharmacy	Brazil
Community Pharmacy Owner Syndicate	Yemen
Philippine Pharmacists Association	Philippines
Rwanda National Pharmacy Council	Rwanda
Japan Pharmaceutical Association	Japan
All-Ukrainian Pharmaceutical Chamber	Ukraine
Afghanistan Nationwide Pharmacists Association	Afghanistan
Association of Community Pharmacists of Nigeria	Nigeria
Association of Mongolian Pharmacy Professionals	Mongolia
Bangladesh Pharmaceutical Society	Bangladesh
Academy of Pharmaceutical Sciences of Brazil,	Brazil
Chamber of Pharmacists of the Federation of Bosnia & Herzegovina	Bosnia & Herzegovina
Chinese Pharmaceutical Association	China
Ethica Independent Pharmacies Association	Jordan
Ethiopian Pharmaceutical Association	Ethiopia
Indian Association of Colleges of Pharmacy	India
Indian Pharmaceutical Association	India
Indonesian Pharmacist Association	Indonesia
Iranian Association of Pharmaceutical Scientists	Iran
Japanese Society of Hospital Pharmacists	Japan
Kosova Chamber of Pharmacists	Kosovo
Malaysian Pharmaceutical Society	Malasya
Moscow Pharmaceutical Society	Russia
National Association of Hospital Pharmacists of Romania	Romania
National College of Pharmacists	India
Nepal Pharmaceutical Association	Nepal
Pakistan Pharmacists Association	Pakistan
Pharmacy Graduates' Association of Pakistan	Pakistan
Pharmaceutical Chamber of Macedonia	Macedonia
Pharmaceutical Chamber of Montenegro	Montenegro
Pharmaceutical Chamber of Serbia	Serbia
Pharmacy Council, Ghana	Ghana
Pharmaceutical Society of Kenya	Kenya
Pharmaceutical Society of Korea	Korea
Pharmaceutical Society of South Africa	South Africa
Pharmaceutical Society of Tanzania	Tanzania



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Pharmaceutical Society of Sri Lanka	Sri Lanka
Pharmaceutical Society of Zambia	Zambia
Pharmaceutical Society of Uganda	Uganda
Pharmaceutical Society of Zimbabwe	Zimbabwe
Pharmacists Order of Albania	Albania
Japanese Society of Pharmaceutical Sciences	Japan
Pharmaceutical Society of Japan	Japan
Arab Association of Pharmacy Progress	Panarab
ReMed	Francophone countries
Association de Pharmacie Galénique Industrielle	Francophone countries
Indian pharmacist Association	India
Farmaceutsko društvo Republike Srpske	Bosnia
Pharmaceutical Society Of Kenya	Kenya
Türk Eczacıları Birliği	Turkey
FSF - Farmacien sans frontières	Global
African chapter FIP	Africa
Western Pacific Pharmaceutical Forum	West Pacific
National Pharmaceutical Association of the South East Asian Region (SEAR) Pharm Forum	South Asia
Pharmaceutical Forum of the Americas	America

Figure 1a. Map of the countries where the respondents practice weighted by the number of medicines mentioned in the survey.

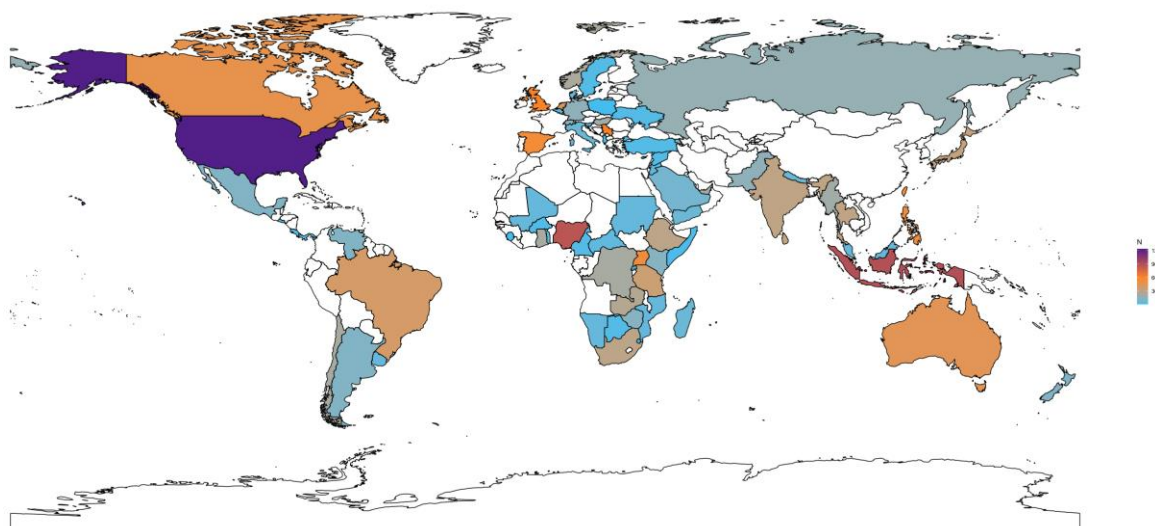


Figure 2a. Map of the countries where physicians responding to the survey practice.

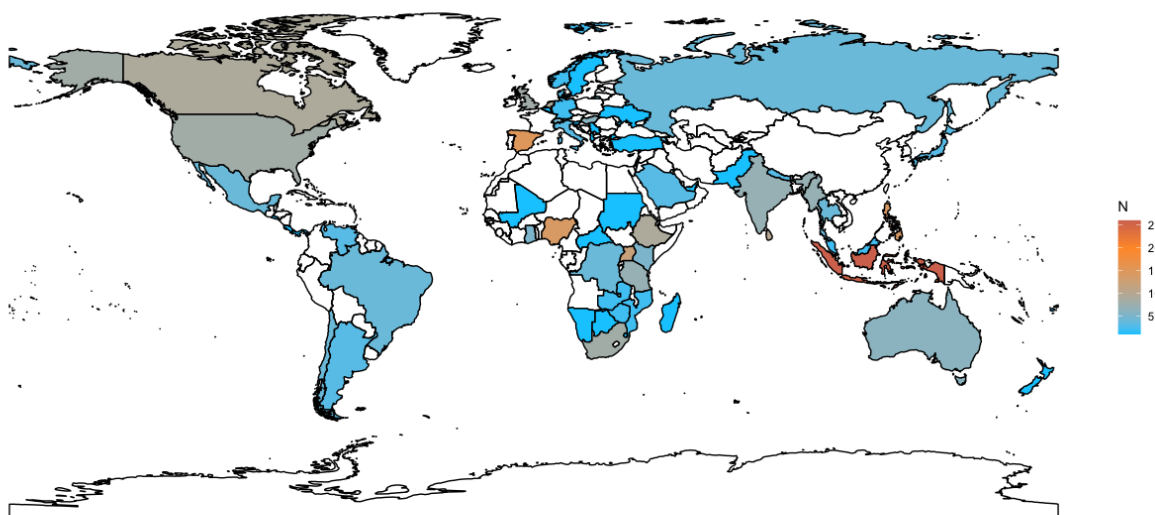


Figure 3a. Map of the countries where nurses responding to the survey practice.

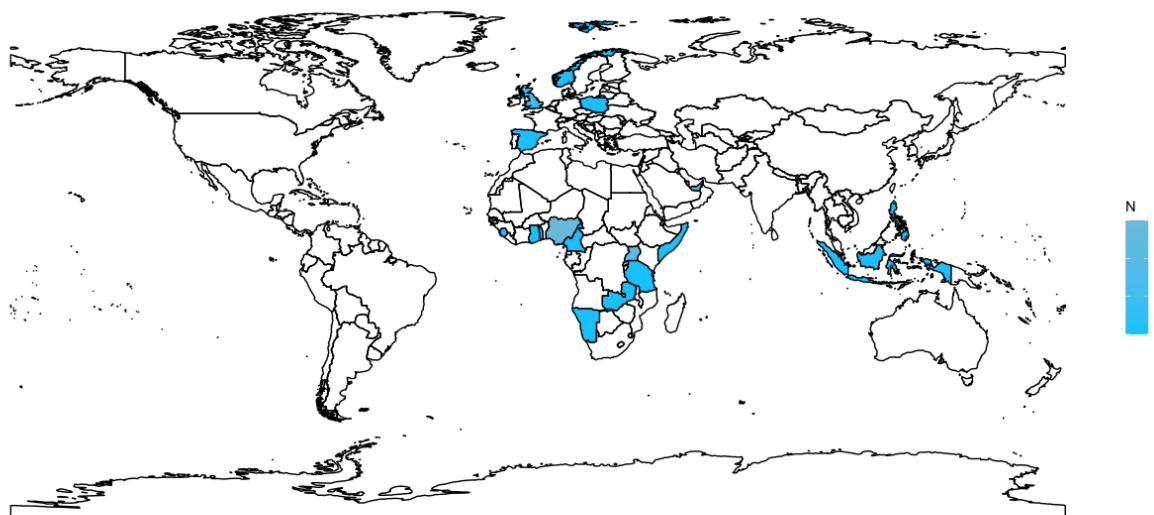
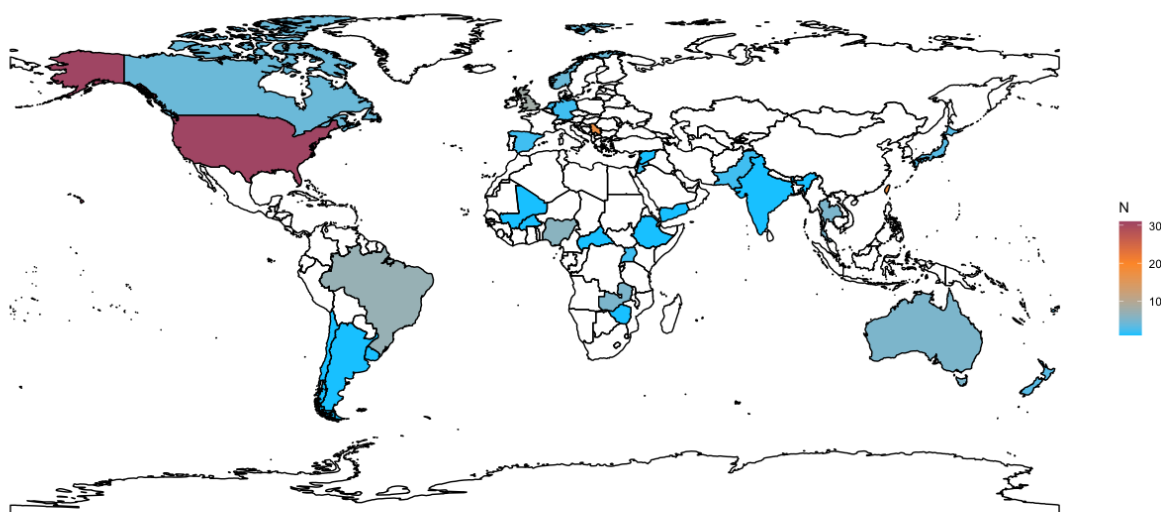


Figure 4a. Map of the countries where pharmacists responding to the survey practice.



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Table 5a: Problematic products as reported by physicians. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Formulation									Acceptability	Usability	Off-label use	Dosing issue	Special utilization
		tablet	oral liquid	parenteral preparation	capsule	preparation for inhalation	rectal preparation	topical	dispersible tablet	other					
Overall	933	346 (37)	291 (31)	170 (18)	66 (7)	37 (4)	8 (0.9)	8 (0.9)	4 (0)	3 (0.7)	424 (45)	223 (24)	111 (12)	335 (36)	95 (10)
lopinavir + ritonavir	41	11 (27)	22 (54)	-	4 (10)	-	-	-	2 (5)	2 (5)	33 (80)	17 (41)	-	4 (10)	2 (5)
clindamycin	21	4 (19)	11 (52)	-	6 (27)	-	-	-	-	-	17 (81)	1 (5)	1 (5)	4 (19)	-
salbutamol	21	1 (5)	1 (5)	1 (5)	-	17 (81)	-	1 (5)	-	-	5 (24)	12 (57)	-	6 (29)	2 (10)
cefuroxime	19	-	18 (95)	1 (5)	-	-	-	-	-	-	16 (84)	2 (11)	-	1 (5)	1 (5)
ciprofloxacin	18	8 (44)	6 (33)	2 (11)	2 (11)	-	-	-	-	-	11 (61)	5 (28)	4 (22)	5 (28)	3 (17)
omeprazole	18	5 (28)	5 (28)	-	8 (44)	-	-	-	-	-	10 (56)	11 (61)	2 (11)	6 (33)	2 (11)
amoxicillin	17	4 (24)	9 (53)	-	3 (18)	-	-	-	1 (6)	-	7 (41)	6 (35)	2 (12)	3 (18)	2 (12)
furosemide	17	13 (77)	3 (18)	1 (6)	-	-	-	-	-	-	6 (35)	5 (29)	-	9 (53)	-
amoxicillin + clavulanic acid	16	3 (19)	12 (75)	1 (6)	-	-	-	-	-	-	6 (38)	6 (38)	-	6 (38)	-
acetaminophen	15	1 (7)	12 (80)	1 (7)	-	-	1 (7)	-	-	-	7 (47)	2 (13)	-	10 (67)	2 (13)
prednisolone	15	11 (73)	4 (27)	-	-	-	-	-	-	-	14 (93)	1 (7)	-	1 (7)	-
digoxin	14	9 (64)	3 (21)	2 (14)	-	-	-	-	-	-	3 (21)	4 (29)	2 (14)	12 (86)	1 (7)
flucloxacillin	12	-	12 (100)	-	-	-	-	-	-	-	11 (92)	-	-	2 (17)	-



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isoniazid	12	6 (50)	6 (50)	-	-	-	-	-	-	-	8 (67)	2 (17)	1 (8)	5 (42)	2 (17)
acyclovir	11	8 (73)	-	2 (18)	1 (9)	-	-	-	-	-	4 (36)	5 (45)	1 (9)	3 (27)	-
isoniazid + pyrazinamide + rifampicin + etambutol	11	10 (91)	1 (9)	-	-	-	-	-	-	-	5 (45)	7 (64)	-	2 (18)	-
abacavir + dolutegravir + lamivudine	10	8 (80)	1 (10)	-	1 (10)	-	-	-	-	-	4 (40)	3 (30)	1 (10)	5 (50)	3 (30)
azithromycin	10	2 (20)	6 (60)	1 (10)	1 (10)	-	-	-	-	-	8 (80)	1 (10)	2 (20)	2 (20)	1 (10)
metronidazole	10	2 (20)	7 (70)	-	1 (10)	-	-	-	-	-	8 (80)	-	1 (10)	-	1 (10)
valproicacid	10	2 (20)	5 (50)	-	3 (30)	-	-	-	-	-	4 (40)	3 (30)	-	4 (40)	2 (20)
caffeine	9	1 (11)	6 (67)	2 (22)	-	-	-	-	-	-	-	3 (33)	1 (11)	4 (44)	3 (33)
cloxacillin	9	-	5 (56)	3 (33)	1 (11)	-	-	-	-	-	5 (56)	1 (11)	-	2 (22)	1 (11)
sildenafil	9	6 (67)	2 (22)	1 (11)	-	-	-	-	-	-	2 (22)	4 (44)	3 (33)	3 (33)	-
amphotericinb	8	-	-	8 (100)	-	-	-	-	-	-	2 (25)	2 (25)	-	6 (75)	3 (38)
gentamicin	8	-	-	8 (100)	-	-	-	-	-	-	-	-	-	6 (75)	1 (13)
methotrexate	8	6 (75)	-	2 (25)	-	-	-	-	-	-	6 (75)	-	1 (13)	3 (38)	-
vancomycin	8	-	1 (12.5)	7 (88)	-	-	-	-	-	-	1 (13)	-	-	7 (88)	-
benzylpenicillin	7	-	-	7 (100)	-	-	-	-	-	-	7 (100)	2 (29)	-	1 (14)	-
captopril	7	6 (86)	1 (14)	-	-	-	-	-	-	-	4 (57)	2 (29)	-	1 (14)	-
ceftriaxone	7	-	1 (14)	6 (86)	-	-	-	-	-	-	1 (14)	1 (14)	2 (29)	3 (43)	-
clarithromycin	7	-	7 (100)	-	-	-	-	-	-	-	7 (100)	-	-	-	-
dexamethasone	7	3 (43)	2 (27)	2 (27)	-	-	-	-	-	-	4 (57)	1 (14)	1 (14)	2 (29)	1 (14)
levothyroxine	7	7 (100)	-	-	-	-	-	-	-	-	1 (14)	-	2 (29)	4 (57)	-
methylprednisolone	7	5 (71)	1 (14)	1 (14)	-	-	-	-	-	-	3 (43)	1 (14)	-	1 (14)	1 (14)

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valaciclovir	7	5 (71)	2 (27)	-	-	-	-	-	-	-	6 (86)	1 (14)	-	1 (14)	-
abacavir + lamivudine	6	6 (100)	-	-	-	-	-	-	-	-	3 (43)	2 (29)	2 (29)	2 (29)	1 (14)
abacavir + lamivudine + zidovudine	6	6 (100)	-	-	-	-	-	-	-	-	2 (33)	1 (17)	-	4 (67)	-
artemether + lumefantrine	6	5 (83)	1 (17)	-	-	-	-	-	-	-	2 (33)	4 (67)	-	2 (33)	-
budesonide	6	-	1 (17)	-	-	4 (67)	-	1 (17)	-	-	3 (50)	3 (50)	-	3 (50)	-
clobazam	6	4 (67)	-	1 (17)	1 (17)	-	-	-	-	-	2 (33)	4 (67)	1 (17)	-	-
hydrocortisone	6	4 (67)	-	1 (17)	-	-	-	1 (17)	-	-	3 (50)	2 (33)	-	-	1 (17)
hydroxyurea	6	-	-	-	6 (100)	-	-	-	-	-	1 (17)	2 (33)	-	2 (33)	1 (17)
ibuprofen	6	1 (17)	5 (83)	-	-	-	-	-	-	-	2 (33)	2 (33)	-	4 (67)	-
methylphenidate	6	5 (83)	-	-	1 (17)	-	-	-	-	-	3 (50)	1 (17)	1 (17)	-	2 (33)
phenobarbital	6	2 (33)	-	4 (67)	-	-	-	-	-	-	2 (33)	3 (50)	1 (17)	1 (17)	1 (17)
phenoxymethylpenicillin	6	1 (17)	4 (67)	1 (17)	-	-	-	-	-	-	5 (83)	2 (33)	-	1 (17)	-
prednisone	6	2 (33)	3 (50)	-	-	-	1 (17)	-	-	-	5 (83)	2 (33)	-	2 (33)	-
spironolactone	6	4 (67)	2 (33)	-	-	-	-	-	-	-	2 (33)	2 (33)	-	3 (50)	-
trimethoprim + sulfamethoxazole	6	-	4 (67)	-	1 (17)	1 (17)	-	-	-	-	2 (33)	-	1 (17)	2 (33)	2 (33)
aminophylline	5	1 (20)	-	4 (80)	-	-	-	-	-	-	1 (20)	2 (40)	3 (60)	3 (60)	2 (40)
epinephrine	5	-	-	5 (100)	-	-	-	-	-	-	-	1 (20)	-	4 (80)	-
isoniazid + pyrazinamide + rifampicin	5	4 (80)	1 (20)	-	-	-	-	-	-	-	3 (60)	1 (20)	-	2 (40)	-
mebendazole	5	2 (40)	3 (60)	-	-	-	-	-	-	-	2 (40)	2 (40)	-	1 (20)	-
albendazole	4	4 (100)	-	-	-	-	-	-	-	-	3 (75)	1 (25)	1 (25)	2 (50)	1 (25)
artesunate + amodiaquine	4	4 (100)	-	-	-	-	-	-	-	-	3 (75)	2 (50)	-	1 (25)	-

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azathioprine	4	4 (100)	-	-	-	-	-	-	-	-	2 (50)	-	1 (25)	1 (25)	-
chloramphenicol	4	1 (25)	1 (25)	-	2 (50)	-	-	-	-	-	2 (50)	1 (25)	2 (50)	1 (25)	2 (50)
colistin	4	-	-	3 (75)	-	1 (25)	-	-	-	-	1 (25)	-	-	3 (75)	-
diazepam	4	-	-	1 (25)	-	-	3 (75)	-	-	-	-	-	-	4 (100)	-
doxycycline	4	2 (50)	1 (25)	1 (25)	-	-	-	-	-	-	-	-	3 (75)	1 (25)	1 (25)
esomeprazole	4	2 (50)	2 (50)	-	-	-	-	-	-	-	1 (25)	2 (50)	1 (25)	1 (25)	-
ethambutol	4	2 (50)	2 (50)	-	-	-	-	-	-	-	2 (50)	1 (25)	-	3 (75)	-
ethosuximide	4	-	2 (50)	-	2 (50)	-	-	-	-	-	2 (50)	-	-	2 (50)	-
ganciclovir	4	1 (25)	-	2 (50)	1 (25)	-	-	-	-	-	1 (25)	-	-	2 (50)	1 (25)
griseofulvin	4	2 (50)	2 (50)	-	-	-	-	-	-	-	1 (25)	-	-	2 (50)	-
levofloxacin	4	3 (75)	-	1 (25)	-	-	-	-	-	-	3 (75)	2 (50)	1 (25)	2 (50)	-
linezolid	4	3 (75)	1 (25)	-	-	-	-	-	-	-	2 (50)	1 (25)	1 (25)	2 (50)	-
nitrofurantoin	4	1 (25)	2 (50)	-	1 (25)	-	-	-	-	-	4 (100)	-	-	1 (25)	-
phenytoin	4	1 (25)	1 (25)	1 (25)	1 (25)	-	-	-	-	-	-	1 (25)	-	3 (75)	-
quinine	4	1 (25)	1 (25)	2 (50)	-	-	-	-	-	-	2 (50)	1 (25)	-	2 (50)	-
ritonavir	4	1 (25)	2 (50)	-	1 (25)	-	-	-	-	-	3 (75)	2 (50)	-	-	1 (25)
tacrolimus	4	2 (50)	1 (25)	-	1 (25)	-	-	-	-	-	1 (25)	2 (50)	1 (25)	3 (75)	-
adalimumab	3	-	-	3 (100)	-	-	-	-	-	-	1 (33)	1 (33)	-	1 (33)	1 (33)
amlodipine	3	3 (100)	-	-	-	-	-	-	-	-	2 (67)	1 (33)	-	-	-
ampicillin	3	-	-	3 (100)	-	-	-	-	-	-	-	-	-	1 (33)	1 (33)
atomoxetine	3	3 (100)	-	-	-	-	-	-	-	-	1 (33)	1 (33)	-	1 (33)	-



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baclofen	3	3 (100)	-	-	-	-	-	-	-	-	-	1 (33)	-	1 (33)	1 (33)
carbamazepine	3	3 (100)	-	-	-	-	-	-	-	-	1 (33)	1 (33)	-	2 (67)	1 (33)
ceftazidime	3	-	-	3 (100)	-	-	-	-	-	-	1 (33)	-	-	1 (33)	1 (33)
chloroquine	3	2 (67)	1 (33)	-	-	-	-	-	-	-	3 (100)	1 (33)	1 (33)	2 (67)	1 (33)
corticotropin	3	-	-	3 (100)	-	-	-	-	-	-	1 (33)	2 (67)	1 (33)	1 (33)	2 (67)
cyclosporine	3	1 (33)	-	-	2 (67)	-	-	-	-	-	2 (67)	-	-	-	1 (33)
dexmedetomidine	3	-	-	3 (100)	-	-	-	-	-	-	-	-	3 (100)	1 (33)	-
dolutegravir + lamivudine	3	3 (100)	-	-	-	-	-	-	-	-	1 (33)	-	-	2 (67)	1 (33)
enalapril	3	3 (100)	-	-	-	-	-	-	-	-	1 (33)	1 (33)	-	2 (67)	-
ferrous gluconate	3	1 (33)	2 (67)	-	-	-	-	-	-	-	2 (67)	-	-	1 (33)	-
ferrous sulfate anhydrous	3	-	3 (100)	-	-	-	-	-	-	-	3 (100)	-	-	-	-
insulin human	3	-	-	2 (67)	-	-	-	-	-	1 (33)	1 (33)	2 (67)	-	1 (33)	-
insulin lispro	3	-	-	3 (100)	-	-	-	-	-	-	3 (100)	1 (33)	-	-	-
ketamine	3	-	-	3 (100)	-	-	-	-	-	-	-	-	2 (67)	3 (100)	-
lamivudine + nevirapine + zidovudine	3	2 (67)	1 (33)	-	-	-	-	-	-	-	1 (33)	2 (67)	-	-	-
ondansetron	3	-	3 (100)	-	-	-	-	-	-	-	-	-	2 (67)	-	1 (33)
primaquine	3	3 (100)	-	-	-	-	-	-	-	-	1 (33)	2 (67)	1 (33)	3 (100)	2 (67)
pyrimethamine	3	3 (100)	-	-	-	-	-	-	-	-	-	2 (67)	2 (67)	2 (67)	1 (33)
ranitidine	3	-	3 (100)	-	-	-	-	-	-	-	1 (33)	1 (33)	-	2 (67)	1 (33)
rifampicin	3	-	3 (100)	-	-	-	-	-	-	-	2 (67)	-	-	-	-
vitamine	3	-	2 (67)	-	1 (33)	-	-	-	-	-	2 (67)	1 (33)	-	1 (33)	-



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acetylcysteine	2	-	1 (50)	-	-	1 (50)	-	-	-	-	-	-	-	1 (50)	1 (50)
adenosine	2	-	-	2 (100)	-	-	-	-	-	-	-	-	-	2 (100)	-
aminosalicylicacid	2	1 (50)	-	-	-	-	1 (50)	-	-	-	2 (100)	-	-	-	-
amiodarone	2	-	1 (50)	1 (50)	-	-	-	-	-	-	1 (50)	-	-	1 (50)	-
anakinra	2	-	-	2 (100)	-	-	-	-	-	-	2 (100)	1 (50)	-	1 (50)	-
ascorbicacid	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)	1 (50)	-	-	1 (50)
atazanavir	2	2 (100)	-	-	-	-	-	-	-	-	2 (100)	-	-	-	-
atropine	2	-	-	2 (100)	-	-	-	-	-	-	-	-	-	2 (100)	2 (100)
bcbg vaccine	2	-	-	2 (100)	-	-	-	-	-	-	-	-	-	1 (50)	-
beclomethasonedipropionate	2	-	-	-	-	2 (100)	-	-	-	-	1 (50)	-	-	1 (50)	-
budesonide + formoterol	2	-	-	-	-	2 (100)	-	-	-	-	1 (50)	-	1 (50)	2 (100)	-
carvedilol	2	2 (100)	-	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-
cetirizine	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)	-	1 (50)	2 (100)	1 (50)
clonidine	2	2 (100)	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)	1 (50)	-
desmopressin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)	2 (100)	-	1 (50)	-
diazoxide	2	2 (100)	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)	1 (50)	-
diclofenac	2	1 (50)	-	-	-	-	1 (50)	-	-	-	1 (50)	-	-	1 (50)	-
domperidone	2	-	1 (50)	-	-	-	1 (50)	-	-	-	1 (50)	-	-	1 (50)	-
dopamine	2	-	-	2 (100)	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-
esmolol	2	-	-	2 (100)	-	-	-	-	-	-	-	-	-	2 (100)	-
favipiravir	2	2 (100)	-	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-

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filgrastim	2	-	-	2 (100)	-	-	-	-	-	-	1 (50)	1 (50)	-	1 (50)	-
fluconazole	2	-	-	-	2 (100)	-	-	-	-	-	1 (50)	1 (50)	-	2 (100)	-
fludrocortisone	2	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	-	1 (50)	-
fluoxetine	2	-	1 (50)	-	1 (50)	-	-	-	-	-	1 (50)	-	-	-	1 (50)
halothane	2	-	-	-	-	2 (100)	-	-	-	-	-	-	-	2 (100)	1 (50)
heparin	2	-	-	2 (100)	-	-	-	-	-	-	-	-	-	2 (100)	-
hydroxychloroquine	2	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	-	1 (50)	-
indomethacin	2	1 (50)	-	-	1 (50)	-	-	-	-	-	-	-	-	2 (100)	-
isionazid + rifampicin	2	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	-	1 (50)	-
levetiracetam	2	-	1 (50)	1 (50)	-	-	-	-	-	-	2 (100)	-	-	1 (50)	-
loratadine	2	2 (100)	-	-	-	-	-	-	-	-	1 (50)	2 (100)	-	1 (50)	-
lorazepam	2	-	-	2 (100)	-	-	-	-	-	-	-	1 (50)	-	1 (50)	1 (50)
mercaptopurine	2	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	-	-	1 (50)
milrinone	2	-	-	2 (100)	-	-	-	-	-	-	-	-	2 (100)	-	-
mometasonefuroate	2	-	-	-	-	-	-	2 (100)	-	-	-	1 (50)	2 (100)	1 (50)	1 (50)
morphine	2	-	1 (50)	1 (50)	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-
moxifloxacin	2	-	1 (50)	-	1 (50)	-	-	-	-	-	1 (50)	-	-	2 (100)	-
mycophenolatemofetil	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)	-	-	1 (50)	-
nevirapine	2	-	2 (100)	-	-	-	-	-	-	-	-	-	1 (50)	-	1 (50)
pantoprazole	2	1 (50)	-	1 (50)	-	-	-	-	-	-	1 (50)	-	1 (50)	1 (50)	-



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pivmecillinam	2	2 (100)	-	-	-	-	-	-	-	-	2 (100)	-	1 (50)	-	-
posaconazole	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	-	1 (50)	-	1 (50)
prednisoloneacetate	2	2 (100)	-	-	-	-	-	-	-	-	2 (100)	1 (50)	-	1 (50)	-
pseudoephedrine	2	-	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	1 (50)	-
raltegravir	2	2 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)
sevelamer	2	1 (50)	-	-	1 (50)	-	-	-	-	-	1 (50)	-	-	1 (50)	-
tenofoviridisoproxil	2	2 (100)	-	-	-	-	-	-	-	-	-	-	2 (100)	-	-
tobramycin	2	-	-	-	-	2 (100)	-	-	-	-	1 (50)	-	-	1 (50)	-
topiramate	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)	1 (50)	-	-	-
valganciclovir	2	-	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	2 (100)	-
vasopressin	2	-	-	1 (50)	-	1 (50)	-	-	-	-	-	1 (50)	-	1 (50)	-
vigabatrin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)	1 (50)	-	-	-
vitamina	2	-	1 (50)	-	1 (50)	-	-	-	-	-	2 (100)	-	-	-	-
warfarin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	-	-	2 (100)	-
zidovudine	2	-	2 (100)	-	-	-	-	-	-	-	2 (100)	-	-	-	-
abacavir	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-
acarbose	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
acetylsalicylicacid	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-
albuminhuman	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
alemtuzumab	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
amantadine	1	-	-	-	1 (100)	-	-	-	-	-	1 (100)	-	-	-	-



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amikacin	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)
amodiaquine	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-
amodiaquine + sulfadoxine + pyrimethamine	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-	-	-
antihemophilic factor human recombinant	1	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-
artesunate + pyronaridine tetraphosphate	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)
asparaginase	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
atovaquone	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
bedaquiline	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
benznidazole	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
benzylbenzoate	1	-	-	-	-	-	-	1 (100)	-	-	1 (100)	-	-	-	-
betamethasone	1	-	-	-	-	1 (100)	-	-	-	-	-	1 (100)	-	-	-
bisoprolol	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
brentuximab vedotin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-
bromodiphenhydramine	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
busulfan	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
calcium glucoheptonate	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
carboplatin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
carboprost tromethamine	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
cefdinir	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)
cefixime	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	1 (100)

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[illegible]



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erythromycin	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)
etanercept	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-	-
ethinylestradiol	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
ethionamide	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-	1 (100)	-
factorixcomplexhuman	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	1 (100)	-
felbamate	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
felodipine	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-
flecainide	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-
flucytosine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
fluticasone + salmeterol	1	-	-	-	-	1 (100)	-	-	-	-	1 (100)	1 (100)	-	-	-
folicacid	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	1 (100)	-
fosfomycin	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
hydrochlorothiazide spironolactone	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
infliximab	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	1 (100)	1 (100)	-
interferonalfa2arecombinant	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
irondextran	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
ironsucrose	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-
isoprinosine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-
itraconazole	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
ivabradine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-
ivermectin	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	1 (100)	1 (100)	-



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kanamycin	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	1 (100)	1 (100)
lactulose	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
lamivudine + tenofovir	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-
lamivudine + zidovudine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
lansoprazole	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
levamisole	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
levosalbutamol	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
lopinavir	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-
mannitol	1	-	-	-	-	1 (100)	-	-	-	-	1 (100)	-	-	-	-
meropenem	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
metoclopramide	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
midazolam	1	-	-	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-
miltefosine	1	-	-	-	1 (100)	-	-	-	-	-	1 (100)	-	-	1 (100)	-
mirtazapine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
montelukast	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
multivitamins	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-
mycophenolicacid	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	1 (100)	-
nalidixicacid	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
nifurtimox	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
nitazoxanide	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-
olanzapine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-



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omalizumab	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-
omega3acidethylesters	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
oralrehydratationsalts	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-
oxacillin	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-	-
oxcarbazepine	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
pancrelipase	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	1 (100)
pentazocine	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
picosulphatesodium	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
piperacillin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
polyethyleneglycol400	1	-	-	-	-	-	-	-	1 (100)	-	-	-	1 (100)	-	-
procaine	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-	-
propofol	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-
propranolol	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	1 (100)	1 (100)	-
pyrazinamide	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
rabiesvaccine	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
riboflavin	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
rifabutin	1	-	-	-	1 (100)	-	-	-	-	-	1 (100)	-	-	-	-
rifapentine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
rituximab	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
salicylicacid	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-
sertraline	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-

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sodiumbicarbonate	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
soldactone	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
somatotropin	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-	-
streptomycin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
sulfadiazine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)
tazobactam	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-
temocillin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-
temozolomide	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-
tenofoviralaftenamide	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
terbinafine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-
tetracycline	1	-	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-
theophylline	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
tiagabine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
timolol	1	-	-	-	-	-	-	1 (100)	-	-	-	-	1 (100)	-	-
tretinoin	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-
trihexyphenidyl	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
ustekinumab	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-
vedolizumab	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-
verapamil	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-
zanamivir	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-



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zincacetate	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-
zincascorbate	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-
zincchloride	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-
zonisamide	1	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-

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Table 6a: Problematic products by pharmaceutical form as reported by physicians. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	Formulation	N	Acceptability	Usability	Offlabel	Dosing/Safety	Special use
abacavir	tablet	1	1 (100)	-	-	-	-
abacavir + dolutegravir + lamivudine	capsule	1	-	-	-	-	1 (100)
	oral liquid	1	1 (100)	-	-	-	-
	tablet	8	3 (37.5)	3 (37.5)	1 (12.5)	5 (62.5)	2 (25.0)
abacavir + lamivudine	tablet	6	2 (33.3)	1 (16.7)	-	4 (66.7)	-
abacavir + lamivudine + zidovudine	tablet	6	2 (33.3)	4 (66.7)	-	2 (33.3)	-
acarbose	tablet	1	-	1 (100)	-	-	-
acetaminophen	oral liquid	12	7 (58.3)	2 (16.7)	-	7 (58.3)	2 (16.7)
	parenteral preparation	1	-	-	-	1 (100)	-
	rectal preparation	1	-	-	-	1 (100)	-
	tablet	1	-	-	-	1 (100)	-
acetylcysteine	oral liquid	1	-	-	-	1 (100)	-
	preparation for inhalation	1	-	-	-	-	1 (100)
acetylsalicylic acid	tablet	1	-	-	1 (100)	1 (100)	-
acyclovir	capsule	1	1 (100)	-	-	-	-
	parenteral preparation	2	1 (50.0)	1 (50.0)	-	1 (50.0)	-
	tablet	8	2 (25.0)	4 (50.0)	1 (12.5)	2 (25.0)	-
adalimumab	parenteral preparation	3	1 (33.3)	1 (33.3)	-	1 (33.3)	1 (33.3)
adenosine	parenteral preparation	2	-	-	-	2 (100)	-
albendazole	tablet	4	3 (75.0)	1 (25.0)	1 (25.0)	2 (50.0)	1 (25.0)
albumin human	parenteral preparation	1	-	-	-	1 (100)	-
alemtuzumab	parenteral preparation	1	-	-	-	-	1 (100)
amantadine	capsule	1	1 (100)	-	-	-	-
amikacin	parenteral preparation	1	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)
aminophylline	parenteral preparation	4	-	1 (25.0)	2 (50.0)	2 (50.0)	1 (25.0)
	tablet	1	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)
aminosalicylic acid	rectal preparation	1	1 (100)	-	-	-	-
	tablet	1	1 (100)	-	-	-	-

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amiodarone	oral liquid	1	1 (100)	-	-	-	-
	parenteral preparation	1	-	-	-	1 (100)	-
amlodipine	tablet	3	2 (66.7)	1 (33.3)	-	-	-
amodiaquine	tablet	1	1 (100)	-	-	-	-
amodiaquine + sulfadoxine + pyrimethamine	tablet	1	1 (100)	1 (100)	-	-	-
amoxicillin	capsule	3	1 (33.3)	2 (66.7)	1 (33.3)	-	-
	dispersable tablet	1	-	-	-	-	1 (100)
	oral liquid	9	2 (22.2)	3 (33.3)	1 (11.1)	3 (33.3)	1 (11.1)
	tablet	4	4 (100)	1 (25.0)	-	-	-
amoxicillin + clavulanic acid	oral liquid	12	4 (33.3)	4 (33.3)	-	3 (25.0)	-
	parenteral preparation	1	-	-	-	1 (100)	-
	tablet	3	2 (66.7)	2 (66.7)	-	2 (66.7)	-
amphotericin b	parenteral preparation	8	2 (25.0)	2 (25.0)	-	6 (75.0)	3 (37.5)
ampicillin	parenteral preparation	3	-	-	-	1 (33.3)	1 (33.3)
anakinra	parenteral preparation	2	2 (100)	1 (50.0)	-	1 (50.0)	-
antihemophilic factor human recombinant	parenteral preparation	1	-	1 (100)	-	-	-
artemether + lumefantrine	oral liquid	1	-	1 (100)	-	1 (100)	-
	tablet	5	3 (60.0)	2 (40.0)	-	2 (40.0)	-
artesunate + amodiaquine	tablet	4	3 (75.0)	2 (50.0)	-	1 (25.0)	-
artesunate + pyronaridine tetraphosphate	tablet	1	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)
ascorbic acid	oral liquid	1	-	-	-	-	1 (100)
	tablet	1	1 (100)	1 (100)	-	-	-
asparaginase	parenteral preparation	1	-	-	-	1 (100)	-
atazanavir	tablet	2	2 (100)	-	-	-	-
atomoxetine	tablet	3	1 (33.3)	1 (33.3)	-	1 (33.3)	-
atovaquone	tablet	1	-	-	1 (100)	-	-
atropine	parenteral preparation	2	-	-	-	2 (100)	2 (100)
azathioprine	tablet	4	2 (50.0)	-	1 (25.0)	1 (25.0)	-
azithromycin	capsule	1	1 (100)	-	1 (100)	-	-
	oral liquid	6	5 (83.3)	1 (16.7)	-	1 (16.7)	-
	parenteral preparation	1	1 (100)	-	-	-	-
	tablet	2	1 (50.0)	-	1 (50.0)	1 (50.0)	1 (50.0)
baclofen	tablet	3	-	1 (33.3)	-	1 (33.3)	1 (33.3)
bcg vaccine	parenteral preparation	2	-	-	-	1 (50.0)	-
beclomethasone dipropionate	preparation for inhalation	2	1 (50.0)	-	-	1 (50.0)	-
bedaquiline	tablet	1	-	-	-	1 (100)	-

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benznidazole	tablet	1	-	-	-	1 (100)	-
benzyl benzoate	topical	1	1 (100)	-	-	-	-
benzylpenicillin	parenteral preparation	7	7 (100)	2 (28.6)	-	1 (14.3)	-
betamethasone	preparation for inhalation	1	-	1 (100)	-	-	-
bisoprolol	tablet	1	-	-	-	1 (100)	-
brentuximab vedotin	parenteral preparation	1	-	-	1 (100)	-	-
bromodiphenhydramine	oral liquid	1	-	1 (100)	-	-	-
budesonide	oral liquid	1	-	-	1 (100)	-	-
	preparation for inhalation	4	2 (50.0)	3 (75.0)	-	-	-
	topical	1	-	1 (100)	-	-	-
budesonide + formoterol	preparation for inhalation	2	1 (50.0)	-	1 (50.0)	2 (100)	-
busulfan	parenteral preparation	1	-	-	-	1 (100)	-
caffeine	oral liquid	6	-	2 (33.3)	1 (16.7)	1 (16.7)	3 (50.0)
	parenteral preparation	2	-	-	-	2 (100)	-
	tablet	1	-	1 (100)	-	1 (100)	-
calcium glucoheptonate	parenteral preparation	1	-	-	-	1 (100)	-
captopril	oral liquid	1	1 (100)	-	-	-	-
	tablet	6	3 (50.0)	2 (33.3)	-	1 (16.7)	-
carbamazepine	tablet	3	1 (33.3)	1 (33.3)	-	2 (66.7)	1 (33.3)
carboplatin	parenteral preparation	1	-	-	-	-	1 (100)
carboprost tromethamine	parenteral preparation	1	-	-	-	-	1 (100)
carvedilol	tablet	2	-	-	1 (50.0)	1 (50.0)	-
cefdinir	oral liquid	1	-	-	-	-	1 (100)
cefixime	oral liquid	1	1 (100)	-	-	-	1 (100)
cefprozil	oral liquid	1	1 (100)	-	-	-	-
ceftazidime	parenteral preparation	3	1 (33.3)	-	-	1 (33.3)	1 (33.3)
ceftriaxone	oral liquid	1	1 (100)	-	-	-	-
	parenteral preparation	6	-	1 (16.7)	2 (33.3)	3 (50.0)	-
cefuroxime	oral liquid	18	16 (88.9)	2 (11.1)	-	1 (5.6)	-
	parenteral preparation	1	-	-	-	-	1 (100)
cephalexin	tablet	1	1 (100)	-	-	1 (100)	-
cetirizine	oral liquid	1	1 (100)	-	-	1 (100)	-
	tablet	1	-	-	1 (100)	1 (100)	1 (100)
chloramphenicol	capsule	2	1 (50.0)	-	1 (50.0)	-	-
	oral liquid	1	-	-	-	-	1 (100)
	tablet	1	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)



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chloroquine	oral liquid	1	1 (100)	-	-	-	-
	tablet	2	2 (100)	1 (50.0)	1 (50.0)	2 (100)	1 (50.0)
chlorpheniramine	tablet	1	-	-	-	1 (100)	-
cholecalciferol	oral liquid	1	1 (100)	-	-	-	-
ciprofloxacin	capsule	2	2 (100)	-	1 (50.0)	-	-
	oral liquid	6	5 (83.3)	-	-	1 (16.7)	1 (16.7)
	parenteral preparation	2	-	-	1 (50.0)	-	1 (50.0)
	tablet	8	4 (50.0)	5 (62.5)	2 (25.0)	4 (50.0)	1 (12.5)
clarithromycin	oral liquid	7	7 (100)	-	-	-	-
clindamycin	capsule	6	5 (83.3)	-	1 (16.7)	-	-
	oral liquid	11	10 (90.9)	-	-	2 (18.2)	-
	tablet	4	2 (50.0)	1 (25.0)	-	2 (50.0)	-
clobazam	capsule	1	-	1 (100)	-	-	-
	parenteral preparation	1	-	-	-	-	1 (100)
	tablet	4	3 (75.0)	1 (25.0)	-	-	-
clobetasol propionate	topical	1	-	1 (100)	-	-	-
clonidine	tablet	2	-	1 (50.0)	1 (50.0)	1 (50.0)	-
cloxacillin	capsule	1	1 (100)	-	-	-	-
	oral liquid	5	3 (60.0)	1 (20.0)	-	1 (20.0)	-
	parenteral preparation	3	1 (33.3)	-	-	1 (33.3)	1 (33.3)
coagulation factor ix recombinant	parenteral preparation	1	-	-	-	1 (100)	-
colchicine	tablet	1	-	1 (100)	-	-	-
colistin	parenteral preparation	3	-	-	-	3 (100)	-
	preparation for inhalation	1	1 (100)	-	-	-	-
corticotropin	parenteral preparation	3	1 (33.3)	2 (66.7)	1 (33.3)	1 (33.3)	2 (66.7)
cyclosporine	capsule	2	2 (100)	-	-	-	-
	tablet	1	-	-	-	-	1 (100)
dantrolene	tablet	1	1 (100)	-	-	-	-
dapsone	tablet	1	-	-	-	1 (100)	-
darunavir	tablet	1	-	-	1 (100)	-	-
desloratadine	tablet	1	-	-	1 (100)	1 (100)	1 (100)
desmopressin	oral liquid	1	1 (100)	1 (100)	-	1 (100)	-
	tablet	1	-	1 (100)	-	-	-
desoximetasone	tablet	1	-	-	-	1 (100)	-
dexamethasone	oral liquid	2	2 (100)	1 (50.0)	-	-	-
	parenteral preparation	2	-	-	-	2 (100)	-



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	tablet	3	2 (66.7)	-	1 (33.3)	-	1 (33.3)
dexmedetomidine	parenteral preparation	3	-	-	3 (100)	1 (33.3)	-
dextromethorphan	oral liquid	1	1 (100)	-	-	-	-
diazepam	parenteral preparation	1	-	-	-	1 (100)	-
	rectal preparation	3	-	-	-	3 (100)	-
diazoxide	tablet	2	-	1 (50.0)	1 (50.0)	1 (50.0)	-
diclofenac	rectal preparation	1	-	-	-	1 (100)	-
	tablet	1	1 (100)	-	-	-	-
dicyclomine	tablet	1	1 (100)	-	-	-	-
	oral liquid	3	-	-	-	3 (100)	-
digoxin	parenteral preparation	2	-	-	-	2 (100)	-
	tablet	9	3 (33.3)	4 (44.4)	2 (22.2)	7 (77.8)	1 (11.1)
diloxanide furoate	oral liquid	1	-	-	-	-	1 (100)
diphenhydramine	oral liquid	1	1 (100)	-	-	-	-
dobutamine	parenteral preparation	1	-	-	1 (100)	-	-
dolutegravir + lamivudine	tablet	3	1 (33.3)	-	-	2 (66.7)	1 (33.3)
	oral liquid	1	1 (100)	-	-	-	-
domperidone	rectal preparation	1	-	-	-	1 (100)	-
dopamine	parenteral preparation	2	-	-	1 (50.0)	1 (50.0)	-
	oral liquid	1	-	-	1 (100)	-	-
doxycycline	parenteral preparation	1	-	-	-	-	1 (100)
	tablet	2	-	-	2 (100)	1 (50.0)	-
eculizumab	parenteral preparation	1	-	-	1 (100)	-	-
efavirenz + emtricitabine + tenofovir	tablet	1	-	-	-	1 (100)	-
enalapril	tablet	3	1 (33.3)	1 (33.3)	-	2 (66.7)	-
epinephrine	parenteral preparation	5	-	1 (20.0)	-	4 (80.0)	-
erythromycin	tablet	1	-	-	-	-	1 (100)
esmolol	parenteral preparation	2	-	-	-	2 (100)	-
	oral liquid	2	-	1 (50.0)	1 (50.0)	-	-
esomeprazole	tablet	2	1 (50.0)	1 (50.0)	-	1 (50.0)	-
etanercept	parenteral preparation	1	1 (100)	-	-	-	-
	oral liquid	2	1 (50.0)	1 (50.0)	-	1 (50.0)	-
ethambutol	tablet	2	1 (50.0)	-	-	2 (100)	-
ethinylestradiol	tablet	1	-	-	-	1 (100)	-
ethionamide	tablet	1	1 (100)	1 (100)	-	1 (100)	-
ethosuximide	capsule	2	1 (50.0)	-	-	1 (50.0)	-

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	oral liquid	2	1 (50.0)	-	-	1 (50.0)	-
factor ix complex human	parenteral preparation	1	1 (100)	-	-	1 (100)	-
favipiravir	tablet	2	-	-	1 (50.0)	1 (50.0)	-
felbamate	oral liquid	1	-	-	-	1 (100)	-
felodipine	tablet	1	1 (100)	-	-	-	-
ferrous gluconate	oral liquid	2	2 (100)	-	-	-	-
	tablet	1	-	-	-	1 (100)	-
ferrous sulfate anhydrous	oral liquid	3	3 (100)	-	-	-	-
filgrastim	parenteral preparation	2	1 (50.0)	1 (50.0)	-	1 (50.0)	-
flecainide	oral liquid	1	-	-	1 (100)	-	-
flucloxacillin	oral liquid	12	11 (91.7)	-	-	2 (16.7)	-
fluconazole	capsule	2	1 (50.0)	1 (50.0)	-	2 (100)	-
flucytosine	tablet	1	-	-	1 (100)	-	-
fludrocortisone	tablet	2	1 (50.0)	-	-	1 (50.0)	-
fluoxetine	capsule	1	-	-	-	-	1 (100)
	oral liquid	1	1 (100)	-	-	-	-
fluticasone + salmeterol	preparation for inhalation	1	1 (100)	1 (100)	-	-	-
folic acid	tablet	1	-	1 (100)	-	1 (100)	-
fosfomycin	oral liquid	1	-	-	-	1 (100)	-
furosemide	oral liquid	3	2 (66.7)	-	-	1 (33.3)	-
	parenteral preparation	1	-	-	-	1 (100)	-
	tablet	13	4 (30.8)	5 (38.5)	-	7 (53.8)	-
ganciclovir	capsule	1	-	-	-	-	1 (100)
	parenteral preparation	2	-	-	-	2 (100)	-
	tablet	1	1 (100)	-	-	-	-
gentamicin	parenteral preparation	8	-	-	-	6 (75.0)	1 (12.5)
griseofulvin	oral liquid	2	-	-	-	1 (50.0)	-
	tablet	2	1 (50.0)	-	-	1 (50.0)	-
halothane	preparation for inhalation	2	-	-	-	2 (100)	1 (50.0)
heparin	parenteral preparation	2	-	-	-	2 (100)	-
hydrochlorothiazide + spironolactone	tablet	1	-	1 (100)	-	-	-
hydrocortisone	parenteral preparation	1	-	-	-	1 (100)	-
	tablet	4	1 (25.0)	2 (50.0)	-	1 (25.0)	-
	topical	1	-	-	-	-	1 (100)
hydroxychloroquine	tablet	2	1 (50.0)	-	-	1 (50.0)	-
hydroxyurea	capsule	6	2 (33.3)	2 (33.3)	-	4 (66.7)	-



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ibuprofen	oral liquid	5	1 (20.0)	-	2 (40.0)	3 (60.0)	-
	tablet	1	-	-	-	1 (100)	-
indomethacin	capsule	1	-	-	-	1 (100)	-
	tablet	1	-	-	-	1 (100)	-
infiximab	parenteral preparation	1	1 (100)	-	1 (100)	1 (100)	-
insulin human	parenteral preparation	2	-	1 (50.0)	-	1 (50.0)	-
	subcutaneous preparation	1	1 (100)	1 (100)	-	-	-
insulin lispro	parenteral preparation	3	3 (100)	1 (33.3)	-	-	-
interferon alfa a recombinant	parenteral preparation	1	-	-	-	-	1 (100)
iron dextran	oral liquid	1	-	-	-	1 (100)	-
iron sucrose	oral liquid	1	1 (100)	-	-	-	-
isionazid + pyrazinamide + rifampicin	oral liquid	1	1 (100)	-	-	-	-
	tablet	4	2 (50.0)	1 (25.0)	-	2 (50.0)	-
isionazid + pyrazinamide + rifampicin + etambutol	oral liquid	1	1 (100)	-	-	-	-
	tablet	10	4 (40.0)	7 (70.0)	-	2 (20.0)	-
isionazid + rifampicin	tablet	2	1 (50.0)	-	-	1 (50.0)	-
isoniazid	oral liquid	6	4 (66.7)	1 (16.7)	-	3 (50.0)	-
	tablet	6	4 (66.7)	1 (16.7)	1 (16.7)	2 (33.3)	2 (33.3)
isoprinosine	oral liquid	1	-	-	1 (100)	-	-
itraconazole	oral liquid	1	-	-	-	1 (100)	-
ivabradine	oral liquid	1	-	-	1 (100)	-	-
ivermectin	tablet	1	1 (100)	-	1 (100)	1 (100)	-
kanamycin	parenteral preparation	1	1 (100)	-	-	1 (100)	1 (100)
ketamine	parenteral preparation	3	-	-	2 (66.7)	3 (100)	-
lactulose	oral liquid	1	-	1 (100)	-	-	-
lamivudine + nevirapine + zidovudine	oral liquid	1	-	1 (100)	-	-	-
	tablet	2	1 (50.0)	1 (50.0)	-	-	-
lamivudine + tenofovir	tablet	1	1 (100)	-	-	-	-
lamivudine + zidovudine	oral liquid	1	-	-	-	1 (100)	-
lansoprazole	tablet	1	-	-	1 (100)	-	-
levamisole	tablet	1	-	1 (100)	-	-	-
levetiracetam	oral liquid	1	1 (100)	-	-	1 (100)	-
	parenteral preparation	1	1 (100)	-	-	-	-
levofloxacin	parenteral preparation	1	-	-	1 (100)	1 (100)	-
	tablet	3	3 (100)	2 (66.7)	-	1 (33.3)	-
levosalbutamol	oral liquid	1	-	1 (100)	-	-	-

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levothyroxine	tablet	7	3 (42.9)	1 (14.3)	-	1 (14.3)	1 (14.3)
linezolid	oral liquid	1	-	-	1 (100)	-	-
	tablet	3	2 (66.7)	1 (33.3)	-	2 (66.7)	-
lopinavir	oral liquid	1	1 (100)	-	-	-	-
	capsule	4	3 (75.0)	4 (100)	-	-	-
	dispersable tablet	2	1 (50.0)	2 (100)	-	1 (50.0)	-
lopinavir + ritonavir	oral liquid	22	20 (90.9)	5 (22.7)	-	1 (4.5)	2 (9.1)
	other	1	1 (100)	1 (100)	-	-	-
	pellet formulation	1	-	1 (100)	-	-	-
	tablet	11	8 (72.7)	4 (36.4)	-	2 (18.2)	-
loratadine	tablet	2	1 (50.0)	2 (100)	-	1 (50.0)	-
lorazepam	parenteral preparation	2	-	1 (50.0)	-	1 (50.0)	1 (50.0)
mannitol	preparation for inhalation	1	1 (100)	-	-	-	-
mebendazole	oral liquid	3	2 (66.7)	1 (33.3)	-	-	-
	tablet	2	-	1 (50.0)	-	1 (50.0)	-
mercaptopurine	tablet	2	1 (50.0)	-	-	-	1 (50.0)
meropenem	parenteral preparation	1	-	-	-	-	1 (100)
methotrexate	parenteral preparation	2	1 (50.0)	-	-	1 (50.0)	-
	tablet	6	5 (83.3)	-	1 (16.7)	2 (33.3)	-
methlyphenidate	capsule	1	1 (100)	-	-	-	-
	tablet	5	2 (40.0)	1 (20.0)	1 (20.0)	-	2 (40.0)
methyprednisolone	oral liquid	1	1 (100)	-	-	-	-
	parenteral preparation	1	-	1 (100)	-	1 (100)	-
	tablet	5	5 (100)	-	-	-	-
metoclopramide	parenteral preparation	1	-	-	-	1 (100)	-
metronidazole	capsule	1	1 (100)	-	-	-	-
	oral liquid	7	6 (85.7)	-	-	-	1 (14.3)
	tablet	2	1 (50.0)	-	1 (50.0)	-	-
midazolam	preparation for inhalation	1	-	-	-	1 (100)	-
milrinone	parenteral preparation	2	-	-	2 (100)	-	-
miltefosine	capsule	1	1 (100)	-	-	1 (100)	-
mirtazapine	tablet	1	-	-	1 (100)	-	-
mometasone furoate	topical	2	-	1 (50.0)	2 (100)	1 (50.0)	1 (50.0)
montelukast	tablet	1	-	-	-	1 (100)	-
morphine	oral liquid	1	-	-	-	1 (100)	-
	parenteral preparation	1	-	-	1 (100)	-	-



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moxifloxacin	capsule	1	-	-	-	1 (100)	-
	oral liquid	1	1 (100)	-	-	1 (100)	-
multivitamins	oral liquid	1	1 (100)	-	-	-	-
	oral liquid	1	-	-	-	1 (100)	-
mycophenolate mofetil	tablet	1	1 (100)	-	-	-	-
	tablet	1	1 (100)	-	-	1 (100)	-
mycophenolic acid	tablet	1	-	-	-	1 (100)	-
nalidixic acid	tablet	1	-	-	-	1 (100)	-
nevirapine	oral liquid	2	-	-	1 (50.0)	-	1 (50.0)
nifurtimox	tablet	1	-	-	-	1 (100)	-
nitazoxanide	tablet	1	1 (100)	-	-	-	-
nitrofurantoin	capsule	1	1 (100)	-	-	1 (100)	-
	oral liquid	2	2 (100)	-	-	-	-
	tablet	1	1 (100)	-	-	-	-
olanzapine	oral liquid	1	-	-	1 (100)	-	-
omalizumab	parenteral preparation	1	-	-	1 (100)	1 (100)	-
omega acid ethyl esters	oral liquid	1	-	1 (100)	-	-	-
omeprazole	capsule	8	5 (62.5)	5 (62.5)	1 (12.5)	3 (37.5)	1 (12.5)
	oral liquid	5	3 (60.0)	4 (80.0)	1 (20.0)	2 (40.0)	1 (20.0)
	tablet	5	2 (40.0)	2 (40.0)	-	1 (20.0)	-
ondansetron	oral liquid	3	-	-	2 (66.7)	-	1 (33.3)
oral rehydration salts	oral liquid	1	1 (100)	-	-	-	-
oxacillin	parenteral preparation	1	1 (100)	-	-	-	-
oxcarbazepine	oral liquid	1	-	1 (100)	-	-	-
pancrelipase	capsule	1	-	1 (100)	-	-	1 (100)
pantoprazole	parenteral preparation	1	-	-	-	1 (100)	-
	tablet	1	1 (100)	-	1 (100)	-	-
pentazocine	parenteral preparation	1	-	-	-	1 (100)	-
phenobarbital	parenteral preparation	4	2 (50.0)	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)
	tablet	2	-	2 (100)	-	-	-
phenoxymethylpenicillin	oral liquid	4	3 (75.0)	2 (50.0)	-	1 (25.0)	-
	parenteral preparation	1	1 (100)	-	-	-	-
	tablet	1	1 (100)	-	-	-	-
phenytoin	capsule	1	-	1 (100)	-	-	-
	oral liquid	1	-	-	-	1 (100)	-
	parenteral preparation	1	-	-	-	1 (100)	-
	tablet	1	-	-	-	1 (100)	-

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picosulphate sodium	oral liquid	1	-	-	-	1 (100)	-
piperacillin	parenteral preparation	1	-	-	-	-	1 (100)
pivmecillinam	tablet	2	2 (100)	-	1 (50.0)	-	-
polyethylene glycol	dispersible tablet	1	-	-	1 (100)	-	-
posaconazole	oral liquid	1	-	-	1 (100)	-	-
posaconazole	tablet	1	-	-	-	-	1 (100)
prednisolone	oral liquid	4	4 (100)	1 (25.0)	-	-	-
	tablet	11	10 (90.9)	-	-	1 (9.1)	-
prednisolone acetate	tablet	2	2 (100)	1 (50.0)	-	1 (50.0)	-
prednisone	oral liquid	3	3 (100)	-	-	-	-
	rectal preparation	1	-	-	-	1 (100)	-
	tablet	2	2 (100)	2 (100)	-	1 (50.0)	-
primaquine	tablet	3	1 (33.3)	2 (66.7)	1 (33.3)	3 (100)	2 (66.7)
procaine	parenteral preparation	1	1 (100)	-	-	-	-
propofol	parenteral preparation	1	-	-	1 (100)	1 (100)	-
propranolol	tablet	1	1 (100)	-	1 (100)	1 (100)	-
pseudoephedrine	oral liquid	2	-	1 (50.0)	-	1 (50.0)	-
pyrazinamide	tablet	1	-	1 (100)	-	-	-
pyrimethamine	tablet	3	-	2 (66.7)	2 (66.7)	2 (66.7)	1 (33.3)
quinine	oral liquid	1	1 (100)	-	-	-	-
	parenteral preparation	2	-	-	-	2 (100)	-
	tablet	1	1 (100)	1 (100)	-	-	-
rabies vaccine	parenteral preparation	1	-	-	-	1 (100)	-
raltegravir	tablet	2	-	-	-	1 (50.0)	1 (50.0)
ranitidine	oral liquid	3	1 (33.3)	1 (33.3)	-	2 (66.7)	1 (33.3)
riboflavin	tablet	1	-	-	1 (100)	-	-
rifabutin	capsule	1	1 (100)	-	-	-	-
rifampicin	oral liquid	3	2 (66.7)	-	-	-	-
rifapentine	tablet	1	-	-	1 (100)	-	-
ritonavir	capsule	1	1 (100)	1 (100)	-	-	1 (100)
	oral liquid	2	1 (50.0)	1 (50.0)	-	-	-
	tablet	1	1 (100)	-	-	-	-
rituximab	parenteral preparation	1	-	-	-	-	1 (100)
salbutamol	oral liquid	1	-	1 (100)	-	-	-
	parenteral preparation	1	1 (100)	-	-	1 (100)	-
	preparation for inhalation	17	2 (11.8)	10 (58.8)	-	5 (29.4)	2 (11.8)

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	tablet	1	1 (100)	-	-	-	-
	topical	1	1 (100)	1 (100)	-	-	-
salicylic acid	oral liquid	1	1 (100)	-	-	-	-
sertraline	oral liquid	1	1 (100)	-	-	-	-
sevelamer	capsule	1	-	-	-	1 (100)	-
	tablet	1	1 (100)	-	-	-	-
sildenafil	oral liquid	2	-	1 (50.0)	1 (50.0)	-	-
	parenteral preparation	1	-	-	1 (100)	1 (100)	-
	tablet	6	2 (33.3)	3 (50.0)	1 (16.7)	2 (33.3)	-
sodium bicarbonate	tablet	1	-	-	1 (100)	-	-
soldactone	parenteral preparation	1	-	-	-	1 (100)	-
somatotropin	parenteral preparation	1	1 (100)	-	-	-	-
spironolactone	oral liquid	2	1 (50.0)	-	-	1 (50.0)	-
	tablet	4	1 (25.0)	2 (50.0)	-	2 (50.0)	-
streptomycin	parenteral preparation	1	-	-	-	1 (100)	-
sulfadiazine	tablet	1	-	-	-	-	1 (100)
	capsule	1	1 (100)	-	-	-	-
tacrolimus	oral liquid	1	-	-	1 (100)	1 (100)	-
	tablet	2	-	2 (100)	-	2 (100)	-
tazobactam	oral liquid	1	-	-	1 (100)	-	-
temocillin	parenteral preparation	1	-	-	1 (100)	-	-
temozolomide	capsule	1	-	1 (100)	-	-	-
tenofovir alafenamide	tablet	1	-	-	1 (100)	-	-
tenofovir disoproxil	tablet	2	-	-	2 (100)	-	-
terbinafine	oral liquid	1	-	-	-	-	-
tetracycline	capsule	1	-	-	1 (100)	-	-
theophylline	oral liquid	1	-	-	-	1 (100)	-
tiagabine	tablet	1	-	-	1 (100)	-	-
timolol	topical	1	-	-	1 (100)	-	-
tobramycin	preparation for inhalation	2	1 (50.0)	-	-	1 (50.0)	-
topiramate	oral liquid	1	-	1 (100)	-	-	-
	tablet	1	1 (100)	-	-	-	-
tretinoin	capsule	1	-	1 (100)	-	-	-
trihexyphenidyl	tablet	1	-	-	-	1 (100)	-
trimethoprim + sulfamethoxazole	capsule	1	1 (100)	-	-	-	-
	oral liquid	4	1 (25.0)	-	1 (25.0)	1 (25.0)	1 (25.0)

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	preparation for inhalation	1	-	-	-	1 (100)	1 (100)
ustekinumab	parenteral preparation	1	-	-	1 (100)	-	-
valaciclovir	oral liquid	2	-	1 (50.0)	1 (50.0)	-	-
	tablet	5	3 (60.0)	1 (20.0)	1 (20.0)	2 (40.0)	1 (20.0)
valganciclovir	oral liquid	2	-	1 (50.0)	-	2 (100)	-
	capsule	3	-	1 (33.3)	-	2 (66.7)	-
valproic acid	oral liquid	5	3 (60.0)	-	-	2 (40.0)	1 (20.0)
	tablet	2	1 (50.0)	2 (100)	-	-	1 (50.0)
vancomycin	oral liquid	1	1 (100)	-	-	-	-
	parenteral preparation	7	-	-	-	7 (100)	-
vasopressin	parenteral preparation	1	-	-	-	1 (100)	-
	preparation for inhalation	1	-	1 (100)	-	-	-
vedolizumab	parenteral preparation	1	-	-	1 (100)	-	-
verapamil	oral liquid	1	-	-	1 (100)	-	-
vigabatrin	oral liquid	1	-	1 (100)	-	-	-
	tablet	1	1 (100)	-	-	-	-
vitamin a	capsule	1	1 (100)	-	-	-	-
	oral liquid	1	1 (100)	-	-	-	-
vitamin e	capsule	1	1 (100)	1 (100)	-	-	-
	oral liquid	2	1 (50.0)	-	-	1 (50.0)	-
warfarin	oral liquid	1	-	-	-	1 (100)	-
	tablet	1	-	-	-	1 (100)	-
zanamivir	parenteral preparation	1	-	-	-	1 (100)	-
zidovudine	oral liquid	2	2 (100)	-	-	-	-
zinc acetate	oral liquid	1	1 (100)	-	-	-	-
zinc ascorbate	oral liquid	1	1 (100)	-	-	-	-
zinc chloride	tablet	1	1 (100)	-	-	-	-
zonisamide	oral liquid	1	1 (100)	-	-	-	-

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Table 7a. Acceptability issues as reported by physicians. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Acceptability						
		taste after taste	tablet capsule size	high volume of liquid for a single dose	numerous daily administrations	texture appearance smell	complexities in using the device	other
<i>Overall</i>	424	184 (43)	123 (29)	31 (7)	41 (10)	37 (9)	19 (4)	41 (10)
lopinavir + ritonavir	33	28 (85)	7 (21)	3 (9)	5 (15)	4 (12)	1 (3)	1 (3)
clindamycin	17	13 (76)	4 (24)	2 (12)	1 (6)	1 (6)	-	1 (6)
cefuroxime	16	12 (75)	1 (6)	1 (6)	-	5 (31)	-	1 (6)
prednisolone	14	7 (50)	4 (29)	-	4 (29)	1 (7)	-	-
ciprofloxacin	11	8 (73)	4 (36)	1 (9)	-	2 (18)	-	1 (9)
flucloxacillin	11	9 (82)	-	3 (27)	5 (45)	1 (9)	-	-
omeprazole	10	1 (10)	7 (70)	-	-	1 (10)	-	-
isoniazid	8	-	5 (63)	-	1 (13)	-	-	1 (13)
azithromycin	8	5 (63)	1 (13)	-	-	-	-	-
metronidazole	8	4 (50)	1 (13)	3 (38)	-	1 (13)	-	-
amoxicillin	7	1 (14)	5 (71)	2 (29)	-	-	-	-
acetaminophen	7	6 (86)	-	-	-	-	-	-
benzylpenicillin	7	-	-	-	-	-	-	4 (57)
clarithromycin	7	3 (43)	-	1 (14)	-	4 (57)	-	-
furosemide	6	1 (17)	2 (33)	-	-	-	-	-
amoxicillin + clavulanic acid	6	3 (50)	2 (33)	2 (33)	-	1 (17)	-	1 (17)
methotrexate	6	1 (17)	1 (17)	-	-	1 (17)	-	3 (50)
methylprednisolone	6	4 (67)	1 (17)	-	-	1 (17)	-	-
salbutamol	5	-	-	-	1 (20)	-	3 (60)	-
isoniazid + pyrazinamide + rifampicin + etambutol	5	3 (60)	4 (80)	1 (20)	-	-	-	-
cloxacillin	5	2 (40)	1 (20)	1 (20)	2 (40)	1 (20)	-	-
phenoxymethylpenicillin	5	2 (40)	-	1 (20)	2 (40)	1 (20)	-	1 (20)
prednisone	5	3 (60)	2 (40)	-	1 (20)	1 (20)	-	-
acyclovir	4	1 (25)	1 (25)	-	2 (50)	-	-	-



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abacavir + dolutegravir + lamivudine	4	-	3 (75)	-	-	-	-	1 (25)
valproic acid	4	2 (50)	1 (25)	-	-	-	-	-
captopril	4	2 (50)	3 (75)	1 (25)	-	-	-	-
dexamethasone	4	2 (50)	1 (25)	1 (25)	-	-	1 (25)	-
nitrofurantoin	4	3 (75)	-	-	1 (25)	-	-	2 (50)
digoxin	3	-	1 (33)	-	-	1 (33)	-	-
levothyroxine	3	-	2 (67)	-	-	-	-	1 (33)
valaciclovir	3	-	1 (33)	-	-	-	-	1 (33)
artemether + lumefantrine	3	2 (67)	3 (100)	-	-	-	-	-
clobazam	3	2 (67)	2 (67)	-	-	-	-	-
methylphenidate	3	-	3 (100)	-	-	-	-	-
isoniazid + pyrazinamide + rifampicin	3	-	1 (33)	-	-	-	-	-
albendazole	3	-	3 (100)	-	-	-	-	-
artesunate + amodiaquine	3	2 (67)	1 (33)	-	-	-	-	1 (33)
levofloxacin	3	-	3 (100)	-	-	-	-	1 (33)
ritonavir	3	1 (33)	2 (67)	-	-	-	-	-
chloroquine	3	3 (100)	-	-	-	-	-	-
ferrous sulfate anhydrous	3	3 (100)	-	-	1 (33)	-	-	-
insulin lispro	3	-	-	-	3 (100)	-	2 (67)	2 (67)
sildenafil	2	1 (50)	1 (50)	-	1 (50)	-	-	-
amphotericin b	2	-	-	-	-	-	1 (50)	1 (50)
abacavir + lamivudine	2	1 (50)	1 (50)	-	-	-	-	-
abacavir + lamivudine + zidovudine	2	-	1 (50)	1 (50)	1 (50)	1 (50)	-	-
budesonide	2	-	-	-	-	-	2 (100)	-
hydroxyurea	2	-	2 (100)	-	-	-	-	-
phenobarbital	2	-	-	-	-	-	-	-
spironolactone	2	-	1 (50)	-	-	-	-	-
trimethoprim + sulfamethoxazole	2	1 (50)	-	-	-	1 (50)	-	-
mebendazole	2	1 (50)	-	-	1 (50)	1 (50)	-	-
azathioprine	2	1 (50)	1 (50)	-	-	-	-	-
chloramphenicol	2	-	-	-	-	-	1 (50)	-
ethambutol	2	1 (50)	1 (50)	-	-	-	-	-
ethosuximide	2	-	-	1 (50)	-	-	-	1 (50)
linezolid	2	1 (50)	1 (50)	-	-	-	-	-
quinine	2	2 (100)	-	-	-	-	-	-



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amlodipine	2	1 (50)	2 (100)	-	-	-	-	-
cyclosporine	2	-	-	-	-	-	-	-
ferrous gluconate	2	1 (50)	-	1 (50)	1 (50)	-	-	-
rifampicin	2	-	1 (50)	1 (50)	-	-	-	-
vitamin e	2	-	2 (100)	-	-	-	-	-
aminosalicylic acid	2	1 (50)	-	-	-	-	1 (50)	-
anakinra	2	-	-	-	-	-	-	2 (100)
atazanavir	2	1 (50)	1 (50)	-	-	1 (50)	-	-
levetiracetam	2	-	-	-	-	-	-	-
pivmecillinam	2	1 (50)	-	-	-	-	-	-
prednisolone acetate	2	1 (50)	1 (50)	-	-	-	-	-
vitamin a	2	1 (50)	1 (50)	-	-	-	-	-
zidovudine	2	-	-	2 (100)	-	-	-	-
vancomycin	1	1 (100)	-	-	1 (100)	-	-	-
ceftriaxone	1	-	-	-	-	-	-	1 (100)
ibuprofen	1	-	-	-	-	1 (100)	-	-
hydrocortisone	1	-	-	-	1 (100)	-	-	-
aminophylline	1	1 (100)	-	-	-	-	-	-
colistin	1	-	-	-	-	-	-	-
esomeprazole	1	-	1 (100)	-	-	-	-	-
ganciclovir	1	-	-	-	-	-	-	-
griseofulvin	1	-	1 (100)	-	-	-	-	-
tacrolimus	1	-	-	-	1 (100)	-	-	-
adalimumab	1	-	-	-	-	-	1 (100)	2 (200)
atomoxetine	1	-	1 (100)	-	-	-	-	-
carbamazepine	1	1 (100)	-	-	-	1 (100)	-	-
ceftazidime	1	-	-	-	-	-	-	1 (100)
corticotropin	1	-	-	-	-	-	1 (100)	-
dolutegravir + lamivudine	1	-	-	-	-	-	-	-
enalapril	1	1 (100)	1 (100)	-	-	-	-	-
insulin human	1	-	-	-	-	-	-	1 (100)
lamivudine + nevirapine + zidovudine	1	-	-	-	-	-	-	-
primaquine	1	1 (100)	-	-	-	-	-	-
ranitidine	1	-	-	-	-	-	-	-
amiodarone	1	-	-	-	-	-	-	1 (100)



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ascorbic acid	1	1 (100)	-	-	-	-	-	-
beclomethasone dipropionate	1	-	-	-	-	-	1 (100)	-
budesonide + formoterol	1	-	-	-	-	-	1 (100)	-
cetirizine	1	-	-	-	-	-	-	-
desmopressin	1	-	-	-	-	-	1 (100)	-
diclofenac	1	-	-	-	-	-	-	-
domperidone	1	1 (100)	-	-	-	-	-	-
filgrastim	1	-	-	-	-	-	-	-
fluconazole	1	-	1 (100)	-	-	-	-	-
fludrocortisone	1	1 (100)	-	-	-	-	-	-
fluoxetine	1	1 (100)	-	-	-	-	-	-
hydroxychloroquine	1	1 (100)	1 (100)	-	-	1 (100)	-	-
isoniazid + rifampicin	1	-	-	-	-	-	-	-
loratadine	1	-	1 (100)	-	-	-	-	-
mercaptopurine	1	-	-	-	-	-	-	-
moxifloxacin	1	1 (100)	-	-	-	-	-	-
mycophenolate mofetil	1	-	1 (100)	-	-	-	-	-
pantoprazole	1	-	-	-	-	-	-	1 (100)
sevelamer	1	1 (100)	1 (100)	-	1 (100)	-	-	-
tobramycin	1	-	-	-	1 (100)	-	-	1 (100)
topiramate	1	-	-	-	-	-	-	-
vigabatrin	1	-	-	-	-	-	-	-
abacavir	1	-	1 (100)	-	-	-	-	-
amantadine	1	-	-	-	-	-	-	-
amikacin	1	-	-	-	-	-	-	-
amodiaquine	1	1 (100)	1 (100)	-	-	-	-	1 (100)
amodiaquine - sulfadoxine + pyrimethamine	1	1 (100)	1 (100)	-	-	-	-	-
artesunate + pyronaridine tetraphosphate	1	-	1 (100)	-	-	-	-	-
benzyl benzoate	1	1 (100)	-	-	-	-	-	-
cefixime	1	1 (100)	-	-	-	-	-	-
cefprozil	1	1 (100)	-	-	-	-	-	-
cephalexin	1	-	1 (100)	-	-	-	-	-
cholecalciferol	1	-	-	-	-	-	-	-
dantrolene	1	-	-	-	-	-	-	-
dextromethorphan	1	1 (100)	-	-	-	1 (100)	-	-



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dicyclomine	1	-	1 (100)	-	-	-	-	-
diphenhydramine	1	1 (100)	-	-	-	-	-	-
etanercept	1	-	-	-	-	-	1 (100)	1 (100)
ethionamide	1	-	1 (100)	-	-	-	-	-
factor ix complex (human)	1	-	-	-	-	-	-	-
felodipine	1	1 (100)	1 (100)	-	-	-	-	-
fluticasone + salmeterol	1	-	-	-	-	-	1 (100)	-
infliximab	1	-	-	-	-	-	-	1 (100)
iron sucrose	1	-	-	-	-	1 (100)	-	-
ivermectin	1	1 (100)	1 (100)	-	-	1 (100)	-	-
kanamycin	1	-	-	-	-	-	-	1 (100)
lamivudine + tenofovir	1	-	1 (100)	-	-	-	-	-
lopinavir	1	1 (100)	-	-	-	-	-	-
mannitol	1	-	-	-	-	-	-	-
miltefosine	1	-	-	-	-	-	-	-
multivitamins	1	1 (100)	-	-	-	-	-	-
mycophenolic acid	1	1 (100)	-	-	1 (100)	-	-	-
nitazoxanide	1	-	1 (100)	-	-	-	-	-
oral rehydration salts	1	1 (100)	-	-	-	-	-	-
oxacillin	1	-	-	-	1 (100)	-	-	1 (100)
procaine	1	-	-	1 (100)	-	-	-	-
propranolol	1	-	-	1 (100)	1 (100)	-	-	-
rifabutin	1	-	1 (100)	-	-	-	-	-
salicylic acid	1	-	1 (100)	-	-	-	-	-
sertraline	1	1 (100)	-	-	-	-	-	-
somatotropin	1	-	-	-	-	-	-	1 (100)
zinc acetate	1	1 (100)	-	-	-	-	-	-
zinc ascorbate	1	1 (100)	-	-	-	-	-	-
zinc chloride	1	1 (100)	-	-	-	-	-	-
zonisamide	1	-	1 (100)	-	-	-	-	-

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Table 8a. Difficult use of products as reported by physicians. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Usability						
		complex preparation	determination of the dose	need for a vehicle	problematic administration device	problematic packaging opening/closing	need to be stored at a specific temperature	other please specify usability
<i>Overall</i>	223	56 (25)	98 (44)	21 (9)	32 (14)	12 (5)	18 (8)	19 (9)
lopinavir + ritonavir	17	6 (35)	2 (12)	4 (24)	3 (18)	1 (6)	4 (24)	2 (12)
salbutamol	12	-	1 (8)	-	11 (92)	1 (8)	1 (8)	-
omeprazole	11	3 (27)	6 (55)	1 (9)	1 (9)	2 (18)	1 (9)	-
isoniazid + pyrazinamide + rifampicin + etambutol	7	1 (14)	2 (29)	1 (14)	-	-	-	1 (14)
amoxicillin	6	2 (33)	3 (50)	2 (33)	-	2 (33)	1 (17)	1 (17)
amoxicillin + clavulanic acid	6	1 (17)	4 (67)	1 (17)	-	-	1 (17)	1 (17)
ciprofloxacin	5	2 (40)	3 (60)	-	-	-	-	-
furosemide	5	1 (20)	5 (100)	1 (20)	-	-	-	-
acyclovir	5	3 (60)	3 (60)	-	-	-	1 (20)	-
digoxin	4	1 (25)	1 (25)	-	-	1 (25)	-	-
sildenafil	4	2 (50)	3 (75)	-	-	-	-	-
abacavir + lamivudine + zidovudine	4	1 (25)	2 (50)	-	-	-	-	1 (25)
budesonide	4	-	1 (25)	-	4 (100)	-	-	-
abacavir + dolutegravir + lamivudine	3	-	1 (33)	-	-	-	-	1 (33)
valproic acid	3	1 (33)	2 (67)	-	-	-	-	2 (67)
caffeine	3	-	2 (67)	-	-	1 (33)	-	-
artemether + lumefantrine	3	2 (67)	3 (100)	-	-	1 (33)	-	-
phenobarbital	3	1 (33)	-	1 (33)	1 (33)	-	-	-
cefuroxime	2	1 (50)	-	-	-	-	-	-
acetaminophen	2	-	2 (100)	-	-	-	-	-
isoniazid	2	1 (50)	-	-	-	-	-	-
amphotericin b	2	1 (50)	1 (50)	-	-	-	1 (50)	-
benzylpenicillin	2	1 (50)	-	-	1 (50)	-	-	-
captopril	2	2 (100)	-	-	-	-	-	-

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valaciclovir	2	1 (50)	2 (100)	-	-	-	-	-
clobazam	2	1 (50)	-	-	-	-	-	-
hydrocortisone	2	1 (50)	1 (50)	1 (50)	-	-	-	-
hydroxyurea	2	2 (100)	1 (50)	-	-	-	-	-
phenoxymethylpenicillin	2	-	-	-	-	-	1 (50)	-
prednisone	2	-	2 (100)	-	-	-	-	-
spironolactone	2	1 (50)	1 (50)	-	-	-	-	-
aminophylline	2	-	1 (50)	1 (50)	1 (50)	-	-	-
mebendazole	2	-	2 (100)	-	-	1 (50)	-	-
artesunate + amodiaquine	2	1 (50)	1 (50)	-	-	-	-	1 (50)
esomeprazole	2	1 (50)	2 (100)	-	-	-	-	-
levofloxacin	2	1 (50)	1 (50)	1 (50)	-	-	-	-
ritonavir	2	1 (50)	1 (50)	-	-	-	-	-
tacrolimus	2	-	1 (50)	-	-	-	-	-
corticotropin	2	1 (50)	-	-	-	-	-	-
insulin human	2	-	1 (50)	-	-	-	2 (100)	-
lamivudine + nevirapine + zidovudine	2	-	2 (100)	-	-	-	-	-
primaquine	2	1 (50)	2 (100)	-	-	-	-	-
pyrimethamine	2	-	2 (100)	-	-	-	-	1 (50)
desmopressin	2	-	1 (50)	-	1 (50)	-	-	-
loratadine	2	1 (50)	1 (50)	-	-	-	-	-
clindamycin	1	-	2 (200)	-	-	-	-	-
prednisolone	1	-	-	1 (100)	-	-	-	-
azithromycin	1	-	1 (100)	-	-	-	-	-
cloxacillin	1	-	-	-	1 (100)	-	-	-
ceftriaxone	1	-	-	-	1 (100)	-	-	-
dexamethasone	1	-	1 (100)	-	-	1 (100)	-	-
levothyroxine	1	-	1 (100)	-	-	-	-	-
methylprednisolone	1	-	-	-	-	-	-	1 (100)
abacavir + lamivudine	1	-	-	-	-	-	-	-
methylphenidate	1	-	-	-	-	-	-	1 (100)
epinephrine	1	-	-	-	-	-	1 (100)	-
isoniazid + pyrazinamide + rifampicin	1	1 (100)	-	-	-	-	-	-
albendazole	1	-	1 (100)	-	-	-	-	-
chloramphenicol	1	-	-	-	1 (100)	-	-	-



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ethambutol	1	-	-	-	-	-	-	1 (100)
linezolid	1	-	1 (100)	1 (100)	-	-	-	-
phenytoin	1	-	-	-	-	-	-	-
quinine	1	-	1 (100)	-	-	-	-	-
adalimumab	1	-	-	-	-	-	-	-
amlodipine	1	-	-	-	-	-	-	-
atomoxetine	1	-	-	-	-	-	-	-
baclofen	1	-	1 (100)	-	-	-	-	1 (100)
carbamazepine	1	-	1 (100)	-	1 (100)	-	-	-
chloroquine	1	-	-	-	1 (100)	-	-	-
enalapril	1	-	1 (100)	-	-	-	-	-
insulin lispro	1	-	1 (100)	-	1 (100)	-	1 (100)	-
ranitidine	1	1 (100)	-	-	-	-	-	-
vitamin e	1	-	1 (100)	-	-	-	-	-
anakinra	1	-	-	-	-	-	-	1 (100)
ascorbic acid	1	-	1 (100)	1 (100)	-	-	-	-
clonidine	1	-	-	-	-	-	-	-
diazoxide	1	-	-	-	-	-	-	-
filgrastim	1	-	-	-	1 (100)	-	1 (100)	-
fluconazole	1	-	1 (100)	-	-	-	-	-
lorazepam	1	1 (100)	-	1 (100)	1 (100)	-	-	-
mometasone furoate	1	-	1 (100)	-	-	-	-	-
prednisolone acetate	1	1 (100)	-	1 (100)	-	-	-	-
pseudoephedrine	1	-	1 (100)	-	-	-	-	-
topiramate	1	-	1 (100)	-	-	-	-	-
valganciclovir	1	1 (100)	-	-	-	-	-	1 (100)
vasopressin	1	-	-	-	-	-	-	-
vigabatrin	1	-	1 (100)	-	-	-	-	-
acarbose	1	-	-	-	-	-	-	-
amikacin	1	-	-	-	-	-	-	-
amodiaquine - sulfadoxine + pyrimethamine	1	-	-	1 (100)	-	-	-	-
antihemophilic factor, human recombinant	1	1 (100)	-	-	-	-	-	-
artesunate + pyronaridine tetraphosphate	1	1 (100)	-	-	-	-	-	-
betamethasone	1	-	-	-	-	-	-	-
bromodiphenhydramine	1	-	1 (100)	-	-	-	-	-



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clobetasol propionate	1	-	1 (100)	-	-	-	-	-
colchicine	1	-	1 (100)	-	-	-	-	1 (100)
ethionamide	1	-	1 (100)	-	-	-	-	-
fluticasone + salmeterol	1	-	-	-	1 (100)	-	-	-
folic acid	1	1 (100)	-	-	-	-	-	-
hydrochlorothiazide + spironolactone	1	-	1 (100)	-	-	-	-	1 (100)
lactulose	1	-	-	-	-	-	1 (100)	-
levamisole	1	-	1 (100)	-	-	-	-	-
levosalbutamol	1	-	-	-	-	-	-	-
omega-3-acid ethyl esters	1	-	-	-	-	-	1 (100)	-
oxcarbazepine	1	-	-	-	-	1 (100)	-	-
pancrelipase	1	-	-	-	-	-	-	-
pyrazinamide	1	1 (100)	-	1 (100)	-	-	-	-
temozolomide	1	-	1 (100)	-	-	-	-	-
tretinoin	1	1 (100)	-	-	-	-	-	-

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Table 9a. Products with dosing issues as reported by physicians. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Dosing issue							
		Discrepancies between dosing guidelines	Wide range of dose across age weightands	Lack of pk evidence for dosing regimen	lack of safety data	narrow therapeutic index	requirement for therapeutic drug monitoring	frequent dosing errors	other
Overall	335	53 (16)	45 (13)	33 (10)	32 (10)	33 (10)	46 (14)	65 (19)	47 (14)
digoxin	12	-	2 (17)	-	-	6 (50)	4 (33)	3 (25)	1 (8)
acetaminophen	10	3 (30)	-	1 (10)	-	-	-	4 (40)	2 (20)
furosemide	9	-	-	1 (11)	-	1 (11)	-	4 (44)	2 (22)
vancomycin	7	-	-	1 (14)	-	1 (14)	6 (86)	-	-
salbutamol	6	1 (17)	1 (17)	-	-	-	1 (17)	1 (17)	1 (17)
omeprazole	6	-	-	-	-	1 (17)	-	2 (33)	-
amoxicillin + clavulanic acid	6	2 (33)	2 (33)	-	-	-	-	1 (17)	2 (33)
amphotericin b	6	-	1 (17)	2 (33)	1 (17)	-	2 (33)	-	1 (17)
gentamicin	6	1 (17)	1 (17)	-	-	3 (50)	2 (33)	-	1 (17)
ciprofloxacin	5	-	-	-	1 (20)	-	-	2 (40)	1 (20)
isoniazid	5	-	-	-	-	-	-	1 (20)	1 (20)
abacavir + dolutegravir + lamivudine	5	1 (20)	1 (20)	2 (40)	2 (40)	-	-	-	2 (40)
lopinavir + ritonavir	4	-	-	1 (25)	-	-	-	1 (25)	2 (50)
clindamycin	4	-	-	-	-	-	-	1 (25)	1 (25)
valproic acid	4	-	1 (25)	-	1 (25)	-	2 (50)	1 (25)	1 (25)
caffeine	4	-	-	-	-	1 (25)	-	1 (25)	-
ibuprofen	4	1 (25)	1 (25)	-	2 (50)	-	-	1 (25)	-
abacavir + lamivudine	4	1 (25)	-	-	-	-	-	-	2 (50)
hydroxyurea	4	1 (25)	2 (50)	-	-	-	-	-	1 (25)
epinephrine	4	3 (75)	1 (25)	-	-	1 (25)	2 (50)	-	1 (25)
diazepam	4	1 (25)	-	-	-	-	1 (25)	-	-
amoxicillin	3	1 (33)	1 (33)	-	-	-	-	1 (33)	-
acyclovir	3	1 (33)	-	-	-	-	1 (33)	-	1 (33)

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sildenafil	3	-	-	1 (33)	-	-	-	1 (33)	-
methotrexate	3	-	-	1 (33)	1 (33)	1 (33)	-	1 (33)	-
ceftriaxone	3	-	-	-	-	-	-	1 (33)	2 (67)
artemether + lumefantrine	3	-	3 (100)	-	-	-	-	-	-
spironolactone	3	-	-	-	-	-	-	2 (67)	-
aminophylline	3	-	-	-	-	1 (33)	2 (67)	-	-
colistin	3	2 (67)	-	1 (33)	-	-	-	1 (33)	-
ethambutol	3	-	-	-	-	-	-	-	2 (67)
phenytoin	3	-	-	-	-	1 (33)	-	1 (33)	1 (33)
tacrolimus	3	-	-	-	-	-	2 (67)	-	-
ketamine	3	-	1 (33)	-	1 (33)	1 (33)	-	-	-
primaquine	3	1 (33)	1 (33)	1 (33)	1 (33)	-	-	1 (33)	-
flucloxacillin	2	1 (50)	-	1 (50)	-	-	-	-	1 (50)
isoniazid + pyrazinamide + rifampicin + etambutol	2	1 (50)	1 (50)	-	-	-	-	-	-
azithromycin	2	-	2 (100)	-	-	-	-	1 (50)	-
cloxacillin	2	-	1 (50)	-	-	-	-	-	-
dexamethasone	2	2 (100)	1 (50)	-	-	1 (50)	-	-	-
valaciclovir	2	1 (50)	-	-	1 (50)	-	-	-	-
abacavir + lamivudine + zidovudine	2	-	-	-	-	-	-	1 (50)	-
hydrocortisone	2	1 (50)	1 (50)	-	-	-	-	1 (50)	-
prednisone	2	-	-	1 (50)	-	-	-	1 (50)	-
trimethoprim + sulfamethoxazole	2	-	1 (50)	-	-	1 (50)	-	-	-
isoniazid + pyrazinamide + rifampicin	2	-	1 (50)	-	1 (50)	-	-	-	1 (50)
albendazole	2	1 (50)	1 (50)	1 (50)	1 (50)	-	-	-	-
ethosuximide	2	-	-	-	-	-	-	-	-
ganciclovir	2	-	-	-	-	-	-	-	-
griseofulvin	2	-	-	-	-	1 (50)	-	-	-
levofloxacin	2	-	1 (50)	-	-	1 (50)	-	-	-
linezolid	2	-	-	-	-	-	-	1 (50)	-
quinine	2	-	-	-	-	-	1 (50)	1 (50)	-
carbamazepine	2	-	-	-	1 (50)	-	2 (100)	1 (50)	-
chloroquine	2	1 (50)	-	-	-	1 (50)	1 (50)	-	-
dolutegravir + lamivudine	2	-	-	-	1 (50)	-	1 (50)	-	-
enalapril	2	-	1 (50)	-	-	-	-	1 (50)	-
pyrimethamine	2	-	1 (50)	-	-	-	-	-	-

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ranitidine	2	-	-	-	-	-	-	1 (50)	-
adenosine	2	-	-	-	-	2 (100)	-	-	-
atropine	2	-	-	-	-	-	1 (50)	-	-
budesonide + formoterol	2	-	-	1 (50)	-	-	-	-	-
cetirizine	2	2 (100)	-	1 (50)	1 (50)	-	-	-	-
esmolol	2	-	-	-	-	-	-	-	2 (100)
fluconazole	2	-	-	1 (50)	-	-	-	-	-
halothane	2	1 (50)	1 (50)	1 (50)	-	-	-	1 (50)	-
heparin	2	1 (50)	1 (50)	-	-	-	2 (100)	-	1 (50)
indomethacin	2	-	-	-	-	-	-	-	2 (100)
moxifloxacin	2	-	-	1 (50)	-	-	-	-	1 (50)
valganciclovir	2	-	-	1 (50)	-	1 (50)	-	-	1 (50)
warfarin	2	-	-	-	-	1 (50)	2 (100)	-	-
cefuroxime	1	-	-	-	-	-	-	-	1 (100)
prednisolone	1	-	-	-	-	-	-	-	-
benzylpenicillin	1	-	-	-	-	-	-	-	-
captopril	1	-	-	-	-	-	-	1 (100)	-
levothyroxine	1	-	-	-	-	-	-	1 (100)	-
methylprednisolone	1	1 (100)	1 (100)	-	-	-	-	-	-
phenobarbital	1	-	-	-	-	-	-	-	-
phenoxymethylpenicillin	1	-	-	-	-	-	-	-	-
mebendazole	1	-	-	-	-	-	-	-	1 (100)
artesunate + amodiaquine	1	-	-	-	-	-	-	1 (100)	-
azathioprine	1	-	-	-	-	-	1 (100)	-	-
chloramphenicol	1	1 (100)	-	-	-	-	-	-	-
doxycycline	1	-	-	-	-	-	-	-	-
esomeprazole	1	-	-	-	-	-	-	-	-
nitrofurantoin	1	-	-	-	-	-	-	-	-
adalimumab	1	-	-	-	-	-	-	-	-
ampicillin	1	1 (100)	-	-	-	-	-	-	-
atomoxetine	1	1 (100)	-	-	-	-	-	-	-
baclofen	1	-	-	-	-	-	-	1 (100)	-
ceftazidime	1	-	-	-	1 (100)	-	-	1 (100)	-
corticotropin	1	-	-	-	-	-	-	-	-
dexmedetomidine	1	-	-	-	2 (200)	-	-	-	-

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ferrous gluconate	1	-	-	-	-	-	-	-	-
insulin human	1	-	-	-	-	-	-	1 (100)	-
vitamin e	1	-	-	-	-	-	-	-	-
acetylcysteine	1	1 (100)	-	1 (100)	-	-	-	-	-
amiodarone	1	-	-	-	-	1 (100)	1 (100)	-	-
anakinra	1	-	-	-	-	-	-	-	1 (100)
bcg vaccine	1	1 (100)	-	-	-	-	-	-	-
beclomethasone dipropionate	1	-	-	-	-	-	-	-	-
carvedilol	1	-	-	1 (100)	1 (100)	-	-	-	-
clonidine	1	-	-	-	-	-	-	1 (100)	-
desmopressin	1	1 (100)	1 (100)	1 (100)	-	1 (100)	-	1 (100)	-
diazoxide	1	1 (100)	-	-	-	-	-	-	-
diclofenac	1	-	-	-	-	-	-	1 (100)	-
domperidone	1	-	-	-	-	-	-	1 (100)	-
dopamine	1	1 (100)	-	-	-	-	-	1 (100)	-
favipiravir	1	-	-	-	1 (100)	-	-	-	-
filgrastim	1	-	1 (100)	-	-	-	-	1 (100)	-
fludrocortisone	1	-	-	-	-	-	-	1 (100)	-
hydroxychloroquine	1	1 (100)	1 (100)	-	-	-	-	-	-
isoniazid + rifampicin	1	-	-	-	-	-	-	-	1 (100)
levetiracetam	1	-	-	1 (100)	-	-	-	-	-
loratadine	1	-	-	-	-	-	-	1 (100)	1 (100)
lorazepam	1	-	-	-	-	-	-	-	-
mometasone furoate	1	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)	-	-	-
morphine	1	-	-	-	-	-	-	1 (100)	-
mycophenolate mofetil	1	1 (100)	-	1 (100)	-	-	1 (100)	-	-
pantoprazole	1	-	-	-	1 (100)	-	-	-	-
prednisolone acetate	1	-	1 (100)	-	-	-	-	-	-
pseudoephedrine	1	1 (100)	-	-	-	-	-	-	-
raltegravir	1	-	-	-	-	-	-	-	-
sevelamer	1	-	-	-	-	-	-	-	-
tobramycin	1	-	-	-	-	-	-	-	-
vasopressin	1	-	-	-	-	-	-	-	1 (100)
acetylsalicylic acid	1	1 (100)	-	-	-	-	-	-	-
albumin human	1	-	-	-	-	-	1 (100)	1 (100)	-



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amikacin	1	-	-	-	-	-	-	-	-
artesunate + pyronaridine tetraphosphate	1	-	-	-	-	-	-	-	-
asparaginase	1	-	-	-	-	-	-	-	-
bedaquiline	1	-	-	-	-	-	-	-	-
benznidazole	1	-	-	-	-	-	-	-	-
bisoprolol	1	-	-	-	-	-	-	-	1 (100)
busulfan	1	1 (100)	-	-	-	-	-	1 (100)	-
calcium glucoheptonate	1	-	-	-	-	1 (100)	1 (100)	1 (100)	-
cephalexin	1	-	-	-	-	-	-	-	-
chlorpheniramine	1	-	-	-	-	-	-	1 (100)	-
coagulation factor ix (recombinant)	1	-	1 (100)	-	-	-	-	-	-
dapsone	1	-	-	-	-	-	-	-	1 (100)
desloratadine	1	1 (100)	-	1 (100)	1 (100)	-	-	-	-
desoximetasone	1	-	-	-	-	-	1 (100)	-	-
efavirenz + emtricitabine + tenofovir	1	-	-	-	-	-	-	-	-
ethinylestradiol	1	-	-	-	-	-	-	-	-
ethionamide	1	-	-	1 (100)	1 (100)	-	-	1 (100)	-
factor ix complex (human)	1	-	-	1 (100)	1 (100)	-	-	-	-
felbamate	1	-	-	-	-	-	-	-	-
folic acid	1	-	-	-	-	-	-	-	-
fosfomycin	1	-	-	-	1 (100)	-	-	-	1 (100)
infliximab	1	-	-	1 (100)	-	-	1 (100)	-	-
iron dextran	1	1 (100)	-	-	-	-	-	-	-
itraconazole	1	-	-	-	-	-	1 (100)	-	-
ivermectin	1	-	-	1 (100)	1 (100)	-	-	-	-
kanamycin	1	-	-	-	-	-	1 (100)	-	-
lamivudine + zidovudine	1	-	-	-	-	-	-	-	-
metoclopramide	1	-	-	-	-	-	-	1 (100)	-
midazolam	1	-	-	-	1 (100)	-	-	-	-
miltefosine	1	-	-	-	-	-	1 (100)	-	-
montelukast	1	-	-	-	-	-	-	-	-
mycophenolic acid	1	-	1 (100)	-	-	-	-	-	-
nalidixic acid	1	-	-	-	1 (100)	-	-	-	-
nifurtimox	1	-	-	-	-	-	-	-	-
omalizumab	1	-	-	1 (100)	-	-	-	-	-



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pentazocine	1	-	-	-	1 (100)	-	-	-	-
picosulphate sodium	1	-	1 (100)	-	-	-	-	1 (100)	1 (100)
propofol	1	1 (100)	-	-	-	-	-	-	-
propranolol	1	1 (100)	-	-	-	-	-	-	-
rabies vaccine	1	-	-	-	-	-	1 (100)	-	-
soldactone	1	1 (100)	1 (100)	-	1 (100)	-	-	-	-
streptomycin	1	-	-	-	-	1 (100)	-	-	-
theophylline	1	-	1 (100)	-	-	1 (100)	-	1 (100)	-
trihexyphenidyl	1	-	1 (100)	-	-	-	-	-	-
zanamivir	1	1 (100)	-	-	-	-	-	-	-

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Table 10a. Products prescribed off label as reported by physicians. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Off label use			
		unapproved indication	unapproved age group	unapproved dosage	unapproved route of administration
Overall	111	38 (34)	62 (56)	29 (26)	13 (12)
ciprofloxacin	4	1 (25)	2 (50)	-	-
sildenafil	3	2 (67)	3 (100)	2 (67)	-
aminophylline	3	-	-	-	2 (67)
doxycycline	3	1 (33)	2 (67)	-	-
dexmedetomidine	3	1 (33)	2 (67)	1 (33)	-
omeprazole	2	-	-	-	2 (100)
amoxicillin	2	2 (100)	-	2 (100)	-
digoxin	2	-	-	1 (50)	-
azithromycin	2	1 (50)	2 (100)	2 (100)	-
ceftriaxone	2	1 (50)	-	-	-
ibuprofen	2	-	1 (50)	1 (50)	-
valaciclovir	2	-	2 (100)	-	-
chloramphenicol	2	2 (100)	-	-	1 (50)
ketamine	2	1 (50)	-	1 (50)	-
ondansetron	2	1 (50)	-	-	1 (50)
pyrimethamine	2	-	2 (100)	1 (50)	-
milrinone	2	1 (50)	1 (50)	1 (50)	-
mometasone furoate	2	1 (50)	1 (50)	2 (100)	-
tenofovir disoproxil	2	-	2 (100)	-	-
clindamycin	1	-	1 (100)	-	-
isoniazid	1	-	-	1 (100)	-
acyclovir	1	-	1 (100)	-	-
abacavir + dolutegravir + lamivudine	1	-	-	-	1 (100)
metronidazole	1	1 (100)	-	-	-
caffeine	1	1 (100)	1 (100)	1 (100)	-

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methotrexate	1	1 (100)	1 (100)	-	1 (100)
dexamethasone	1	1 (100)	-	1 (100)	-
budesonide	1	-	-	-	-
methylphenidate	1	-	1 (100)	-	-
phenobarbital	1	-	-	-	1 (100)
trimethoprim + sulfamethoxazole	1	-	1 (100)	-	-
albendazole	1	1 (100)	1 (100)	-	-
azathioprine	1	-	1 (100)	-	-
esomeprazole	1	-	1 (100)	1 (100)	-
levofloxacin	1	-	1 (100)	-	-
linezolid	1	-	-	-	-
tacrolimus	1	-	-	-	-
chloroquine	1	-	-	1 (100)	-
corticotropin	1	1 (100)	-	-	-
primaquine	1	-	1 (100)	-	-
budesonide + formoterol	1	-	1 (100)	1 (100)	-
carvedilol	1	-	-	-	-
cetirizine	1	-	1 (100)	-	-
clonidine	1	2 (200)	1 (100)	1 (100)	1 (100)
diazoxide	1	1 (100)	-	-	-
dopamine	1	-	1 (100)	-	-
favipiravir	1	1 (100)	1 (100)	-	-
morphine	1	-	-	-	-
nevirapine	1	-	1 (100)	-	-
pantoprazole	1	1 (100)	1 (100)	1 (100)	-
pivmecillinam	1	-	-	-	-
posaconazole	1	-	1 (100)	-	-
acetylsalicylic acid	1	1 (100)	1 (100)	-	-
amikacin	1	-	-	-	-
artesunate + pyronaridine tetraphosphate	1	-	1 (100)	-	-
atovaquone	1	-	1 (100)	1 (100)	-
brentuximab vedotin	1	-	1 (100)	-	-
darunavir	1	-	-	1 (100)	-
desloratadine	1	-	1 (100)	-	-
dobutamine	1	-	1 (100)	-	-



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eculizumab	1	-	1 (100)	-	-
flecainide	1	-	-	1 (100)	1 (100)
flucytosine	1	-	1 (100)	-	-
infliximab	1	-	1 (100)	1 (100)	-
isoprinosine	1	1 (100)	-	-	-
ivabradine	1	-	1 (100)	-	-
ivermectin	1	1 (100)	1 (100)	-	-
lansoprazole	1	-	1 (100)	-	-
mirtazapine	1	-	1 (100)	-	-
olanzapine	1	1 (100)	-	-	-
omalizumab	1	1 (100)	1 (100)	1 (100)	-
polyethylene glycol 4--	1	-	1 (100)	-	-
propofol	1	-	1 (100)	-	-
propranolol	1	-	-	1 (100)	-
riboflavin	1	-	1 (100)	-	-
rifapentine	1	-	1 (100)	-	-
sodium bicarbonate	1	-	-	-	-
tazobactam	1	1 (100)	-	-	-
temocillin	1	1 (100)	1 (100)	-	-
tenofovir alafenamide	1	-	1 (100)	-	-
tetracycline	1	1 (100)	1 (100)	1 (100)	-
tiagabine	1	1 (100)	-	-	-
timolol	1	-	-	-	1 (100)
ustekinumab	1	1 (100)	1 (100)	-	-
vedolizumab	1	1 (100)	-	-	-
verapamil	1	-	1 (100)	-	-

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Table 11a. Products presenting difficulties when used in “special populations” as reported by physicians. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Special utilization						
		lack of indication for specific use	lack of safety data	lack of specific dosing guidelines	Drug-drug interaction	lack of pk data	Medication burden	other
<i>Overall</i>	95	17 (18)	14 (15)	17 (18)	3 (3)	6 (6)	11 (12)	22 (23)
ciprofloxacin	3	2 (67)	-	-	-	1 (33)	-	-
abacavir + dolutegravir + lamivudine	3	-	-	-	-	-	-	1 (33)
caffeine	3	-	-	-	-	-	-	-
amphotericin b	3	1 (33)	-	1 (33)	-	-	-	1 (33)
lopinavir + ritonavir	2	-	-	2 (100)	-	-	1 (50)	-
salbutamol	2	-	-	-	-	-	-	2 (100)
omeprazole	2	1 (50)	-	-	-	-	1 (50)	-
amoxicillin	2	-	-	1 (50)	-	-	-	1 (50)
acetaminophen	2	1 (50)	-	-	-	-	1 (50)	-
isoniazid	2	-	-	-	-	-	1 (50)	1 (50)
valproic acid	2	-	-	1 (50)	-	-	-	-
methylphenidate	2	-	-	-	-	-	-	2 (100)
trimethoprim + sulfamethoxazole	2	-	-	-	-	-	1 (50)	1 (50)
aminophylline	2	-	1 (50)	-	-	-	-	-
chloramphenicol	2	1 (50)	-	-	-	-	-	-
corticotropin	2	-	-	-	-	-	-	1 (50)
primaquine	2	-	2 (100)	2 (100)	-	1 (50)	-	-
atropine	2	-	-	-	-	-	-	-
cefuroxime	1	-	-	-	-	-	-	1 (100)
digoxin	1	-	-	-	-	1 (100)	-	-
azithromycin	1	1 (100)	-	-	1 (100)	-	-	-
metronidazole	1	-	-	-	-	-	-	-
cloxacillin	1	1 (100)	-	-	-	-	-	-
gentamicin	1	-	-	-	-	-	-	1 (100)

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dexamethasone	1	-	-	-	-	-	-	-
levothyroxine	1	-	-	-	-	-	-	-
valaciclovir	1	-	-	-	-	-	-	1 (100)
clobazam	1	-	-	-	-	-	-	-
hydrocortisone	1	-	-	-	-	-	-	1 (100)
phenobarbital	1	-	-	-	-	-	-	-
albendazole	1	1 (100)	1 (100)	1 (100)	-	1 (100)	-	-
doxycycline	1	1 (100)	1 (100)	-	-	-	-	-
ganciclovir	1	1 (100)	-	-	-	-	-	1 (100)
ritonavir	1	-	-	-	-	-	-	-
adalimumab	1	-	-	-	-	-	-	-
ampicillin	1	-	-	-	-	-	-	-
baclofen	1	-	-	-	-	-	-	-
carbamazepine	1	-	-	-	-	-	1 (100)	-
ceftazidime	1	-	-	-	-	-	-	1 (100)
chloroquine	1	-	-	-	1 (100)	-	-	-
cyclosporine	1	-	-	-	-	-	-	-
dolutegravir + lamivudine	1	-	-	-	-	-	-	1 (100)
ondansetron	1	-	1 (100)	1 (100)	-	-	-	-
pyrimethamine	1	-	-	-	-	-	1 (100)	-
ranitidine	1	1 (100)	-	-	1 (100)	-	-	-
acetylcysteine	1	-	-	1 (100)	-	-	-	-
ascorbic acid	1	-	-	1 (100)	-	-	-	-
cetirizine	1	1 (100)	1 (100)	1 (100)	-	-	1 (100)	-
fluoxetine	1	1 (100)	-	1 (100)	-	-	-	-
halothane	1	-	-	-	-	-	-	-
lorazepam	1	1 (100)	-	-	-	1 (100)	-	-
mercaptopurine	1	-	-	-	-	-	-	-
mometasone furoate	1	1 (100)	-	1 (100)	-	-	-	-
nevirapine	1	-	-	-	-	-	-	-
posaconazole	1	-	-	1 (100)	-	-	-	-
raltegravir	1	-	-	-	-	1 (100)	-	-
alemtuzumab	1	-	-	-	-	-	-	-
amikacin	1	-	-	-	-	-	-	-
artesunate + pyronaridine tetraphosphate	1	-	-	-	-	-	1 (100)	-



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carboplatin	1	-	-	-	-	-	-	1 (100)
carboprost tromethamine	1	-	-	-	-	-	-	-
cefdinir	1	-	-	-	-	-	-	-
cefixime	1	-	-	-	-	-	-	-
desloratadine	1	1 (100)	1 (100)	1 (100)	-	-	-	-
diloxanide furoate	1	-	-	-	-	-	-	1 (100)
erythromycin	1	-	-	1 (100)	-	-	-	-
interferon alfa-2a, recombinant	1	-	-	-	-	-	-	-
kanamycin	1	-	-	-	-	-	-	1 (100)
meropenem	1	-	-	-	-	-	1 (100)	-
pancrelipase	1	-	-	-	-	-	-	-
piperacillin	1	-	-	-	-	-	1 (100)	-
rituximab	1	-	-	-	-	-	-	1 (100)
sulfadiazine	1	-	-	-	-	-	-	1 (100)

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Table 12a. Problematic products as reported by nurses. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Formulation							Acceptability	Usability	Special use
		Parenteral preparation	Oral liquid	Tablet	Topical	Capsule	Rectal preparation	Preparation for inhalation			
<i>Overall</i>	96	38 (68)	26 (63)	24 (11)	4 (5)	2 (3)	1 (3)	1 (139)	53 (126)	48 (47)	38 (68)
amoxicillin + clavulanic acid	7	2 (29)	4 (57)	1 (14)	-	-	-	-	3 (43)	4 (57)	1 (14)
benzylpenicillin	4	4 (100)	-	-	-	-	-	-	-	2 (50)	-
metronidazole	4	-	-	4 (100)	-	-	-	-	4 (100)	-	-
cefotaxime	3	3 (100)	-	-	-	-	-	-	1 (33)	-	2 (67)
diazepam	3	2 (67)	1 (33)	-	-	-	-	-	3 (100)	2 (67)	1 (33)
gentamicin	3	2 (67)	-	-	1 (33)	-	-	-	-	1 (33)	2 (67)
albendazole	2	-	-	2 (100)	-	-	-	-	2 (100)	-	-
aminophylline	2	2 (100)	-	-	-	-	-	-	1 (50)	1 (50)	-
amoxicillin	2	-	2 (100)	-	-	-	-	-	2 (100)	2 (100)	-
cefuroxime	2	-	2 (100)	-	-	-	-	-	1 (50)	-	-
cloxacillin	2	2 (100)	-	-	-	-	-	-	2 (100)	1 (50)	1 (50)
digoxin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)
ferrous fumarate	2	-	2 (100)	-	-	-	-	-	2 (100)	1 (50)	-
midazolam	2	1 (50)	1 (50)	-	-	-	-	-	1 (50)	1 (50)	-
morphine	2	2 (100)	-	-	-	-	-	-	-	1 (50)	-
vancomycin	2	2 (100)	-	-	-	-	-	-	-	1 (50)	2 (100)
acetaminophen	1	-	-	-	-	-	1 (100)	-	1 (100)	-	-
alefacept	1	-	-	-	-	1 (100)	-	-	1 (100)	-	-
allopurinol	1	-	-	1 (100)	-	-	-	-	1 (100)	1 (100)	-
amikacin	1	1 (100)	-	-	-	-	-	-	1 (100)	-	-
amphotericinb	1	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)	-
ampicillin	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)
ardeparin	1	-	1 (100)	-	-	-	-	-	1 (100)	1 (100)	-
artemether + lumefantrine	1	-	-	1 (100)	-	-	-	-	1 (100)	-	-
artesunate + amodiaquine	1	-	-	1 (100)	-	-	-	-	1 (100)	1 (100)	-
ascorbicacid	1	-	-	1 (100)	-	-	-	-	1 (100)	-	-
atropine	1	-	-	-	1 (100)	-	-	-	1 (100)	1 (100)	-

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bcg vaccine	1	1 (100)	-	-	-	-	-	-	-	1 (100)	-
bimatoprost	1	-	1 (100)	-	-	-	-	-	-	1 (100)	-
caffeine	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)
captopril	1	-	-	1 (100)	-	-	-	-	1 (100)	1 (100)	-
carbamazepine	1	-	-	1 (100)	-	-	-	-	-	1 (100)	-
cephalexin	1	-	1 (100)	-	-	-	-	-	1 (100)	-	-
cephaloglycin	1	-	-	1 (100)	-	-	-	-	1 (100)	-	-
chloramphenicol	1	-	-	-	-	1 (100)	-	-	1 (100)	1 (100)	-
chloroquine	1	-	1 (100)	-	-	-	-	-	-	1 (100)	-
ciprofloxacin	1	1 (100)	-	-	-	-	-	-	-	1 (100)	-
clindamycin	1	1 (100)	-	-	-	-	-	-	-	1 (100)	-
diazoxide	1	-	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)
epinephrine	1	1 (100)	-	-	-	-	-	-	-	1 (100)	-
erythromycin	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)
ferrous sulfate anhydrous	1	-	1 (100)	-	-	-	-	-	1 (100)	1 (100)	-
flucloxacillin	1	-	1 (100)	-	-	-	-	-	-	-	-
fluorometholone	1	-	-	-	1 (100)	-	-	-	1 (100)	1 (100)	-
insulinlispro	1	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)	-
insulinpork	1	1 (100)	-	-	-	-	-	-	-	1 (100)	-
ironsucrose	1	-	1 (100)	-	-	-	-	-	1 (100)	1 (100)	-
isoniazid	1	-	1 (100)	-	-	-	-	-	1 (100)	-	-
ketamine	1	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)	-
lopinavir + ritonavir	1	-	1 (100)	-	-	-	-	-	1 (100)	1 (100)	-
meropenem	1	1 (100)	-	-	-	-	-	-	-	-	1 (100)
metoclopramide	1	-	1 (100)	-	-	-	-	-	-	1 (100)	-
omeprazole	1	-	-	1 (100)	-	-	-	-	-	1 (100)	-
pantoprazole	1	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)	-
potassium citrate	1	-	-	1 (100)	-	-	-	-	1 (100)	-	-
prednisone	1	-	-	1 (100)	-	-	-	-	1 (100)	-	-
prostaglandin 2	1	-	-	1 (100)	-	-	-	-	-	1 (100)	-
quinine	1	-	-	1 (100)	-	-	-	-	1 (100)	1 (100)	-
rabies vaccine	1	1 (100)	-	-	-	-	-	-	-	1 (100)	1 (100)
rifampicin	1	-	1 (100)	-	-	-	-	-	1 (100)	-	-
rifamycin	1	-	-	-	1 (100)	-	-	-	1 (100)	1 (100)	-
salbutamol	1	-	-	-	-	-	-	1 (100)	1 (100)	1 (100)	1 (100)
sildenafil	1	-	-	1 (100)	-	-	-	-	-	-	-



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tinidazole	1	-	-	1 (100)	-	-	-	-	1 (100)	-	-
valaciclovir	1	-	1 (100)	-	-	-	-	-	1 (100)	-	-
varicella vaccine	1	1 (100)	-	-	-	-	-	-	-	1 (100)	-
warfarin	1	-	-	1 (100)	-	-	-	-	-	-	1 (100)
zinc ascorbate	1	-	-	1 (100)	-	-	-	-	1 (100)	-	-



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Table 13a. Problematic products by pharmaceutical form as reported by nurses. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	Formulation	N	Acceptability	Usability	Other
acetaminophen	rectal preparation	1	1 (100)	-	-
albendazole	tablet	2	2 (100)	-	-
alefacept	capsule	1	1 (100)	-	-
allopurinol	tablet	1	1 (100)	1 (100)	-
amikacin	parenteral preparation	1	1 (100)	-	-
aminophylline	parenteral preparation	2	1 (50.0)	1 (50.0)	-
amoxicillin	oral liquid	2	2 (100)	2 (100)	-
amoxicillin + clavulanic acid	oral liquid	4	2 (50.0)	2 (50.0)	1 (25.0)
	parenteral preparation	2	-	2 (100)	-
	tablet	1	1 (100)	-	-
amphotericin b	parenteral preparation	1	1 (100)	1 (100)	-
ampicillin	parenteral preparation	1	-	-	1 (100)
ardeparin	oral liquid	1	1 (100)	1 (100)	-
artemether + lumefantrine	tablet	1	1 (100)	-	-
artesunate + amodiaquine	tablet	1	1 (100)	1 (100)	-
ascorbic acid	tablet	1	1 (100)	-	-
atropine	topical	1	1 (100)	1 (100)	-
bcg vaccine	parenteral preparation	1	-	1 (100)	-
benzylpenicillin	parenteral preparation	4	-	2 (50.0)	-
bimatoprost	oral liquid	1	-	1 (100)	-
caffeine	parenteral preparation	1	-	-	1 (100)
captopril	tablet	1	1 (100)	1 (100)	-
carbamazepine	tablet	1	-	1 (100)	-
cefotaxime	parenteral preparation	3	1 (33.3)	-	2 (66.7)
cefuroxime	oral liquid	2	1 (50.0)	-	-
cephalexin	oral liquid	1	1 (100)	-	-
cephaloglycin	tablet	1	1 (100)	-	-
chloramphenicol	capsule	1	1 (100)	1 (100)	-
chloroquine	oral liquid	1	-	1 (100)	-
ciprofloxacin	parenteral preparation	1	-	1 (100)	-
clindamycin	parenteral preparation	1	-	1 (100)	-



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cloxacillin	parenteral preparation	2	2 (100)	1 (50.0)	1 (50.0)
diazepam	oral liquid	1	1 (100)	1 (100)	-
	parenteral preparation	2	2 (100)	1 (50.0)	1 (50.0)
diazoxide	oral liquid	1	-	1 (100)	1 (100)
digoxin	oral liquid	1	-	-	1 (100)
epinephrine	parenteral preparation	1	-	1 (100)	-
erythromycin	tablet	1	-	-	1 (100)
ferrous fumarate	oral liquid	2	2 (100)	1 (50.0)	-
ferrous sulfate anhydrous	oral liquid	1	1 (100)	1 (100)	-
fluorometholone	topical	1	1 (100)	1 (100)	-
gentamicin	parenteral preparation	2	-	1 (50.0)	1 (50.0)
	topical	1	-	-	1 (100)
insulin lispro	parenteral preparation	1	1 (100)	1 (100)	-
insulin pork	parenteral preparation	1	-	1 (100)	-
iron sucrose	oral liquid	1	1 (100)	1 (100)	-
isoniazid	oral liquid	1	1 (100)	-	-
ketamine	parenteral preparation	1	1 (100)	1 (100)	-
lopinavir + ritonavir	oral liquid	1	1 (100)	1 (100)	-
meropenem	parenteral preparation	1	-	-	1 (100)
metoclopramide	oral liquid	1	-	1 (100)	-
metronidazole	tablet	4	4 (100)	-	-
	oral liquid	1	1 (100)	-	-
midazolam	parenteral preparation	1	-	1 (100)	-
morphine	parenteral preparation	2	-	1 (50.0)	-
omeprazole	tablet	1	-	1 (100)	-
pantoprazole	parenteral preparation	1	1 (100)	1 (100)	-
potassium citrate	tablet	1	1 (100)	-	-
prednisone	tablet	1	1 (100)	-	-
prostaglandin d2	tablet	1	-	1 (100)	-
quinine	tablet	1	1 (100)	1 (100)	-
rabies vaccine	parenteral preparation	1	-	1 (100)	1 (100)
rifampicin	oral liquid	1	1 (100)	-	-
rifamycin	topical	1	1 (100)	1 (100)	-
salbutamol	preparation for inhalation	1	1 (100)	1 (100)	1 (100)
tinidazole	tablet	1	1 (100)	-	-
valaciclovir	oral liquid	1	1 (100)	-	-



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vancomycin	parenteral preparation	2	-	1 (50.0)	2 (100)
varicella vaccine	parenteral preparation	1	-	1 (100)	-
warfarin	tablet	1	-	-	1 (100)
zinc ascorbate	tablet	1	1 (100)	-	-

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Table 14a. Acceptability issues as reported by nurses. Data are shown as numbers, N and percentages (%) of the total by row.

medicine	N	Acceptability						
		Taste/after taste	Tablet/capsule size	High volume of liquid for a single dose	Numerous daily administrations	Texture appearance/smell	Complexities in using the device	Other
<i>Overall</i>	53	28 (53)	9 (17)	8 (15)	16 (30)	9 (17)	2 (4)	6 (11)
metronidazole	4	4 (100)	1 (25)	-	2 (50)	-	-	-
amoxicillin + clavulanic acid	3	3 (100)	1 (33)	2 (67)	1 (33)	1 (33)	-	-
diazepam	3	1 (33)	-	2 (67)	1 (33)	-	-	1 (33)
albendazole	2	1 (50)	2 (100)	-	-	-	-	-
amoxicillin	2	1 (50)	-	-	1 (50)	1 (50)	-	-
cloxacillin	2	-	-	1 (50)	1 (50)	-	-	1 (50)
ferrous fumarate	2	2 (100)	-	-	1 (50)	1 (50)	-	-
cefotaxime	1	-	-	-	-	-	-	1 (100)
aminophylline	1	-	-	-	-	-	1 (100)	-
cefuroxime	1	2 (200)	-	-	-	1 (100)	-	-
midazolam	1	1 (100)	-	-	-	-	-	1 (100)
acetaminophen	1	-	-	-	-	-	-	-
alefacept	1	-	-	-	-	-	-	-
allopurinol	1	-	-	-	1 (100)	-	-	-
amikacin	1	-	-	-	-	-	-	1 (100)
amphotericin b	1	-	-	-	-	-	1 (100)	-
ardeparin	1	-	-	-	-	-	-	-
artemether + lumefantrine	1	-	-	-	-	-	-	-
artesunate + amodiaquine	1	-	-	-	-	-	-	-
ascorbic acid	1	1 (100)	-	-	-	-	-	-
atropine	1	-	-	-	-	1 (100)	-	-
captopril	1	1 (100)	-	-	1 (100)	-	-	-
cephalexin	1	1 (100)	-	-	-	-	-	-
cephaloglycin	1	1 (100)	-	-	-	-	-	-
chloramphenicol	1	1 (100)	1 (100)	-	1 (100)	-	-	-
ferrous sulfate anhydrous	1	1 (100)	-	1 (100)	1 (100)	1 (100)	-	-
fluorometholone	1	-	-	-	-	-	-	1 (100)



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Insulin lispro	1	-	-	-	1 (100)	-	-	-
Iron sucrose	1	1 (100)	-	-	-	1 (100)	-	-
isoniazid	1	-	-	1 (100)	-	-	-	-
ketamine	1	-	-	-	-	-	-	-
lopinavir + ritonavir	1	1 (100)	-	-	-	-	-	-
pantoprazole	1	-	-	-	-	-	-	-
potassium citrate	1	-	1 (100)	-	-	-	-	-
prednisone	1	1 (100)	1 (100)	-	-	-	-	-
quinine	1	1 (100)	-	-	-	-	-	-
rifampicin	1	-	-	1 (100)	-	1 (100)	-	-
rifamycin	1	-	-	-	-	1 (100)	-	-
salbutamol	1	-	-	-	1 (100)	-	-	-
tinidazole	1	1 (100)	1 (100)	-	-	-	-	-
valaciclovir	1	1 (100)	-	-	-	-	-	-
zinc ascorbate	1	-	1 (100)	-	-	-	-	-



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Table 15a. Usability issues as reported by nurses. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Usability							
		complex preparation	need for dilution for dosing	determination of the dose	need for a vehicle	problematic administration device	problematic packaging opening/closing	need to be stored at a specific temperature	Other
<i>Overall</i>	48	9 (19)	19 (40)	20 (42)	2 (4)	5 (10)	2 (4)	15 (31)	5 (10)
amoxicillin + clavulanic acid	4	1 (25)	1 (25)	-	-	-	-	4 (100)	1 (25)
benzylpenicillin	2	-	3 (150)	-	-	-	-	-	-
diazepam	2	-	-	2 (100)	-	-	1 (50)	1 (50)	-
amoxicillin	2	1 (50)	1 (50)	-	-	-	-	1 (50)	1 (50)
gentamicin	1	-	1 (100)	1 (100)	-	-	-	-	-
aminophylline	1	-	1 (100)	1 (100)	-	-	-	-	-
cloxacillin	1	-	-	-	-	-	-	-	1 (100)
ferrous fumarate	1	-	-	-	-	-	-	-	-
midazolam	1	-	1 (100)	-	-	-	-	-	-
morphine	1	-	1 (100)	-	-	-	-	-	-
vancomycin	1	-	-	1 (100)	-	-	-	-	-
allopurinol	1	-	-	-	-	-	-	-	1 (100)
amphotericin b	1	1 (100)	-	1 (100)	-	-	-	-	-
ardeparin	1	-	-	1 (100)	-	-	-	-	-
artesanate + amodiaquine	1	-	-	-	-	-	-	-	-
atropine	1	-	-	-	-	-	-	-	1 (100)
bcg vaccine	1	-	-	-	-	-	-	1 (100)	-
bimatoprost	1	-	1 (100)	-	-	-	-	-	-
captopril	1	-	1 (100)	1 (100)	-	-	-	1 (100)	-
carbamazepine	1	-	-	1 (100)	-	-	-	-	-
chloramphenicol	1	-	-	-	-	-	-	-	-
chloroquine	1	-	-	-	1 (100)	-	-	-	-
ciprofloxacin	1	-	1 (100)	-	-	-	-	-	-
clindamycin	1	-	-	1 (100)	-	-	-	-	-
diazoxide	1	-	-	1 (100)	-	-	-	-	-
epinephrine	1	-	1 (100)	1 (100)	-	-	-	-	-



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ferrous sulfate anhydrous	1	-	-	-	-	-	-	1 (100)	-
fluorometholone	1	1 (100)	-	-	-	-	-	-	-
insulin lispro	1	-	-	1 (100)	-	-	-	1 (100)	-
insulin pork	1	1 (100)	1 (100)	-	-	1 (100)	-	-	-
ironsucrose	1	-	-	-	-	-	-	-	-
ketamine	1	-	1 (100)	-	-	-	-	-	-
lopinavir + ritonavir	1	-	-	-	-	-	-	1 (100)	-
metoclopramide	1	-	-	1 (100)	-	-	-	-	-
omeprazole	1	1 (100)	-	-	-	-	-	-	-
pantoprazole	1	-	-	1 (100)	-	-	-	-	-
prostaglandin d2	1	-	1 (100)	-	-	1 (100)	-	1 (100)	-
quinine	1	-	-	-	1 (100)	-	-	-	-
rabies vaccine	1	1 (100)	-	1 (100)	-	-	-	1 (100)	-
rifamycin	1	-	-	-	-	1 (100)	-	-	-
salbutamol	1	-	1 (100)	-	-	1 (100)	-	1 (100)	-
varicella vaccine	1	-	-	-	-	1 (100)	-	-	-

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Table 16a. Problematic products as reported by pharmacists. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Formulation										Extemporaneous preparation	Reconstitution and stability	Off-label use	Special use
		Oral liquid	Tablet	Parentral preparation	Capsule	Rectal preparation	Preparation for inhalation	Topical	Ophthalmological preparation	Fine granules	Other				
Overall	526	190 (36)	160 (30)	73 (14)	53 (10)	12 (2)	9 (2)	4 (0.8)	3 (0)	1 (0)	8 (2)	294 (56)	181 (34)	91 (17)	106 (20)
omeprazole	18	11 (61)	2 (11)	-	4 (22)	-	-	-	-	-	1 (6)	11 (61)	11 (61)	4 (22)	2 (11)
phenobarbital	12	3 (25)	8 (67)	1 (8)	-	-	-	-	-	-	-	8 (67)	3 (25)	1 (8)	5 (42)
acetylsalicylic acid	11	3 (27)	7 (64)	-	1 (9)	-	-	-	-	-	-	8 (73)	4 (36)	1 (9)	3 (27)
azithromycin	10	8 (80)	2 (20)	-	-	-	-	-	-	-	-	-	8 (80)	1 (10)	-
ciprofloxacin	9	5 (56)	4 (44)	-	-	-	-	-	-	-	-	7 (78)	4 (44)	2 (22)	1 (11)
furosemide	9	4 (44)	4 (44)	-	1 (11)	-	-	-	-	-	-	7 (78)	1 (11)	2 (22)	2 (22)
amoxicillin + clavulanic acid	8	7 (88)	1 (13)	-	-	-	-	-	-	-	-	-	8 (100)	-	-
captopril	8	3 (38)	5 (63)	-	-	-	-	-	-	-	-	7 (88)	3 (38)	3 (38)	-
hydroxyurea	8	4 (50)	-	-	4 (50)	-	-	-	-	-	-	7 (88)	4 (50)	1 (13)	1 (13)
sildenafil	8	4 (50)	2 (25)	2 (25)	-	-	-	-	-	-	-	4 (50)	2 (25)	1 (13)	2 (25)
abacavir + dolutegravir + lamivudine	7	-	5 (71)	1 (14)	-	1 (14)	-	-	-	-	-	2 (29)	3 (43)	2 (29)	2 (29)



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amoxicillin	7	4 (57)	1 (14)	-	2 (29)	-	-	-	-	-	-	1 (14)	3 (43)	1 (14)	2 (29)
clonidine	7	6 (86)	1 (14)	-	-	-	-	-	-	-	-	7 (100)	3 (43)	-	-
digoxin	7	3 (43)	4 (57)	-	-	-	-	-	-	-	-	5 (71)	1 (14)	1 (14)	1 (14)
prednisolone	7	3 (43)	4 (57)	-	-	-	-	-	-	-	-	5 (71)	2 (29)	-	2 (29)
tacrolimus	7	5 (71)	1 (14)	-	1 (14)	-	-	-	-	-	-	6 (86)	6 (86)	1 (14)	1 (14)
calcitriol	6	-	1 (17)	-	5 (83)	-	-	-	-	-	-	4 (67)	2 (33)	1 (17)	1 (17)
clindamycin	6	2 (33)	-	-	3 (50)	-	-	-	-	-	-	4 (67)	3 (50)	-	-
topiramate	6	3 (50)	3 (50)	-	-	-	-	-	-	-	-	5 (83)	2 (33)	-	1 (17)
bosentan	5	4 (80)	1 (20)	-	-	-	-	-	-	-	-	4 (80)	3 (60)	3 (60)	-
clopidogrel	5	1 (20)	3 (60)	-	-	-	-	-	-	-	-	4 (80)	-	1 (20)	-
dexamethasone	5	2 (40)	2 (40)	1 (20)	-	-	-	-	-	-	-	2 (40)	2 (40)	-	5 (100)
enalapril	5	1 (20)	3 (60)	-	-	-	-	-	-	1 (20)	-	3 (60)	2 (40)	1 (20)	-
esomeprazole	5	2 (40)	1 (20)	-	-	-	-	-	-	-	2 (40)	3 (60)	1 (20)	3 (60)	-
hydrocortisone	5	3 (60)	2 (40)	-	-	-	-	-	-	-	-	4 (80)	4 (80)	-	-
lopinavir + ritonavir	5	3 (60)	1 (20)	-	-	-	-	-	-	-	1 (20)	1 (20)	3 (60)	-	2 (40)
propranolol	5	-	4 (80)	1 (20)	-	-	-	-	-	-	-	4 (80)	1 (20)	1 (20)	-
abacavir	4	1 (25)	3 (75)	-	-	-	-	-	-	-	-	3 (75)	2 (50)	1 (25)	-
baclofen	4	1 (25)	3 (75)	-	-	-	-	-	-	-	-	4 (100)	1 (25)	-	1 (25)



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carbamazepine	4	3 (75)	1 (25)	-	-	-	-	-	-	-	-	1 (25)	3 (75)	-	1 (25)
diazepam	4	-	-	-	-	4 (100)	-	-	-	-	-	1 (25)	-	2 (50)	1 (25)
diclofenac	4	-	-	-	-	3 (75)	-	-	-	-	1 (25)	2 (50)	-	2 (50)	-
enoxaparin	4	-	-	3 (75)	-	-	-	-	-	-	-	2 (50)	2 (50)	1 (25)	-
fentanyl	4	-	-	4 (100)	-	-	-	-	-	-	-	3 (75)	2 (50)	-	-
levothyroxine	4	2 (50)	1 (25)	-	-	-	-	-	-	-	-	4 (100)	1 (25)	-	-
morphine	4	2 (50)	1 (25)	-	1 (25)	-	-	-	-	-	-	2 (50)	3 (75)	-	2 (50)
pegfilgrastim	4	-	-	4 (100)	-	-	-	-	-	-	-	3 (75)	2 (50)	1 (25)	-
spironolactone	4	1 (25)	2 (50)	1 (25)	-	-	-	-	-	-	-	4 (100)	1 (25)	1 (25)	-
amiodarone	3	-	1 (33)	2 (67)	-	-	-	-	-	-	-	1 (33)	1 (33)	-	1 (33)
amphotericin b	3	-	-	3 (100)	-	-	-	-	-	-	-	2 (67)	-	-	1 (33)
artemether + lumefantrine	3	1 (33)	1 (33)	-	-	-	-	-	-	-	-	-	-	1 (33)	2 (67)
atenolol	3	2 (67)	1 (33)	-	-	-	-	-	-	-	-	2 (67)	1 (33)	1 (33)	2 (67)
cefixime	3	1 (33)	1 (33)	-	1 (33)	-	-	-	-	-	-	2 (67)	-	-	1 (33)
ethambutol	3	1 (33)	1 (33)	-	-	-	-	-	-	-	-	2 (67)	2 (67)	-	-
folic acid	3	1 (33)	1 (33)	-	-	-	-	-	-	-	-	1 (33)	2 (67)	-	1 (33)
gentamicin	3	-	-	2 (67)	-	-	-	-	1 (33)	-	-	-	2 (67)	-	2 (67)
isoniazid	3	2 (67)	-	-	1 (33)	-	-	-	-	-	-	2 (67)	-	-	-



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mercaptopurine	3	-	3 (100)	-	-	-	-	-	-	-	-	1 (33)	1 (33)	-	1 (33)
methotrexate	3	-	2 (67)	-	-	-	-	-	-	-	1 (33)	1 (33)	-	1 (33)	1 (33)
metoprolol	3	2 (67)	1 (33)	-	-	-	-	-	-	-	-	3 (100)	-	-	-
ondansetron	3	2 (67)	1 (33)	-	-	-	-	-	-	-	-	1 (33)	1 (33)	-	2 (67)
oseltamivir	3	-	-	-	3 (100)	-	-	-	-	-	-	2 (67)	3 (100)	-	-
quinine	3	1 (33)	2 (67)	-	-	-	-	-	-	-	-	1 (33)	3 (100)	-	-
trimethoprim + sulfamethoxazole	3	-	1 (33)	1 (33)	-	-	-	-	-	-	-	-	1 (33)	-	2 (67)
valaciclovir	3	1 (33)	1 (33)	-	-	-	-	-	1 (33)	-	-	3 (100)	1 (33)	-	1 (33)
vancomycin	3	1 (33)	-	1 (33)	1 (33)	-	-	-	-	-	-	2 (67)	1 (33)	-	1 (33)
vigabatrin	3	1 (33)	1 (33)	-	-	-	-	-	-	-	1 (33)	2 (67)	2 (67)	-	1 (33)
abacavir + lamivudine + zidovudine	2	-	1 (50)	-	1 (50)	-	-	-	-	-	-	1 (50)	1 (50)	-	1 (50)
abequose	2	-	-	1 (50)	1 (50)	-	-	-	-	-	-	1 (50)	1 (50)	-	-
acetaminophen	2	-	1 (50)	-	-	1 (50)	-	-	-	-	-	2 (100)	-	-	1 (50)
alprostadil	2	-	-	2 (100)	-	-	-	-	-	-	-	1 (50)	1 (50)	-	-
atazanavir	2	-	1 (50)	-	1 (50)	-	-	-	-	-	-	1 (50)	1 (50)	-	1 (50)
azathioprine	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	2 (100)	-	1 (50)	-
bisoprolol	2	-	2 (100)	-	-	-	-	-	-	-	-	1 (50)	1 (50)	1 (50)	-
budesonide	2	-	-	-	-	-	2 (100)	-	-	-	-	-	1 (50)	1 (50)	-



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bumetanide	2	-	1 (50)	1 (50)	-	-	-	-	-	-	-	1 (50)	-	1 (50)	-
caffeine	2	2 (100)	-	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)	1 (50)
ceftriaxone	2	-	-	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	1 (50)
clobazam	2	-	2 (100)	-	-	-	-	-	-	-	-	1 (50)	-	-	1 (50)
colforsin	2	-	2 (100)	-	-	-	-	-	-	-	-	2 (100)	-	-	-
dalteparin	2	-	-	2 (100)	-	-	-	-	-	-	-	2 (100)	-	1 (50)	-
desmopressin	2	-	2 (100)	-	-	-	-	-	-	-	-	-	-	-	2 (100)
dexmedetomidine	2	1 (50)	-	1 (50)	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)
domperidone	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	2 (100)	-	-	-
efavirenz	2	-	1 (50)	-	1 (50)	-	-	-	-	-	-	1 (50)	-	1 (50)	-
etoposide	2	-	-	1 (50)	1 (50)	-	-	-	-	-	-	1 (50)	1 (50)	-	-
ferrous sulfate anhydrous	2	2 (100)	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-	1 (50)
flecainide	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	2 (100)	-	-	-
flucloxacillin	2	2 (100)	-	-	-	-	-	-	-	-	-	-	-	-	1 (50)
gabapentin	2	1 (50)	-	-	1 (50)	-	-	-	-	-	-	2 (100)	1 (50)	-	-
hydrochlorothiazide	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-	1 (50)
insulin lispro	2	-	-	1 (50)	-	-	-	-	-	-	1 (50)	1 (50)	2 (100)	-	-
isotretinoin	2	-	-	-	2 (100)	-	-	-	-	-	-	2 (100)	-	1 (50)	-



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itraconazole	2	1 (50)	-	-	1 (50)	-	-	-	-	-	-	2 (100)	1 (50)	-	1 (50)
ketamine	2	-	-	2 (100)	-	-	-	-	-	-	-	1 (50)	-	1 (50)	1 (50)
levofloxacin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	-	-	2 (100)	-
lorazepam	2	1 (50)	-	1 (50)	-	-	-	-	-	-	-	2 (100)	-	-	-
methadone	2	2 (100)	-	-	-	-	-	-	-	-	-	2 (100)	1 (50)	-	-
midazolam	2	1 (50)	-	1 (50)	-	-	-	-	-	-	-	1 (50)	-	-	1 (50)
moxifloxacin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-	-
mycophenolate mofetil	2	-	-	-	2 (100)	-	-	-	-	-	-	1 (50)	-	-	1 (50)
nevirapine	2	2 (100)	-	-	-	-	-	-	-	-	-	-	2 (100)	-	-
nitrofurantoin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	1 (50)	-	-	1 (50)
olanzapine	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	-	2 (100)	1 (50)	-
omega 3 acid ethyl esters	2	1 (50)	-	-	1 (50)	-	-	-	-	-	-	1 (50)	-	1 (50)	-
pantoprazole	2	-	-	1 (50)	1 (50)	-	-	-	-	-	-	1 (50)	-	1 (50)	-
phenoxymethylpenicillin	2	2 (100)	-	-	-	-	-	-	-	-	-	2 (100)	-	-	-
phenytoin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	2 (100)	-	-	-
potassium chloride	2	1 (50)	-	1 (50)	-	-	-	-	-	-	-	2 (100)	1 (50)	-	-
rifampicin	2	1 (50)	-	-	-	-	-	-	-	-	-	2 (100)	-	-	-
salbutamol	2	1 (50)	-	-	-	-	1 (50)	-	-	-	-	-	-	2 (100)	1 (50)



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temozolomide	2	1 (50)	-	-	-	-	-	-	-	-	-	1 (50)	-	-	-
tretinoin	2	-	-	-	2 (100)	-	-	-	-	-	-	2 (100)	-	-	1 (50)
valproic acid	2	-	-	-	2 (100)	-	-	-	-	-	-	1 (50)	1 (50)	1 (50)	-
vitamin e	2	1 (50)	-	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-	2 (100)
voriconazole	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	-	1 (50)	-	1 (50)
warfarin	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	1 (50)	1 (50)	-	-
zinc acetate	2	1 (50)	1 (50)	-	-	-	-	-	-	-	-	1 (50)	-	1 (50)	-
zonisamide	2	2 (100)	-	-	-	-	-	-	-	-	-	2 (100)	-	-	-
abarelix	1	-	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-
acamprosate	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-
acarbose	1	-	-	-	-	1 (100)	-	-	-	-	-	1 (100)	-	-	-
acedoben	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-
acetamide	1	-	-	-	-	-	-	1 (100)	-	-	-	1 (100)	-	-	-
acetyl sulfisoxazole	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-
adalimumab	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
albendazole	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)
alendronic acid	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
allopurinol	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-



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amikacin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-
ampicillin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
anakinra	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
antihemophilic factor human recombinant	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
atomoxetine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)
atorvastatin	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)	1 (100)
beclomethasone dipropionate	1	-	-	-	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)
benzyl benzoate	1	-	-	-	-	-	-	1 (100)	-	-	-	1 (100)	-	-	-
bicalutamide	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-	-
bictegravir emtricitabine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
tenofovir alafenamide	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
bleomycin	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)
budesonide + formoterol	1	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
buprenorphine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
calcium acetate	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
calcium carbonate	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-
cefotaxime	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
ceftazidime + avibactam	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
cefuroxime	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-



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cephalexin	1	-	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-
chlorhexidine	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)
clarithromycin	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
clinoleic lipids	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
clonazepam	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
cloxacillin	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-	1 (100)
coagulation factor ix recombinant	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
coagulation factor viia recombinant human	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
dantrolene	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)	-	-
dasatinib	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
desloratadine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)
diamorphine	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)
diazoxide	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	-	-	-
docetaxel	1	-	-	-	-	-	1 (100)	-	-	-	-	1 (100)	-	-	-
emtricitabine + tenofovir	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
erythromycin	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
ethanol	1	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	1 (100)	-
exemestane	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-

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isionazid + pyrazinamide + rifampicin + etambutol	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
isionazid + pyridoxine + sulfamethoxazole + trimethoprim	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	1 (100)
lamivudine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
lansoprazole	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
latanoprost	1	-	-	-	-	-	-	1 (100)	-	-	-	-	-	1 (100)	-
levamisole	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
levetiracetam	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-	-
lisinopril	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
magnesium sulfate	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)
meclizine	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
methylphenidate	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
methylprednisolone aceponate	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
metronidazole	1	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-	-
mexiletine	1	-	-	-	1 (100)	-	-	-	-	-	-	1 (100)	1 (100)	-	-
midodrine	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
nicardipine	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-
nifedipine	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
oxytocin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-

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rufinamide	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
ruxolitinib	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
sertraline	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	1 (100)	-
sodium chloride	1	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-
sodium phosphate dibasic	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
somatotropin	1	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	1 (100)
sorafenib	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	1 (100)	1 (100)	-
sulfamethoxazole	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
tenofovir disoproxil	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
terbinafine	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
teriparatide	1	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-
thymol	1	-	-	-	-	-	1 (100)	-	-	-	-	1 (100)	-	-	-
treprostinil	1	-	-	-	-	-	1 (100)	-	-	-	-	-	-	-	1 (100)
trimethoprim	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
urea	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
ursodeoxycholic acid	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-
valganciclovir	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)
vasopressin	1	-	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-

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[illegible]

Table 17a. Problematic products by pharmaceutical form as reported by pharmacists. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	Formulation	N	Extemporaneous preparation	Reconstitution and stability issue	Offlabel	Special use
abacavir	oral liquid	1	-	1 (100)	-	-
	tablet	3	3 (100)	1 (33.3)	1 (33.3)	-
abacavir + dolutegravir + lamivudine	parenteral preparation	1	-	-	-	1 (100)
	rectal preparation	1	1 (100)	1 (100)	1 (100)	-
	tablet	5	1 (20.0)	2 (40.0)	1 (20.0)	1 (20.0)
abacavir + lamivudine + zidovudine	capsule	1	-	1 (100)	-	-
abacavir + lamivudine + zidovudine	tablet	1	1 (100)	-	-	1 (100)
abarelix	rectal preparation	1	-	1 (100)	-	-
abequose	capsule	1	1 (100)	-	-	-
	parenteral preparation	1	-	1 (100)	-	-
acamprosate	capsule	1	1 (100)	-	-	-
acarbose	rectal preparation	1	1 (100)	-	-	-
acetamide	topical	1	1 (100)	-	-	-
acetaminophen	rectal preparation	1	1 (100)	-	-	1 (100)
	tablet	1	1 (100)	-	-	-
acetyl sulfisoxazole	capsule	1	1 (100)	-	-	-
acetylsalicylic acid	capsule	1	1 (100)	-	-	-
	oral liquid	3	3 (100)	1 (33.3)	-	1 (33.3)
	tablet	7	4 (57.1)	3 (42.9)	1 (14.3)	2 (28.6)
adalimumab	parenteral preparation	1	-	-	1 (100)	-
albendazole	oral liquid	1	-	-	1 (100)	1 (100)
alendronic acid	oral liquid	1	-	-	1 (100)	-
allopurinol	oral liquid	1	1 (100)	-	-	-
alprostadil	parenteral preparation	2	1 (50.0)	1 (50.0)	-	-
amikacin	parenteral preparation	1	-	1 (100)	-	-
amiodarone	parenteral preparation	2	-	1 (50.0)	-	1 (50.0)
	tablet	1	1 (100)	-	-	-
amoxicillin	capsule	2	1 (50.0)	1 (50.0)	-	-
	oral liquid	4	-	2 (50.0)	1 (25.0)	1 (25.0)



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	tablet	1	-	-	-	1 (100)
amoxicillin + clavulanic acid	oral liquid	7	-	7 (100)	-	-
	tablet	1	-	1 (100)	-	-
amphotericin b	parenteral preparation	3	2 (66.7)	-	-	1 (33.3)
ampicillin	parenteral preparation	1	-	-	1 (100)	-
anakinra	parenteral preparation	1	-	-	-	1 (100)
antihemophilic factor human recombinant	parenteral preparation	1	-	-	-	1 (100)
artemether + lumefantrine	oral liquid	1	-	-	-	1 (100)
	rectal preparation	1	-	-	-	1 (100)
	tablet	1	-	-	1 (100)	-
atazanavir	capsule	1	-	1 (100)	-	1 (100)
	tablet	1	1 (100)	-	-	-
atenolol	oral liquid	2	1 (50.0)	1 (50.0)	1 (50.0)	2 (100)
	tablet	1	1 (100)	-	-	-
atomoxetine	tablet	1	-	-	-	1 (100)
atorvastatin	tablet	1	-	1 (100)	1 (100)	1 (100)
azathioprine	oral liquid	1	1 (100)	-	1 (100)	-
	tablet	1	1 (100)	-	-	-
azithromycin	oral liquid	8	-	8 (100)	-	-
	tablet	2	-	-	1 (50.0)	-
baclofen	oral liquid	1	1 (100)	-	-	-
	tablet	3	3 (100)	1 (33.3)	-	1 (33.3)
beclomethasone dipropionate	preparation for inhalation	1	-	-	-	1 (100)
benzyl benzoate	topical	1	1 (100)	-	-	-
bicalutamide	oral liquid	1	1 (100)	1 (100)	-	-
bictegravir emtricitabine tenofovir alafenamide	tablet	1	-	-	1 (100)	-
bisoprolol	tablet	2	1 (50.0)	1 (50.0)	1 (50.0)	-
bleomycin	parenteral preparation	1	-	-	-	1 (100)
bosentan	oral liquid	4	3 (75.0)	3 (75.0)	3 (75.0)	-
	tablet	1	1 (100)	-	-	-
budesonide	preparation for inhalation	2	-	1 (50.0)	1 (50.0)	-
budesonide + formoterol	preparation for inhalation	1	-	-	1 (100)	-
bumetanide	parenteral preparation	1	1 (100)	-	-	-
	tablet	1	-	-	1 (100)	-
buprenorphine	oral liquid	1	-	1 (100)	-	-
caffeine	oral liquid	2	-	1 (50.0)	1 (50.0)	1 (50.0)

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calcitriol	capsule	5	3 (60.0)	2 (40.0)	1 (20.0)	1 (20.0)
	tablet	1	1 (100)	-	-	-
calcium acetate	tablet	1	-	-	1 (100)	-
calcium carbonate	tablet	1	-	1 (100)	-	-
captopril	oral liquid	3	2 (66.7)	2 (66.7)	1 (33.3)	-
	tablet	5	5 (100)	1 (20.0)	2 (40.0)	-
carbamazepine	oral liquid	3	1 (33.3)	3 (100)	-	-
	tablet	1	-	-	-	1 (100)
cefixime	capsule	1	1 (100)	-	-	-
	oral liquid	1	1 (100)	-	-	-
	tablet	1	-	-	-	1 (100)
cefotaxime	parenteral preparation	1	-	-	-	1 (100)
ceftazidime + avibactam	parenteral preparation	1	-	-	-	1 (100)
ceftriaxone	parenteral preparation	2	-	1 (50.0)	-	1 (50.0)
cefuroxime	oral liquid	1	-	1 (100)	-	-
cephalexin	capsule	1	-	1 (100)	-	-
chlorhexidine	topical	1	-	-	-	1 (100)
ciprofloxacin	oral liquid	5	5 (100)	3 (60.0)	1 (20.0)	1 (20.0)
	tablet	4	2 (50.0)	1 (25.0)	1 (25.0)	-
clarithromycin	oral liquid	1	-	-	1 (100)	-
clindamycin	capsule	3	3 (100)	1 (33.3)	-	-
	oral liquid	3	1 (33.3)	2 (66.7)	-	-
clinoleic lipids	parenteral preparation	1	-	-	-	1 (100)
clobazam	tablet	2	1 (50.0)	-	-	1 (50.0)
clonazepam	oral liquid	1	1 (100)	-	-	-
clonidine	oral liquid	6	6 (100)	2 (33.3)	-	-
	tablet	1	1 (100)	1 (100)	-	-
	oral liquid	1	1 (100)	-	-	-
clopidogrel	tablet	4	3 (75.0)	-	1 (25.0)	-
	oral liquid	1	1 (100)	1 (100)	-	1 (100)
cloxacillin	parenteral preparation	1	-	-	-	1 (100)
coagulation factor ix recombinant	parenteral preparation	1	-	-	-	1 (100)
coagulation factor viia recombinant human	parenteral preparation	1	-	-	-	1 (100)
colforsin	tablet	2	2 (100)	-	-	-
dalteparin	parenteral preparation	2	2 (100)	-	1 (50.0)	-
dantrolene	capsule	1	1 (100)	1 (100)	-	-
dasatinib	tablet	1	1 (100)	-	-	-

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desloratadine	oral liquid	1	-	-	1 (100)	1 (100)
desmopressin	tablet	2	-	-	-	2 (100)
dexamethasone	oral liquid	2	1 (50.0)	1 (50.0)	-	2 (100)
	parenteral preparation	1	-	-	-	1 (100)
	tablet	2	1 (50.0)	1 (50.0)	-	2 (100)
dexmedetomidine	oral liquid	1	-	-	1 (100)	-
	parenteral preparation	1	-	-	-	1 (100)
diamorphine	tablet	1	-	-	1 (100)	1 (100)
diazepam	rectal preparation	4	1 (25.0)	-	2 (50.0)	1 (25.0)
diazoxide	capsule	1	1 (100)	-	-	-
diclofenac	parenteral preparation	1	-	-	1 (100)	-
	rectal preparation	3	2 (66.7)	-	1 (33.3)	-
digoxin	oral liquid	3	1 (33.3)	-	1 (33.3)	1 (33.3)
	tablet	4	4 (100)	1 (25.0)	-	-
docetaxel	preparation for inhalation	1	1 (100)	-	-	-
domperidone	oral liquid	1	1 (100)	-	-	-
	tablet	1	1 (100)	-	-	-
efavirenz	capsule	1	-	-	1 (100)	-
	tablet	1	1 (100)	-	-	-
emtricitabine + tenofovir	tablet	1	1 (100)	-	-	-
enalapril	oral liquid	2	-	2 (100)	-	-
	tablet	3	3 (100)	-	1 (33.3)	-
enoxaparin	parenteral preparation	4	2 (50.0)	2 (50.0)	1 (25.0)	-
erythromycin	oral liquid	1	1 (100)	-	-	-
esomeprazole	oral liquid	4	2 (50.0)	1 (25.0)	3 (75.0)	-
	tablet	1	1 (100)	-	-	-
ethambutol	oral liquid	2	2 (100)	1 (50.0)	-	-
	tablet	1	-	1 (100)	-	-
ethanol	parenteral preparation	1	1 (100)	-	1 (100)	-
etoposide	capsule	1	1 (100)	-	-	-
	parenteral preparation	1	-	1 (100)	-	-
exemestane	oral liquid	1	1 (100)	-	-	-
fentanyl	parenteral preparation	4	3 (75.0)	2 (50.0)	-	-
ferrous sulfate anhydrous	oral liquid	2	1 (50.0)	1 (50.0)	-	1 (50.0)
flecainide	oral liquid	1	1 (100)	-	-	-
	tablet	1	1 (100)	-	-	-



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flucloxacillin	oral liquid	2	-	-	-	1 (50.0)
fludrocortisone	tablet	1	-	1 (100)	-	-
folic acid	oral liquid	2	-	1 (50.0)	-	1 (50.0)
	tablet	1	1 (100)	1 (100)	-	-
	capsule	1	1 (100)	-	-	-
furosemide	oral liquid	4	2 (50.0)	-	1 (25.0)	1 (25.0)
	tablet	4	4 (100)	1 (25.0)	1 (25.0)	1 (25.0)
	capsule	1	1 (100)	-	-	-
gabapentin	oral liquid	1	1 (100)	1 (100)	-	-
ganciclovir	tablet	1	1 (100)	1 (100)	-	-
gentamicin	ophthalmological preparation	1	-	1 (100)	-	1 (100)
	parenteral preparation	2	-	1 (50.0)	-	1 (50.0)
glucosamine 6 phosphate	tablet	1	-	-	1 (100)	-
glycopyrronium	oral liquid	1	1 (100)	-	-	-
heparin	parenteral preparation	1	-	-	1 (100)	-
hydralazine	oral liquid	1	1 (100)	1 (100)	-	-
	oral liquid	1	1 (100)	1 (100)	-	-
	tablet	1	-	-	-	1 (100)
hydrochlorothiazide + spironolactone	tablet	1	1 (100)	-	-	-
hydrocortisone	oral liquid	3	3 (100)	2 (66.7)	-	-
	tablet	2	1 (50.0)	2 (100)	-	-
hydromorphone	parenteral preparation	1	1 (100)	-	-	-
hydroxocobalamin	parenteral preparation	1	-	-	1 (100)	-
hydroxyurea	capsule	4	4 (100)	1 (25.0)	1 (25.0)	1 (25.0)
	oral liquid	4	3 (75.0)	3 (75.0)	-	-
hydroxyzine	capsule	1	1 (100)	-	-	-
hypertonic saline	preparation for inhalation	1	1 (100)	-	-	-
ibrutinib	tablet	1	1 (100)	-	-	-
ibuprofen	oral liquid	1	-	1 (100)	-	-
imatinib	tablet	1	1 (100)	-	-	-
indomethacin	rectal preparation	1	1 (100)	-	-	-
insulin	parenteral preparation	1	-	1 (100)	-	-
insulin human	parenteral preparation	1	1 (100)	-	-	-
insulin lispro	parenteral preparation	2	1 (50.0)	2 (100)	-	-
isoniazid + pyrazinamide + rifampicin	oral liquid	1	1 (100)	-	-	-
isoniazid + pyridoxine + sulfamethoxazole + trimethoprim	tablet	1	-	1 (100)	-	1 (100)



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isoniazid	capsule	1	1 (100)	-	-	-
	oral liquid	2	1 (50.0)	-	-	-
isotretinoin	capsule	2	2 (100)	-	1 (50.0)	-
itraconazole	capsule	1	1 (100)	1 (100)	-	1 (100)
	oral liquid	1	1 (100)	-	-	-
ketamine	parenteral preparation	2	1 (50.0)	-	1 (50.0)	1 (50.0)
lamivudine	oral liquid	1	-	1 (100)	-	-
lansoprazole	tablet	1	-	-	1 (100)	-
latanoprost	topical	1	-	-	1 (100)	-
levamisole	tablet	1	-	-	1 (100)	-
levetiracetam	oral liquid	1	1 (100)	1 (100)	-	-
levofloxacin	oral liquid	1	-	-	1 (100)	-
	tablet	1	-	-	1 (100)	-
levothyroxine	oral liquid	3	3 (100)	1 (33.3)	-	-
	tablet	1	1 (100)	-	-	-
lisinopril	tablet	1	1 (100)	-	-	-
lopinavir + ritonavir	oral liquid	4	1 (25.0)	3 (75.0)	-	1 (25.0)
	tablet	1	-	-	-	1 (100)
lorazepam	oral liquid	1	1 (100)	-	-	-
	parenteral preparation	1	1 (100)	-	-	-
magnesium sulfate	parenteral preparation	1	-	-	-	1 (100)
meclizine	oral liquid	1	1 (100)	-	-	-
mercaptopurine	tablet	3	1 (33.3)	1 (33.3)	-	1 (33.3)
methadone	oral liquid	2	2 (100)	1 (50.0)	-	-
methotrexate	oral liquid	1	1 (100)	-	-	-
	tablet	2	-	-	1 (50.0)	1 (50.0)
methylphenidate	oral liquid	1	1 (100)	-	-	-
methylprednisolone aceponate	tablet	1	-	-	1 (100)	-
metoprolol	oral liquid	2	2 (100)	-	-	-
	tablet	1	1 (100)	-	-	-
metronidazole	oral liquid	1	-	1 (100)	-	-
mexiletine	capsule	1	1 (100)	1 (100)	-	-
midazolam	oral liquid	1	-	-	-	1 (100)
	parenteral preparation	1	1 (100)	-	-	-
midodrine	tablet	1	1 (100)	-	-	-
morphine	capsule	1	-	1 (100)	-	-



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	oral liquid	2	1 (50.0)	2 (100)	-	2 (100)
	tablet	1	1 (100)	-	-	-
moxifloxacin	oral liquid	1	1 (100)	-	-	-
	tablet	1	-	1 (100)	-	-
mycophenolate mofetil	capsule	2	1 (50.0)	-	-	1 (50.0)
nevirapine	oral liquid	2	-	2 (100)	-	-
nicardipine	parenteral preparation	1	-	-	1 (100)	-
nifedipine	oral liquid	1	-	-	1 (100)	-
nitrofurantoin	oral liquid	1	1 (100)	-	-	-
	tablet	1	-	-	-	1 (100)
olanzapine	oral liquid	1	-	1 (100)	-	-
	tablet	1	-	1 (100)	1 (100)	-
omega acid ethyl esters	capsule	1	1 (100)	-	-	-
	oral liquid	1	-	-	1 (100)	-
omeprazole	capsule	4	3 (75.0)	3 (75.0)	2 (50.0)	1 (25.0)
	oral liquid	12	7 (58.3)	7 (58.3)	1 (8.3)	1 (8.3)
	tablet	2	1 (50.0)	1 (50.0)	1 (50.0)	-
ondansetron	oral liquid	2	1 (50.0)	1 (50.0)	-	1 (50.0)
	tablet	1	-	-	-	1 (100)
oseltamivir	capsule	3	2 (66.7)	3 (100)	-	-
oxytocin	parenteral preparation	1	-	-	1 (100)	-
palivizumab	parenteral preparation	1	-	-	-	1 (100)
pancrelipase	capsule	1	1 (100)	-	-	-
pantoprazole	capsule	1	1 (100)	-	-	-
	parenteral preparation	1	-	-	1 (100)	-
pegaspargase	parenteral preparation	1	-	-	-	1 (100)
pegfilgrastim	parenteral preparation	4	3 (75.0)	2 (50.0)	1 (25.0)	-
pemetrexed	preparation for inhalation	1	1 (100)	-	-	-
	oral liquid	3	2 (66.7)	-	-	2 (66.7)
phenobarbital	parenteral preparation	1	1 (100)	-	-	-
	tablet	8	5 (62.5)	3 (37.5)	1 (12.5)	3 (37.5)
phenoxymethylpenicillin	oral liquid	2	2 (100)	-	-	-
phenylephrine	ophthalmological preparation	1	1 (100)	-	-	-
phenytoin	oral liquid	1	1 (100)	-	-	-
	tablet	1	1 (100)	-	-	-
piperacillin + tazobactam	parenteral preparation	1	-	1 (100)	-	-



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potassium chloride	oral liquid	1	1 (100)	1 (100)	-	-
	parenteral preparation	1	1 (100)	-	-	-
praziquantel	tablet	1	-	1 (100)	-	-
prednisolone	oral liquid	3	2 (66.7)	1 (33.3)	-	2 (66.7)
	tablet	4	3 (75.0)	1 (25.0)	-	-
primaquine	tablet	1	1 (100)	-	-	-
probenecid	tablet	1	-	1 (100)	1 (100)	-
proparacaine	topical	1	1 (100)	-	-	-
propofol	parenteral preparation	1	-	-	-	1 (100)
propranolol	parenteral preparation	1	-	1 (100)	-	-
	tablet	4	4 (100)	-	1 (25.0)	-
pseudoephedrine	oral liquid	1	1 (100)	-	-	-
pyrimethamine	oral liquid	1	1 (100)	-	-	-
quinine	oral liquid	1	-	1 (100)	-	-
	tablet	2	1 (50.0)	2 (100)	-	-
ramelteon	tablet	1	1 (100)	1 (100)	-	1 (100)
renal replacement fluids premix from manufacturers	parenteral preparation	1	-	1 (100)	1 (100)	1 (100)
rifabutin	oral liquid	1	1 (100)	-	-	-
rifampicin	capsule	1	1 (100)	-	-	-
	oral liquid	1	1 (100)	-	-	-
risperidone	oral liquid	1	-	-	1 (100)	-
rituximab	parenteral preparation	1	-	-	1 (100)	-
rufinamide	tablet	1	1 (100)	-	-	-
ruxolitinib	tablet	1	1 (100)	-	-	-
salbutamol	oral liquid	1	-	-	1 (100)	-
	preparation for inhalation	1	-	-	1 (100)	1 (100)
sertraline	tablet	1	-	-	1 (100)	-
sildenafil	oral liquid	4	2 (50.0)	1 (25.0)	1 (25.0)	-
	parenteral preparation	2	-	1 (50.0)	-	2 (100)
	tablet	2	2 (100)	-	-	-
sodium chloride	tablet	1	-	1 (100)	-	-
sodium phosphate dibasic	oral liquid	1	1 (100)	-	-	-
somatotropin	parenteral preparation	1	1 (100)	-	-	1 (100)
sorafenib	tablet	1	1 (100)	1 (100)	1 (100)	-
spironolactone	oral liquid	1	1 (100)	-	-	-
	parenteral preparation	1	1 (100)	-	-	-



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	tablet	2	2 (100)	1 (50.0)	1 (50.0)	-
sulfamethoxazole	tablet	1	1 (100)	-	-	-
	capsule	1	-	1 (100)	-	-
tacrolimus	oral liquid	5	5 (100)	4 (80.0)	-	1 (20.0)
	tablet	1	1 (100)	1 (100)	1 (100)	-
temozolomide	oral liquid	1	1 (100)	-	-	-
tenofovir disoproxil	tablet	1	1 (100)	-	-	-
terbinafine	oral liquid	1	1 (100)	-	-	-
teriparatide	tablet	1	1 (100)	-	-	-
thymol	preparation for inhalation	1	1 (100)	-	-	-
	oral liquid	3	3 (100)	1 (33.3)	-	-
topiramate	tablet	3	2 (66.7)	1 (33.3)	-	1 (33.3)
treprostinil	preparation for inhalation	1	-	-	-	1 (100)
tretinoin	capsule	2	2 (100)	-	-	1 (50.0)
trimethoprim	oral liquid	1	1 (100)	-	-	-
	oral liquid	1	-	-	-	1 (100)
trimethoprim + sulfamethoxazole	parenteral preparation	1	-	1 (100)	-	-
	tablet	1	-	-	-	1 (100)
urea	oral liquid	1	-	-	1 (100)	-
ursodeoxycholic acid	oral liquid	1	1 (100)	-	-	-
	ophthalmological preparation	1	1 (100)	-	-	-
valaciclovir	oral liquid	1	1 (100)	1 (100)	-	1 (100)
	tablet	1	1 (100)	-	-	-
valganciclovir	oral liquid	1	-	-	-	1 (100)
valproic acid	capsule	2	1 (50.0)	1 (50.0)	1 (50.0)	-
	capsule	1	1 (100)	1 (100)	-	-
vancomycin	oral liquid	1	1 (100)	-	-	-
	parenteral preparation	1	-	-	-	1 (100)
vasopressin	parenteral preparation	1	-	1 (100)	-	-
vencuronium	parenteral preparation	1	-	-	-	1 (100)
venetoclax	tablet	1	-	-	1 (100)	-
	oral liquid	2	1 (50.0)	1 (50.0)	-	-
vigabatrin	tablet	1	1 (100)	1 (100)	-	1 (100)
vitamin e	oral liquid	2	1 (50.0)	1 (50.0)	-	2 (100)
	oral liquid	1	-	1 (100)	-	-
voriconazole	tablet	1	-	-	-	1 (100)



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warfarin	oral liquid	1	1 (100)	-	-	-
	tablet	1	-	1 (100)	-	-
zinc acetate	oral liquid	1	1 (100)	-	-	-
	tablet	1	-	-	1 (100)	-
zonisamide	oral liquid	2	2 (100)	-	-	-



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Table 17a. Products reported by pharmacists to need extemporaneous formulation for use in children. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Extemporaneous formulation	
		Starting from the active ingredients and excipients	Modifying the adult formulation
Overall	294	73 (25)	193 (66)
omeprazole	11	5 (45)	6 (55)
phenobarbital	8	1 (13)	7 (88)
acetylsalicylic acid	8	2 (25)	6 (75)
ciprofloxacin	7	1 (14)	6 (86)
furosemide	7	2 (29)	5 (71)
captopril	7	-	6 (86)
hydroxyurea	7	2 (29)	4 (57)
clonidine	7	3 (43)	3 (43)
tacrolimus	6	3 (50)	3 (50)
digoxin	5	1 (20)	4 (80)
prednisolone	5	1 (20)	4 (80)
topiramate	5	1 (20)	4 (80)
sildenafil	4	1 (25)	3 (75)
calcitriol	4	1 (25)	3 (75)
clindamycin	4	-	4 (100)
bosentan	4	-	3 (75)
clopidogrel	4	1 (25)	2 (50)
hydrocortisone	4	-	3 (75)
propranolol	4	-	4 (100)
baclofen	4	2 (50)	2 (50)
levothyroxine	4	1 (25)	1 (25)
spironolactone	4	3 (75)	1 (25)
enalapril	3	-	3 (100)
esomeprazole	3	-	3 (100)
abacavir	3	1 (33)	-
fentanyl	3	-	3 (100)
pegfilgrastim	3	-	3 (100)
metoprolol	3	-	3 (100)

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valaciclovir	3	1 (33)	2 (67)
abacavir + dolutegravir + lamivudine	2	1 (50)	1 (50)
dexamethasone	2	1 (50)	1 (50)
diclofenac	2	1 (50)	1 (50)
enoxaparin	2	-	2 (100)
morphine	2	2 (100)	-
amphotericin b	2	1 (50)	-
atenolol	2	1 (50)	1 (50)
cefixime	2	1 (50)	-
ethambutol	2	-	-
isoniazid	2	1 (50)	-
oseltamivir	2	-	2 (100)
vancomycin	2	1 (50)	-
vigabatrin	2	-	2 (100)
acetaminophen	2	1 (50)	1 (50)
azathioprine	2	-	2 (100)
colforsin	2	-	-
dalteparin	2	-	1 (50)
domperidone	2	-	1 (50)
flecainide	2	-	2 (100)
gabapentin	2	-	2 (100)
isotretinoin	2	-	2 (100)
itraconazole	2	-	2 (100)
lorazepam	2	1 (50)	1 (50)
methadone	2	-	1 (50)
phenoxymethylpenicillin	2	1 (50)	-
phenytoin	2	-	2 (100)
potassium chloride	2	1 (50)	1 (50)
rifampicin	2	-	-
tretinoin	2	-	2 (100)
zonisamide	2	1 (50)	1 (50)
amoxicillin	1	-	-
lopinavir + ritonavir	1	-	-
carbamazepine	1	-	1 (100)
diazepam	1	-	1 (100)
amiodarone	1	1 (100)	-

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folic acid	1	-	1 (100)
mercaptopurine	1	-	1 (100)
methotrexate	1	-	1 (100)
ondansetron	1	-	1 (100)
quinine	1	1 (100)	-
abacavir + lamivudine + zidovudine	1	1 (100)	-
abequose	1	-	-
alprostadil	1	1 (100)	-
atazanavir	1	-	1 (100)
bisoprolol	1	-	1 (100)
bumetanide	1	-	2 (200)
clobazam	1	-	1 (100)
efavirenz	1	-	1 (100)
etoposide	1	-	1 (100)
ferrous sulfate anhydrous	1	1 (100)	-
hydrochlorothiazide	1	-	2 (200)
insulin lispro	1	-	1 (100)
ketamine	1	-	1 (100)
midazolam	1	-	1 (100)
moxifloxacin	1	-	1 (100)
mycophenolate mofetil	1	-	2 (200)
nitrofurantoin	1	-	1 (100)
omega 3 acid ethyl esters	1	-	1 (100)
pantoprazole	1	-	1 (100)
temozolomide	1	-	1 (100)
valproic acid	1	-	2 (200)
vitamin e	1	-	-
warfarin	1	1 (100)	-
zinc acetate	1	-	-
acamprosate	1	-	-
acarbose	1	-	-
acetamide	1	1 (100)	-
acetyl sulfisoxazole	1	-	1 (100)
allopurinol	1	-	1 (100)
benzyl benzoate	1	1 (100)	-
bicalutamide	1	-	1 (100)



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clonazepam	1	1 (100)	-
cloxacillin	1	1 (100)	-
dantrolene	1	-	1 (100)
dasatinib	1	-	1 (100)
diazoxide	1	-	1 (100)
docetaxel	1	1 (100)	-
emtricitabine + tenofovir	1	-	1 (100)
erythromycin	1	-	-
ethanol	1	1 (100)	-
exemestane	1	-	1 (100)
ganciclovir	1	-	1 (100)
glycopyrronium	1	1 (100)	-
hydralazine	1	1 (100)	-
hydrochlorothiazide + spironolactone	1	1 (100)	-
hydromorphone	1	-	1 (100)
hydroxyzine	1	1 (100)	-
hypertonic saline	1	-	1 (100)
ibrutinib	1	-	1 (100)
imatinib	1	-	1 (100)
indomethacin	1	1 (100)	-
insulin human	1	-	1 (100)
isionazid + pyrazinamide + rifampicin + etambutol	1	-	1 (100)
levetiracetam	1	-	1 (100)
lisinopril	1	1 (100)	-
meclizine	1	-	1 (100)
methylphenidate	1	-	1 (100)
mexiletine	1	-	1 (100)
midodrine	1	-	1 (100)
pancrelipase	1	-	1 (100)
pemetrexed	1	1 (100)	-
phenylephrine	1	-	1 (100)
primaquine	1	-	1 (100)
proparacaine	1	1 (100)	-
pseudoephedrine	1	1 (100)	-
pyrimethamine	1	1 (100)	-
ramelteon	1	-	1 (100)



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rifabutin	1	-	1 (100)
rufinamide	1	-	1 (100)
ruxolitinib	1	-	-
sodium phosphate dibasic	1	1 (100)	-
somatotropin	1	-	1 (100)
sorafenib	1	-	1 (100)
sulfamethoxazole	1	-	1 (100)
tenofovir disoproxil	1	-	1 (100)
terbinafine	1	-	1 (100)
teriparatide	1	-	-
thymol	1	1 (100)	-
trimethoprim	1	-	1 (100)
ursodeoxycholic acid	1	-	1 (100)
metronidazole	1	1 (100)	-
sodium chloride	1	-	1 (100)

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Table 18a. Products reported by pharmacists as difficult for caregivers to deal with. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Reconstitution and stability					
		Access to clean water	Unclear or too complex label instructions	Numerous steps	Need for dilution for dosing	Problematic stability	Other please specify
<i>Overall</i>	181	26 (14)	12 (7)	19 (10)	70 (39)	81 (45)	50 (28)
omeprazole	11	-	-	1 (9)	3 (27)	9 (82)	5 (45)
azithromycin	8	2 (25)	-	-	2 (25)	3 (38)	1 (13)
amoxicillin + clavulanic acid	8	4 (50)	-	2 (25)	4 (50)	4 (50)	1 (13)
tacrolimus	6	-	1 (17)	3 (50)	1 (17)	2 (33)	3 (50)
acetylsalicylic acid	4	-	-	-	3 (75)	1 (25)	1 (25)
ciprofloxacin	4	1 (25)	-	-	2 (50)	1 (25)	1 (25)
hydroxyurea	4	-	1 (25)	1 (25)	2 (50)	2 (50)	2 (50)
hydrocortisone	4	-	-	-	4 (100)	1 (25)	1 (25)
phenobarbital	3	-	-	-	1 (33)	3 (100)	-
captopril	3	-	-	-	3 (100)	1 (33)	1 (33)
abacavir + dolutegravir + lamivudine	3	-	-	-	2 (67)	-	-
amoxicillin	3	1 (33)	-	1 (33)	-	1 (33)	-
clonidine	3	-	-	-	1 (33)	1 (33)	1 (33)
clindamycin	3	1 (33)	-	-	-	1 (33)	2 (67)
bosentan	3	-	-	1 (33)	2 (67)	1 (33)	2 (67)
lopinavir + ritonavir	3	1 (33)	-	-	-	1 (33)	1 (33)
carbamazepine	3	1 (33)	-	-	-	3 (100)	-
morphine	3	1 (33)	-	-	2 (67)	2 (67)	1 (33)
oseltamivir	3	3 (100)	-	1 (33)	2 (67)	1 (33)	-
quinine	3	1 (33)	1 (33)	1 (33)	1 (33)	1 (33)	1 (33)
sildenafil	2	-	1 (50)	-	-	1 (50)	1 (50)
prednisolone	2	1 (50)	1 (50)	-	1 (50)	1 (50)	-
calcitriol	2	-	1 (50)	1 (50)	1 (50)	-	2 (100)
topiramate	2	-	-	-	1 (50)	-	1 (50)
dexamethasone	2	1 (50)	1 (50)	-	1 (50)	2 (100)	-
enalapril	2	-	-	-	1 (50)	1 (50)	-



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abacavir	2	-	-	1 (50)	-	1 (50)	-
enoxaparin	2	-	-	-	2 (100)	-	-
fentanyl	2	-	-	-	2 (100)	-	-
pegfilgrastim	2	-	-	-	2 (100)	-	1 (50)
ethambutol	2	-	-	-	-	1 (50)	1 (50)
folic acid	2	1 (50)	-	-	-	1 (50)	-
gentamicin	2	-	-	-	1 (50)	1 (50)	-
vigabatrin	2	1 (50)	-	-	2 (100)	1 (50)	-
insulin lispro	2	-	1 (50)	-	1 (50)	1 (50)	-
nevirapine	2	-	-	-	-	2 (100)	-
olanzapine	2	-	-	-	-	1 (50)	1 (50)
furosemide	1	-	-	-	1 (100)	1 (100)	-
digoxin	1	-	-	-	1 (100)	-	-
esomeprazole	1	-	-	-	1 (100)	-	-
propranolol	1	-	-	-	-	1 (100)	-
baclofen	1	-	-	1 (100)	1 (100)	-	-
levothyroxine	1	-	-	-	1 (100)	-	1 (100)
spironolactone	1	-	-	-	-	-	-
amiodarone	1	-	-	-	-	-	2 (200)
atenolol	1	1 (100)	1 (100)	-	-	1 (100)	-
mercaptopurine	1	-	-	-	1 (100)	-	-
ondansetron	1	-	-	-	1 (100)	-	-
trimethoprim + sulfamethoxazole	1	-	-	-	-	1 (100)	-
valaciclovir	1	-	-	-	-	-	1 (100)
vancomycin	1	-	-	-	-	-	-
abacavir + lamivudine + zidovudine	1	-	-	-	-	1 (100)	-
abequose	1	-	-	-	-	-	-
alprostadil	1	-	-	-	1 (100)	1 (100)	1 (100)
atazanavir	1	-	-	-	-	-	-
bisoprolol	1	-	-	-	-	-	1 (100)
budesonide	1	-	-	-	1 (100)	-	-
caffeine	1	-	-	-	-	1 (100)	-
ceftriaxone	1	-	-	-	-	1 (100)	-
etoposide	1	-	-	-	-	-	1 (100)
ferrous sulfate anhydrous	1	1 (100)	1 (100)	-	-	1 (100)	-
gabapentin	1	-	-	1 (100)	-	-	1 (100)



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hydrochlorothiazide	1	-	-	-	1 (100)	-	-
itraconazole	1	-	-	1 (100)	1 (100)	-	-
methadone	1	-	-	-	1 (100)	-	-
moxifloxacin	1	-	-	-	1 (100)	-	-
potassium chloride	1	1 (100)	-	-	-	1 (100)	-
valproic acid	1	-	-	-	-	-	-
vitamin e	1	1 (100)	-	-	-	1 (100)	-
voriconazole	1	-	-	-	-	1 (100)	-
warfarin	1	-	-	-	-	-	-
abarelix	1	-	-	-	-	1 (100)	1 (100)
amikacin	1	-	-	-	-	1 (100)	-
atorvastatin	1	-	-	-	-	-	1 (100)
bicalutamide	1	-	-	-	-	1 (100)	1 (100)
buprenorphine	1	-	-	-	-	-	1 (100)
calcium carbonate	1	-	-	-	-	1 (100)	1 (100)
cefuroxime	1	-	-	-	1 (100)	-	-
cephalexin	1	1 (100)	-	-	-	1 (100)	-
cloxacillin	1	1 (100)	1 (100)	-	-	1 (100)	-
dantrolene	1	-	-	-	-	-	-
fludrocortisone	1	-	-	-	1 (100)	-	-
ganciclovir	1	-	-	1 (100)	-	1 (100)	1 (100)
hydralazine	1	-	-	-	-	1 (100)	-
ibuprofen	1	-	-	-	-	1 (100)	-
insulin	1	-	-	-	-	1 (100)	1 (100)
isionazid + pyridoxine + sulfamethoxazole + trimethoprim	1	-	-	-	-	-	-
lamivudine	1	-	-	-	-	1 (100)	-
levetiracetam	1	-	-	-	1 (100)	1 (100)	-
metronidazole	1	-	-	-	-	-	1 (100)
mexiletine	1	-	-	-	-	1 (100)	-
piperacillin + tazobactam	1	-	-	1 (100)	-	-	1 (100)
praziquantel	1	-	-	-	-	-	-
probenecid	1	-	-	-	-	-	1 (100)
ramelteon	1	-	-	-	1 (100)	1 (100)	-
renal replacement fluids premix from manufacturers	1	-	1 (100)	1 (100)	1 (100)	-	-
sodium chloride	1	-	-	-	-	-	-
sorafenib	1	-	-	-	1 (100)	1 (100)	-



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vasopressin	1	-	-	-	1 (100)	-	-
clopidogrel	1	-	-	-	-	1 (100)	1 (100)



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Table 19a Products used off-label as reported by pharmacists. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Off-label use			
		Unapproved indication	Unapproved age group	Unapproved dosage	Unapproved route of administration
Overall	91	25 (27)	55 (60)	34 (37)	13 (14)
omeprazole	4	2 (50)	1 (25)	2 (50)	2 (50)
captopril	3	2 (67)	3 (100)	3 (100)	-
bosentan	3	1 (33)	3 (100)	1 (33)	1 (33)
esomeprazole	3	-	2 (67)	1 (33)	1 (33)
ciprofloxacin	2	-	1 (50)	1 (50)	-
furosemide	2	-	2 (100)	1 (50)	-
abacavir + dolutegravir + lamivudine	2	-	1 (50)	1 (50)	-
diazepam	2	-	1 (50)	1 (50)	-
diclofenac	2	1 (50)	2 (100)	-	-
levofloxacin	2	-	1 (50)	-	-
salbutamol	2	-	1 (50)	2 (100)	-
phenobarbital	1	1 (100)	1 (100)	1 (100)	-
acetylsalicylic acid	1	-	1 (100)	-	-
azithromycin	1	1 (100)	1 (100)	-	-
hydroxyurea	1	-	1 (100)	1 (100)	-
sildenafil	1	1 (100)	1 (100)	-	-
amoxicillin	1	-	-	-	-
digoxin	1	-	1 (100)	-	-
tacrolimus	1	-	-	-	-
calcitriol	1	-	-	1 (100)	-
clopidogrel	1	1 (100)	-	-	-
enalapril	1	-	-	-	1 (100)
propranolol	1	1 (100)	1 (100)	1 (100)	-
abacavir	1	1 (100)	1 (100)	-	-
enoxaparin	1	-	1 (100)	-	-
pegfilgrastim	1	-	1 (100)	-	-
spironolactone	1	-	1 (100)	1 (100)	-
artemether + lumefantrine	1	-	-	-	-



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atenolol	1	-	1 (100)	-	-
methotrexate	1	1 (100)	-	-	-
azathioprine	1	-	1 (100)	-	-
bisoprolol	1	-	1 (100)	-	-
budesonide	1	1 (100)	-	-	-
bumetanide	1	-	1 (100)	1 (100)	1 (100)
caffeine	1	1 (100)	-	-	-
dalteparin	1	-	1 (100)	-	-
dexmedetomidine	1	-	1 (100)	-	-
efavirenz	1	-	-	1 (100)	-
isotretinoin	1	1 (100)	-	-	-
ketamine	1	-	1 (100)	-	-
olanzapine	1	1 (100)	-	-	1 (100)
omega 3 acid ethyl esters	1	-	-	-	1 (100)
pantoprazole	1	-	1 (100)	1 (100)	-
valproic acid	1	-	-	-	1 (100)
zinc acetate	1	-	-	-	-
adalimumab	1	-	-	-	-
albendazole	1	-	1 (100)	-	-
alendronic acid	1	1 (100)	1 (100)	-	-
ampicillin	1	-	-	1 (100)	-
atorvastatin	1	-	1 (100)	1 (100)	-
bictegravir emtricitabine tenofovir alafenamide	1	-	1 (100)	-	-
budesonide + formoterol	1	-	1 (100)	-	-
calcium acetate	1	-	-	1 (100)	-
clarithromycin	1	-	-	-	1 (100)
desloratadine	1	-	1 (100)	1 (100)	-
diamorphine	1	-	1 (100)	1 (100)	1 (100)
ethanol	1	1 (100)	-	-	-
glucosamine 6 phosphate	1	-	-	-	-
heparin	1	1 (100)	-	1 (100)	-
hydroxocobalamin	1	-	1 (100)	1 (100)	-
lansoprazole	1	-	-	-	1 (100)
latanoprost	1	-	1 (100)	1 (100)	-
levamisole	1	1 (100)	1 (100)	-	-
methylprednisolone aceponate	1	-	-	1 (100)	-



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nicardipine	1	-	-	1 (100)	-
nifedipine	1	-	1 (100)	-	-
oxytocin	1	-	-	-	-
probenecid	1	-	-	-	-
renal replacement fluids premix from manufacturers	1	-	1 (100)	-	-
risperidone	1	1 (100)	1 (100)	1 (100)	-
rituximab	1	1 (100)	1 (100)	-	-
sertraline	1	-	1 (100)	-	-
sorafenib	1	1 (100)	1 (100)	-	-
urea	1	1 (100)	1 (100)	1 (100)	1 (100)
venetoclax	1	-	1 (100)	1 (100)	-

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Table 20a Products reported by pharmacists as problematic for use in children with co-morbidities or co-treatments. Data are shown as numbers, N and percentages (%) of the total by row.

Medicine	N	Special use						
		Lack of indication for specific use	Lack of safety data	Lack of specific dosing guidelines	Drug-drug interaction	Lack of PK data	Medication burden	Other
<i>Overall</i>	106	18 (17)	30 (28)	31 (29)	12 (11)	12 (11)	20 (19)	33 (31)
phenobarbital	5	-	-	1 (20)	-	-	-	3 (60)
dexamethasone	5	-	1 (20)	2 (40)	-	-	1 (20)	1 (20)
acetylsalicylic acid	3	-	1 (33)	-	-	1 (33)	-	2 (67)
omeprazole	2	-	-	1 (50)	-	-	-	1 (50)
furosemide	2	1 (50)	1 (50)	1 (50)	-	1 (50)	-	-
sildenafil	2	1 (50)	1 (50)	-	2 (100)	-	-	-
abacavir + dolutegravir + lamivudine	2	-	1 (50)	-	-	-	-	-
amoxicillin	2	-	-	1 (50)	-	-	1 (50)	-
prednisolone	2	1 (50)	1 (50)	1 (50)	1 (50)	-	2 (100)	1 (50)
lopinavir + ritonavir	2	-	-	-	-	-	1 (50)	1 (50)
morphine	2	-	1 (50)	1 (50)	-	-	1 (50)	1 (50)
artemether + lumefantrine	2	2 (100)	1 (50)	2 (100)	-	2 (100)	-	-
atenolol	2	-	2 (100)	-	-	-	1 (50)	-
gentamicin	2	1 (50)	1 (50)	-	-	-	-	-
ondansetron	2	-	-	-	-	-	-	-
trimethoprim + sulfamethoxazole	2	-	-	-	-	-	2 (100)	2 (100)
desmopressin	2	-	1 (50)	-	-	1 (50)	-	1 (50)
vitamin e	2	-	1 (50)	1 (50)	-	-	-	1 (50)
ciprofloxacin	1	-	1 (100)	1 (100)	-	-	-	-
hydroxyurea	1	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)	-
digoxin	1	-	-	-	-	1 (100)	-	-
tacrolimus	1	-	-	-	1 (100)	-	1 (100)	-
calcitriol	1	-	-	-	-	-	-	1 (100)
topiramate	1	-	-	-	-	-	-	1 (100)
baclofen	1	-	1 (100)	-	-	-	-	-

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carbamazepine	1	-	-	-	1 (100)	-	-	-
diazepam	1	1 (100)	-	-	-	-	-	-
amiodarone	1	-	1 (100)	-	-	-	-	-
amphotericin b	1	1 (100)	-	-	-	-	-	-
cefixime	1	-	-	-	-	-	-	-
folic acid	1	-	-	1 (100)	-	-	-	-
mercaptopurine	1	-	-	-	-	-	-	-
methotrexate	1	-	-	-	-	-	-	1 (100)
valaciclovir	1	-	-	-	-	1 (100)	-	-
vancomycin	1	-	-	-	-	-	-	1 (100)
vigabatrin	1	-	-	1 (100)	-	-	-	-
abacavir + lamivudine + zidovudine	1	-	-	-	-	-	-	-
acetaminophen	1	-	-	-	-	-	-	1 (100)
atazanavir	1	-	-	-	-	-	-	-
caffeine	1	-	-	-	-	-	-	1 (100)
ceftriaxone	1	-	-	-	-	-	1 (100)	1 (100)
clobazam	1	1 (100)	-	-	-	-	-	-
dexmedetomidine	1	1 (100)	1 (100)	-	-	-	-	-
ferrous sulfate anhydrous	1	-	-	1 (100)	-	-	1 (100)	-
flucloxacillin	1	-	-	-	-	-	-	1 (100)
hydrochlorothiazide	1	-	-	1 (100)	-	-	-	-
itraconazole	1	-	1 (100)	-	-	-	-	-
ketamine	1	1 (100)	1 (100)	-	-	-	-	-
midazolam	1	-	-	-	-	-	-	1 (100)
mycophenolate mofetil	1	-	-	-	-	-	-	1 (100)
nitrofurantoin	1	-	1 (100)	-	-	-	-	-
salbutamol	1	-	-	1 (100)	-	-	-	-
tretinoin	1	-	-	-	-	-	-	1 (100)
voriconazole	1	-	-	1 (100)	1 (100)	1 (100)	-	1 (100)
albendazole	1	-	-	1 (100)	-	-	-	-
anakinra	1	-	-	-	-	-	-	-
antihemophilic factor human recombinant	1	-	-	-	-	-	1 (100)	-
atomoxetine	1	1 (100)	1 (100)	1 (100)	1 (100)	-	1 (100)	-
atorvastatin	1	-	1 (100)	1 (100)	-	-	-	-
beclomethasone dipropionate	1	-	-	-	-	-	-	1 (100)
bleomycin	1	1 (100)	1 (100)	1 (100)	-	1 (100)	1 (100)	-



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cefotaxime	1	-	-	-	-	-	-	-
ceftazidime + avibactam	1	-	-	1 (100)	-	1 (100)	-	-
chlorhexidine	1	1 (100)	1 (100)	-	-	-	-	-
clinoleic lipids	1	-	-	-	1 (100)	-	-	1 (100)
cloxacillin	1	-	1 (100)	1 (100)	1 (100)	-	1 (100)	-
coagulation factor ix recombinant	1	-	-	-	-	-	1 (100)	-
coagulation factor viia recombinant human	1	-	-	-	-	-	1 (100)	-
desloratadine	1	-	-	1 (100)	-	-	-	-
diamorphine	1	-	-	-	-	-	-	-
isoniazid + pyridoxine + sulfamethoxazole + trimethoprim	1	-	-	-	1 (100)	-	-	-
magnesium sulfate	1	1 (100)	-	1 (100)	-	-	-	-
palivizumab	1	-	-	-	-	-	-	1 (100)
pegaspargase	1	-	-	-	-	-	-	1 (100)
propofol	1	-	1 (100)	-	-	-	-	-
ramelteon	1	1 (100)	1 (100)	-	-	-	-	-
renal replacement fluids premix from manufacturers	1	1 (100)	1 (100)	1 (100)	-	-	-	-
somatotropin	1	-	-	1 (100)	-	-	-	-
treprostinil	1	-	-	1 (100)	-	-	-	-
valganciclovir	1	-	-	-	-	-	-	1 (100)
vencuronium	1	-	-	-	-	-	-	1 (100)



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Table 21a. Medicine stratified by pharmaceutical form considered most problematic for physicians, nurses, and pharmacists. Data are shown as numbers, N and percentages (%) of the total by row.

[Legend: (*) Medical doctors, (**) Pharmacists, (^) Medical doctors and nurses, (^) Medical doctors and pharmacists.]

Medicine	Formulation	N	Dosing/Safety*	Extemporaneous preparation**	Reconstitution and stability issue**	Acceptability^	Usability^	Off label^^	Special use^^
lopinavir + ritonavir	oral liquid	27	1 (4)	1 (4)	3 (11)	21 (78)	6 (22)	-	3 (11)
amoxicillin + clavulanic acid	oral liquid	23	3 (13)	-	7 (30)	6 (26)	6 (26)	-	-
cefuroxime	oral liquid	21	1 (5)	-	1 (5)	17 (81)	2 (10)	-	-
salbutamol	preparation for inhalation	19	5 (26)	-	-	3 (16)	11 (58)	1 (5)	3 (16)
furosemide	tablet	17	7 (41)	4 (24)	1 (6)	4 (24)	5 (29)	1 (6)	1 (6)
omeprazole	oral liquid	17	2 (12)	7 (41)	7 (41)	3 (18)	4 (24)	2 (12)	2 (12)
amoxicillin	oral liquid	15	3 (20)	-	2 (13)	4 (27)	5 (33)	2 (13)	2 (13)
prednisolone	tablet	15	1 (7)	3 (20)	1 (7)	10 (67)	-	-	-
azithromycin	oral liquid	14	1 (7)	-	8 (57)	5 (36)	1 (7)	-	-
clindamycin	oral liquid	14	2 (14)	1 (7)	2 (14)	10 (71)	-	-	-
flucloxacillin	oral liquid	14	2 (14)	-	-	11 (79)	-	-	1 (7)
abacavir + dolutegravir + lamivudine	tablet	13	5 (38)	1 (8)	2 (15)	3 (23)	3 (23)	2 (15)	3 (23)
digoxin	tablet	13	7 (54)	4 (31)	1 (8)	3 (23)	4 (31)	2 (15)	1 (8)
acetaminophen	oral liquid	12	7 (58)	-	-	7 (58)	2 (17)	-	2 (17)
amphotericin b	parenteral preparation	12	6 (50)	2 (17)	-	3 (25)	3 (25)	-	4 (33)
captopril	tablet	12	1 (8)	5 (42)	1 (8)	4 (33)	3 (25)	2 (17)	-
ciprofloxacin	tablet	12	4 (33)	2 (17)	1 (8)	4 (33)	5 (42)	3 (25)	1 (8)
gentamicin	parenteral preparation	12	6 (50)	-	1 (8)	-	1 (8)	-	2 (17)
lopinavir + ritonavir	tablet	12	2 (17)	-	-	8 (67)	4 (33)	-	1 (8)
omeprazole	capsule	12	3 (25)	3 (25)	3 (25)	5 (42)	5 (42)	3 (25)	2 (17)
benzylpenicillin	parenteral preparation	11	1 (9)	-	-	7 (64)	4 (36)	-	-
ciprofloxacin	oral liquid	11	1 (9)	5 (45)	3 (27)	5 (45)	-	1 (9)	2 (18)
hydroxyurea	capsule	10	4 (40)	4 (40)	1 (10)	2 (20)	2 (20)	1 (10)	1 (10)
isoniazid + pyrazinamide + rifampicin + etambutol	tablet	10	2 (20)	-	-	4 (40)	7 (70)	-	-
phenobarbital	tablet	10	-	5 (50)	3 (30)	-	2 (20)	1 (10)	3 (30)
vancomycin	parenteral preparation	10	7 (70)	-	-	-	1 (10)	-	1 (10)
clindamycin	capsule	9	-	3 (33)	1 (11)	5 (56)	-	1 (11)	-
isoniazid	oral liquid	9	3 (33)	1 (11)	-	5 (56)	1 (11)	-	-
acetylsalicylic acid	tablet	8	1 (13)	4 (50)	3 (38)	-	-	2 (25)	2 (25)

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acyclovir	tablet	8	2 (25)	-	-	2 (25)	4 (50)	1 (13)	-
caffeine	oral liquid	8	1 (13)	-	1 (13)	-	2 (25)	2 (25)	4 (50)
ceftriaxone	parenteral preparation	8	3 (38)	-	1 (13)	-	1 (13)	2 (25)	1 (13)
clarithromycin	oral liquid	8	-	-	-	7 (88)	-	1 (13)	-
levothyroxine	tablet	8	1 (13)	1 (13)	-	3 (38)	1 (13)	-	1 (13)
methotrexate	tablet	8	2 (25)	-	-	5 (63)	-	2 (25)	1 (13)
metronidazole	oral liquid	8	-	-	1 (13)	6 (75)	-	-	1 (13)
omeprazole	tablet	8	1 (13)	1 (13)	1 (13)	2 (25)	3 (38)	1 (13)	-
sildenafil	tablet	8	2 (25)	2 (25)	-	2 (25)	3 (38)	1 (13)	-
abacavir + lamivudine + zidovudine	tablet	7	2 (29)	1 (14)	-	2 (29)	4 (57)	-	1 (14)
artemether + lumefantrine	tablet	7	2 (29)	-	-	4 (57)	2 (29)	1 (14)	-
diazepam	rectal preparation	7	3 (43)	1 (14)	-	-	-	2 (29)	1 (14)
digoxin	oral liquid	7	3 (43)	1 (14)	-	-	-	1 (14)	1 (14)
furosemide	oral liquid	7	1 (14)	2 (29)	-	2 (29)	-	1 (14)	1 (14)
prednisolone	oral liquid	7	-	2 (29)	1 (14)	4 (57)	1 (14)	-	2 (29)
abacavir + lamivudine	tablet	6	4 (67)	-	-	2 (33)	1 (17)	-	-
albendazole	tablet	6	2 (33)	-	-	5 (83)	1 (17)	1 (17)	1 (17)
aminophylline	parenteral preparation	6	2 (33)	-	-	1 (17)	2 (33)	2 (33)	1 (17)
baclofen	tablet	6	1 (17)	3 (50)	1 (17)	-	1 (17)	-	2 (33)
budesonide	preparation for inhalation	6	-	-	1 (17)	2 (33)	3 (50)	1 (17)	-
clobazam	tablet	6	-	1 (17)	-	3 (50)	1 (17)	-	1 (17)
clonidine	oral liquid	6	-	6 (100)	2 (33)	-	-	-	-
cloxacillin	oral liquid	6	1 (17)	1 (17)	1 (17)	3 (50)	1 (17)	-	1 (17)
enalapril	tablet	6	2 (33)	3 (50)	-	1 (17)	1 (17)	1 (17)	-
epinephrine	parenteral preparation	6	4 (67)	-	-	-	2 (33)	-	-
esomeprazole	oral liquid	6	-	2 (33)	1 (17)	-	1 (17)	4 (67)	-
ferrous sulfate anhydrous	oral liquid	6	-	1 (17)	1 (17)	4 (67)	1 (17)	-	1 (17)
hydrocortisone	tablet	6	1 (17)	1 (17)	2 (33)	1 (17)	2 (33)	-	-
ibuprofen	oral liquid	6	3 (50)	-	1 (17)	1 (17)	-	2 (33)	-
insulin lispro	parenteral preparation	6	-	1 (17)	2 (33)	4 (67)	2 (33)	-	-
isoniazid	tablet	6	2 (33)	-	-	4 (67)	1 (17)	1 (17)	2 (33)
ketamine	parenteral preparation	6	3 (50)	1 (17)	-	1 (17)	1 (17)	3 (50)	1 (17)
methylprednisolone	tablet	6	-	-	-	5 (83)	-	1 (17)	-
metronidazole	tablet	6	-	-	-	5 (83)	-	1 (17)	-
phenoxymethylpenicillin	oral liquid	6	1 (17)	2 (33)	-	3 (50)	2 (33)	-	-
sildenafil	oral liquid	6	-	2 (33)	1 (17)	-	1 (17)	2 (33)	-
spironolactone	tablet	6	2 (33)	2 (33)	1 (17)	1 (17)	2 (33)	1 (17)	-
tacrolimus	oral liquid	6	1 (17)	5 (83)	4 (67)	-	-	1 (17)	1 (17)
valaciclovir	tablet	6	2 (33)	1 (17)	-	3 (50)	1 (17)	1 (17)	1 (17)
amoxicillin	capsule	5	-	1 (20)	1 (20)	1 (20)	2 (40)	1 (20)	-
amoxicillin	tablet	5	-	-	-	4 (80)	1 (20)	-	1 (20)

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amoxicillin + clavulanic acid	tablet	5	2 (40)	-	1 (20)	3 (60)	2 (40)	-	-
ampicillin	parenteral preparation	5	1 (20)	-	-	-	-	1 (20)	1 (20)
artesunate + amodiaquine	tablet	5	1 (20)	-	-	4 (80)	3 (60)	-	-
azathioprine	tablet	5	1 (20)	1 (20)	-	2 (40)	-	1 (20)	-
calcitriol	capsule	5	-	3 (60)	2 (40)	-	-	1 (20)	1 (20)
carbamazepine	tablet	5	2 (40)	-	-	1 (20)	2 (40)	-	2 (40)
cloxacillin	parenteral preparation	5	1 (20)	-	-	3 (60)	1 (20)	-	1 (20)
dexamethasone	tablet	5	-	1 (20)	1 (20)	2 (40)	-	1 (20)	3 (60)
mercaptopurine	tablet	5	-	1 (20)	1 (20)	1 (20)	-	-	2 (40)
methylphenidate	tablet	5	-	-	-	2 (40)	1 (20)	1 (20)	2 (40)
ondansetron	oral liquid	5	-	1 (20)	1 (20)	-	-	2 (40)	2 (40)
phenobarbital	parenteral preparation	5	1 (20)	1 (20)	-	2 (40)	1 (20)	1 (20)	1 (20)
propranolol	tablet	5	1 (20)	4 (80)	-	1 (20)	-	2 (40)	-
rifampicin	oral liquid	5	-	1 (20)	-	3 (60)	-	-	-
trimethoprim + sulfamethoxazole	oral liquid	5	1 (20)	-	-	1 (20)	-	1 (20)	2 (40)
valproic acid	capsule	5	2 (40)	1 (20)	1 (20)	-	1 (20)	1 (20)	-
valproic acid	oral liquid	5	2 (40)	-	-	3 (60)	-	-	1 (20)
abacavir	tablet	4	-	3 (75)	1 (25)	1 (25)	-	1 (25)	-
adalimumab	parenteral preparation	4	1 (25)	-	-	1 (25)	1 (25)	1 (25)	1 (25)
atomoxetine	tablet	4	1 (25)	-	-	1 (25)	1 (25)	-	1 (25)
azithromycin	tablet	4	1 (25)	-	-	1 (25)	-	2 (50)	1 (25)
bosentan	oral liquid	4	-	3 (75)	3 (75)	-	-	3 (75)	-
captopril	oral liquid	4	-	2 (50)	2 (50)	1 (25)	-	1 (25)	-
cefotaxime	parenteral preparation	4	-	-	-	1 (25)	-	-	1 (25)
clindamycin	tablet	4	2 (50)	-	-	2 (50)	1 (25)	-	-
clopidogrel	tablet	4	-	3 (75)	-	-	-	1 (25)	-
dexamethasone	oral liquid	4	-	1 (25)	1 (25)	2 (50)	1 (25)	-	2 (50)
dexmedetomidine	parenteral preparation	4	1 (25)	-	-	-	-	3 (75)	1 (25)
diclofenac	rectal preparation	4	1 (25)	2 (50)	-	-	-	1 (25)	-
enoxaparin	parenteral preparation	4	-	2 (50)	2 (50)	-	-	1 (25)	-
ethambutol	oral liquid	4	1 (25)	2 (50)	1 (25)	1 (25)	1 (25)	-	-
fentanyl	parenteral preparation	4	-	3 (75)	2 (50)	-	-	-	-
hydroxyurea	oral liquid	4	-	3 (75)	3 (75)	-	-	-	-
isoniazid + pyrazinamide + rifampicin	tablet	4	2 (50)	-	-	2 (50)	1 (25)	-	-
levofloxacin	tablet	4	1 (25)	-	-	3 (75)	2 (50)	1 (25)	-
lopinavir + ritonavir	capsule	4	-	-	-	3 (75)	4 (100)	-	-
nevirapine	oral liquid	4	-	-	2 (50)	-	-	1 (25)	1 (25)
pegfilgrastim	parenteral preparation	4	-	3 (75)	2 (50)	-	-	1 (25)	-
primaquine	tablet	4	3 (75)	1 (25)	-	1 (25)	2 (50)	1 (25)	2 (50)
quinine	tablet	4	-	1 (25)	2 (50)	2 (50)	2 (50)	-	-
topiramate	oral liquid	4	-	3 (75)	1 (25)	-	1 (25)	-	-

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topiramate	tablet	4	-	2 (50)	1 (25)	1 (25)	-	-	1 (25)
valaciclovir	oral liquid	4	-	1 (25)	1 (25)	1 (25)	1 (25)	1 (25)	1 (25)
vitamin e	oral liquid	4	1 (25)	1 (25)	1 (25)	1 (25)	-	-	2 (50)
acetaminophen	rectal preparation	3	1 (33)	1 (33)	-	1 (33)	-	-	1 (33)
acetylsalicylic acid	oral liquid	3	-	3 (100)	1 (33)	-	-	-	1 (33)
amikacin	parenteral preparation	3	1 (33)	-	1 (33)	2 (67)	1 (33)	1 (33)	1 (33)
amiodarone	parenteral preparation	3	1 (33)	-	1 (33)	-	-	-	1 (33)
amlodipine	tablet	3	-	-	-	2 (67)	1 (33)	-	-
amoxicillin + clavulanic acid	parenteral preparation	3	1 (33)	-	-	-	2 (67)	-	-
anakinra	parenteral preparation	3	1 (33)	-	-	2 (67)	1 (33)	-	1 (33)
atazanavir	tablet	3	-	1 (33)	-	2 (67)	-	-	-
bcg vaccine	parenteral preparation	3	1 (33)	-	-	-	1 (33)	-	-
beclomethasone dipropionate	preparation for inhalation	3	1 (33)	-	-	1 (33)	-	-	1 (33)
bisoprolol	tablet	3	1 (33)	1 (33)	1 (33)	-	-	1 (33)	-
budesonide + formoterol	preparation for inhalation	3	2 (67)	-	-	1 (33)	-	2 (67)	-
caffeine	parenteral preparation	3	2 (67)	-	-	-	-	-	-
carbamazepine	oral liquid	3	-	1 (33)	3 (100)	-	-	-	-
ceftazidime	parenteral preparation	3	1 (33)	-	-	1 (33)	-	-	1 (33)
chloramphenicol	capsule	3	-	-	-	2 (67)	1 (33)	1 (33)	-
ciprofloxacin	parenteral preparation	3	-	-	-	-	1 (33)	1 (33)	1 (33)
clonidine	tablet	3	1 (33)	1 (33)	1 (33)	-	1 (33)	1 (33)	-
colistin	parenteral preparation	3	3 (100)	-	-	-	-	-	-
corticotropin	parenteral preparation	3	1 (33)	-	-	1 (33)	2 (67)	1 (33)	2 (67)
desmopressin	tablet	3	-	-	-	-	1 (33)	-	2 (67)
dexamethasone	parenteral preparation	3	2 (67)	-	-	-	-	-	1 (33)
diazepam	parenteral preparation	3	1 (33)	-	-	2 (67)	1 (33)	-	-
dolutegravir + lamivudine	tablet	3	2 (67)	-	-	1 (33)	-	-	1 (33)
esomeprazole	tablet	3	1 (33)	1 (33)	-	1 (33)	1 (33)	-	-
ethambutol	tablet	3	2 (67)	-	1 (33)	1 (33)	-	-	-
fludrocortisone	tablet	3	1 (33)	-	1 (33)	1 (33)	-	-	-
heparin	parenteral preparation	3	2 (67)	-	-	-	-	1 (33)	-
hydrocortisone	oral liquid	3	-	3 (100)	2 (67)	-	-	-	-
insulin human	parenteral preparation	3	1 (33)	1 (33)	-	-	1 (33)	-	-
levothyroxine	oral liquid	3	-	3 (100)	1 (33)	-	-	-	-
linezolid	tablet	3	2 (67)	-	-	2 (67)	1 (33)	-	-
lorazepam	parenteral preparation	3	1 (33)	1 (33)	-	-	1 (33)	-	1 (33)
mebendazole	oral liquid	3	-	-	-	2 (67)	1 (33)	-	-
morphine	oral liquid	3	1 (33)	1 (33)	2 (67)	-	-	-	2 (67)
morphine	parenteral preparation	3	-	-	-	-	1 (33)	1 (33)	-
nitrofurantoin	oral liquid	3	-	1 (33)	-	2 (67)	-	-	-
oseltamivir	capsule	3	-	2 (67)	3 (100)	-	-	-	-

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pantoprazole	parenteral preparation	3	1 (33)	-	-	1 (33)	1 (33)	1 (33)	-
phenobarbital	oral liquid	3	-	2 (67)	-	-	-	-	2 (67)
prednisone	oral liquid	3	-	-	-	3 (100)	-	-	-
prednisone	tablet	3	1 (33)	-	-	3 (100)	2 (67)	-	-
pseudoephedrine	oral liquid	3	1 (33)	1 (33)	-	-	1 (33)	-	-
pyrimethamine	tablet	3	2 (67)	-	-	-	2 (67)	2 (67)	1 (33)
ranitidine	oral liquid	3	2 (67)	-	-	1 (33)	1 (33)	-	1 (33)
sildenafil	parenteral preparation	3	1 (33)	-	1 (33)	-	-	1 (33)	2 (67)
spironolactone	oral liquid	3	1 (33)	1 (33)	-	1 (33)	-	-	-
tacrolimus	tablet	3	2 (67)	1 (33)	1 (33)	-	2 (67)	1 (33)	-
tenofovir disoproxil	tablet	3	-	1 (33)	-	-	-	2 (67)	-
tretinoin	capsule	3	-	2 (67)	-	-	1 (33)	-	1 (33)
valganciclovir	oral liquid	3	2 (67)	-	-	-	1 (33)	-	1 (33)
vigabatrin	oral liquid	3	-	1 (33)	1 (33)	-	1 (33)	-	-
warfarin	tablet	3	1 (33)	-	1 (33)	-	-	-	-
zonisamide	oral liquid	3	-	2 (67)	-	1 (33)	-	-	-
acetaminophen	tablet	2	1 (50)	1 (50)	-	-	-	-	-
acyclovir	parenteral preparation	2	1 (50)	-	-	1 (50)	1 (50)	-	-
adenosine	parenteral preparation	2	2 (100)	-	-	-	-	-	-
alprostadil	parenteral preparation	2	-	1 (50)	1 (50)	-	-	-	-
artemether + lumefantrine	oral liquid	2	1 (50)	-	-	-	1 (50)	-	1 (50)
ascorbic acid	tablet	2	-	-	-	2 (100)	1 (50)	-	-
atenolol	oral liquid	2	-	1 (50)	1 (50)	-	-	1 (50)	2 (100)
atropine	parenteral preparation	2	2 (100)	-	-	-	-	-	2 (100)
benzyl benzoate	topical	2	-	1 (50)	-	1 (50)	-	-	-
carvedilol	tablet	2	1 (50)	-	-	-	-	1 (50)	-
cefixime	oral liquid	2	-	1 (50)	-	1 (50)	-	-	1 (50)
chloroquine	oral liquid	2	-	-	-	1 (50)	1 (50)	-	-
chloroquine	tablet	2	2 (100)	-	-	2 (100)	1 (50)	1 (50)	1 (50)
ciprofloxacin	capsule	2	-	-	-	2 (100)	-	1 (50)	-
coagulation factor ix recombinant	parenteral preparation	2	1 (50)	-	-	-	-	-	1 (50)
colforsin	tablet	2	-	2 (100)	-	-	-	-	-
cyclosporine	capsule	2	-	-	-	2 (100)	-	-	-
dalteparin	parenteral preparation	2	-	2 (100)	-	-	-	1 (50)	-
diazoxide	tablet	2	1 (50)	-	-	-	1 (50)	1 (50)	-
digoxin	parenteral preparation	2	2 (100)	-	-	-	-	-	-
domperidone	oral liquid	2	-	1 (50)	-	1 (50)	-	-	-
dopamine	parenteral preparation	2	1 (50)	-	-	-	-	1 (50)	-
doxycycline	tablet	2	1 (50)	-	-	-	-	2 (100)	-
enalapril	oral liquid	2	-	-	2 (100)	-	-	-	-
erythromycin	tablet	2	-	-	-	-	-	-	1 (50)

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esmolol	parenteral preparation	2	2 (100)	-	-	-	-	-	-
ethosuximide	capsule	2	1 (50)	-	-	1 (50)	-	-	-
ethosuximide	oral liquid	2	1 (50)	-	-	1 (50)	-	-	-
favipiravir	tablet	2	1 (50)	-	-	-	-	1 (50)	-
ferrous fumarate	oral liquid	2	-	-	-	2 (100)	1 (50)	-	-
ferrous gluconate	oral liquid	2	-	-	-	2 (100)	-	-	-
filgrastim	parenteral preparation	2	1 (50)	-	-	1 (50)	1 (50)	-	-
flecainide	oral liquid	2	-	1 (50)	-	-	-	1 (50)	-
fluconazole	capsule	2	2 (100)	-	-	1 (50)	1 (50)	-	-
folic acid	tablet	2	1 (50)	1 (50)	1 (50)	-	1 (50)	-	-
folic acid	oral liquid	2	-	-	1 (50)	-	-	-	1 (50)
ganciclovir	parenteral preparation	2	2 (100)	-	-	-	-	-	-
ganciclovir	tablet	2	-	1 (50)	1 (50)	1 (50)	-	-	-
griseofulvin	oral liquid	2	1 (50)	-	-	-	-	-	-
griseofulvin	tablet	2	1 (50)	-	-	1 (50)	-	-	-
halothane	preparation for inhalation	2	2 (100)	-	-	-	-	-	1 (50)
hydrochlorothiazide + spironolactone	tablet	2	-	1 (50)	-	-	1 (50)	-	-
hydroxychloroquine	tablet	2	1 (50)	-	-	1 (50)	-	-	-
iron sucrose	oral liquid	2	-	-	-	2 (100)	1 (50)	-	-
isoniazid + rifampicin	tablet	2	1 (50)	-	-	1 (50)	-	-	-
isoniazid + pyrazinamide + rifampicin	oral liquid	2	-	1 (50)	-	1 (50)	-	-	-
isotretinoin	capsule	2	-	2 (100)	-	-	-	1 (50)	-
itraconazole	oral liquid	2	1 (50)	1 (50)	-	-	-	-	-
lamivudine + nevirapine + zidovudine	tablet	2	-	-	-	1 (50)	1 (50)	-	-
lansoprazole	tablet	2	-	-	-	-	-	2 (100)	-
levamisole	tablet	2	-	-	-	-	1 (50)	1 (50)	-
levetiracetam	oral liquid	2	1 (50)	1 (50)	1 (50)	1 (50)	-	-	-
lopinavir + ritonavir	dispersable tablet	2	1 (50)	-	-	1 (50)	2 (100)	-	-
loratadine	tablet	2	1 (50)	-	-	1 (50)	2 (100)	-	-
mebendazole	tablet	2	1 (50)	-	-	-	1 (50)	-	-
meropenem	parenteral preparation	2	-	-	-	-	-	-	1 (50)
methadone	oral liquid	2	-	2 (100)	1 (50)	-	-	-	-
methotrexate	parenteral preparation	2	1 (50)	-	-	1 (50)	-	-	-
metoprolol	oral liquid	2	-	2 (100)	-	-	-	-	-
midazolam	oral liquid	2	-	-	-	1 (50)	-	-	1 (50)
midazolam	parenteral preparation	2	-	1 (50)	-	-	1 (50)	-	-
milrinone	parenteral preparation	2	-	-	-	-	-	2 (100)	-
mometasone furoate	topical	2	1 (50)	-	-	-	1 (50)	2 (100)	1 (50)
moxifloxacin	oral liquid	2	1 (50)	1 (50)	-	1 (50)	-	-	-
mycophenolate mofetil	capsule	2	-	1 (50)	-	-	-	-	1 (50)
nitrofurantoin	tablet	2	-	-	-	1 (50)	-	-	1 (50)

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olanzapine	oral liquid	2	-	-	1 (50)	-	-	1 (50)	-
omega acid ethyl esters	oral liquid	2	-	-	-	-	1 (50)	1 (50)	-
pancrelipase	capsule	2	-	1 (50)	-	-	1 (50)	-	1 (50)
phenytoin	oral liquid	2	1 (50)	1 (50)	-	-	-	-	-
phenytoin	tablet	2	1 (50)	1 (50)	-	-	-	-	-
pivmecillinam	tablet	2	-	-	-	2 (100)	-	1 (50)	-
prednisolone acetate	tablet	2	1 (50)	-	-	2 (100)	1 (50)	-	-
propofol	parenteral preparation	2	1 (50)	-	-	-	-	1 (50)	1 (50)
quinine	oral liquid	2	-	-	1 (50)	1 (50)	-	-	-
quinine	parenteral preparation	2	2 (100)	-	-	-	-	-	-
rabies vaccine	parenteral preparation	2	1 (50)	-	-	-	1 (50)	-	-
raltegravir	tablet	2	1 (50)	-	-	-	-	-	1 (50)
ritonavir	oral liquid	2	-	-	-	1 (50)	1 (50)	-	-
rituximab	parenteral preparation	2	-	-	-	-	-	1 (50)	1 (50)
salbutamol	oral liquid	2	-	-	-	-	1 (50)	1 (50)	-
somatotropin	parenteral preparation	2	-	1 (50)	-	1 (50)	-	-	1 (50)
tacrolimus	capsule	2	-	-	1 (50)	1 (50)	-	-	-
terbinafine	oral liquid	2	-	1 (50)	-	-	-	-	-
tobramycin	preparation for inhalation	2	1 (50)	-	-	1 (50)	-	-	-
valproic acid	tablet	2	-	-	-	1 (50)	2 (100)	-	1 (50)
vancomycin	oral liquid	2	-	1 (50)	-	1 (50)	-	-	-
vasopressin	parenteral preparation	2	1 (50)	-	1 (50)	-	-	-	-
vigabatrin	tablet	2	-	1 (50)	1 (50)	1 (50)	-	-	1 (50)
warfarin	oral liquid	2	1 (50)	1 (50)	-	-	-	-	-
zidovudine	oral liquid	2	-	-	-	2 (100)	-	-	-
zinc acetate	oral liquid	2	-	1 (50)	-	1 (50)	-	-	-
abacavir	oral liquid	1	-	-	1 (100)	-	-	-	-
abacavir + dolutegravir + lamivudine	capsule	1	-	-	-	-	-	-	1 (100)
abacavir + dolutegravir + lamivudine	oral liquid	1	-	-	-	1 (100)	-	-	-
abacavir + dolutegravir + lamivudine	parenteral preparation	1	-	-	-	-	-	-	1 (100)
abacavir + dolutegravir + lamivudine	rectal preparation	1	-	1 (100)	1 (100)	-	-	1 (100)	-
abacavir + lamivudine + zidovudine	capsule	1	-	-	1 (100)	-	-	-	-
abarelix	rectal preparation	1	-	-	1 (100)	-	-	-	-
abequose	capsule	1	-	1 (100)	-	-	-	-	-
abequose	parenteral preparation	1	-	-	1 (100)	-	-	-	-
acamprosate	capsule	1	-	1 (100)	-	-	-	-	-
acarbose	tablet	1	-	-	-	-	1 (100)	-	-
acarbose	rectal preparation	1	-	1 (100)	-	-	-	-	-
acetamide	topical	1	-	1 (100)	-	-	-	-	-
acetaminophen	parenteral preparation	1	1 (100)	-	-	-	-	-	-
acetyl sulfisoxazole	capsule	1	-	1 (100)	-	-	-	-	-



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acetylcysteine	oral liquid	1	1 (100)	-	-	-	-	-	-
acetylcysteine	preparation for inhalation	1	-	-	-	-	-	-	1 (100)
acetylsalicylic acid	capsule	1	-	1 (100)	-	-	-	-	-
acyclovir	capsule	1	-	-	-	1 (100)	-	-	-
albendazole	oral liquid	1	-	-	-	-	-	1 (100)	1 (100)
albumin human	parenteral preparation	1	1 (100)	-	-	-	-	-	-
alefacept	capsule	1	-	-	-	1 (100)	-	-	-
alemtuzumab	parenteral preparation	1	-	-	-	-	-	-	1 (100)
alendronic acid	oral liquid	1	-	-	-	-	-	1 (100)	-
allopurinol	tablet	1	-	-	-	1 (100)	1 (100)	-	-
allopurinol	oral liquid	1	-	1 (100)	-	-	-	-	-
amantadine	capsule	1	-	-	-	1 (100)	-	-	-
aminophylline	tablet	1	1 (100)	-	-	1 (100)	1 (100)	1 (100)	1 (100)
aminosalicylic acid	rectal preparation	1	-	-	-	1 (100)	-	-	-
aminosalicylic acid	tablet	1	-	-	-	1 (100)	-	-	-
amiodarone	oral liquid	1	-	-	-	1 (100)	-	-	-
amiodarone	tablet	1	-	1 (100)	-	-	-	-	-
amodiaquine	tablet	1	-	-	-	1 (100)	-	-	-
amodiaquine + sulfadoxine + pyrimethamine	tablet	1	-	-	-	1 (100)	1 (100)	-	-
amoxicillin	dispersable tablet	1	-	-	-	-	-	-	1 (100)
antihemophilic factor human recombinant	parenteral preparation	1	-	-	-	-	1 (100)	-	1 (100)
ardeparin	oral liquid	1	-	-	-	1 (100)	1 (100)	-	-
artemether + lumefantrine	rectal preparation	1	-	-	-	-	-	-	1 (100)
artesunate + pyronaridine tetraphosphate	tablet	1	1 (100)	-	-	1 (100)	1 (100)	1 (100)	1 (100)
ascorbic acid	oral liquid	1	-	-	-	-	-	-	1 (100)
asparaginase	parenteral preparation	1	1 (100)	-	-	-	-	-	-
atazanavir	capsule	1	-	-	1 (100)	-	-	-	1 (100)
atenolol	tablet	1	-	1 (100)	-	-	-	-	-
atorvastatin	tablet	1	-	-	1 (100)	-	-	1 (100)	1 (100)
atovaquone	tablet	1	-	-	-	-	-	1 (100)	-
atropine	topical	1	-	-	-	1 (100)	1 (100)	-	-
azathioprine	oral liquid	1	-	1 (100)	-	-	-	1 (100)	-
azithromycin	capsule	1	-	-	-	1 (100)	-	1 (100)	-
azithromycin	parenteral preparation	1	-	-	-	1 (100)	-	-	-
baclofen	oral liquid	1	-	1 (100)	-	-	-	-	-
bedaquiline	tablet	1	1 (100)	-	-	-	-	-	-
benznidazole	tablet	1	1 (100)	-	-	-	-	-	-
betamethasone	preparation for inhalation	1	-	-	-	-	1 (100)	-	-
bicalutamide	oral liquid	1	-	1 (100)	1 (100)	-	-	-	-
bictegravir emtricitabine tenofovir alafenamide	tablet	1	-	-	-	-	-	1 (100)	-
bimatoprost	oral liquid	1	-	-	-	-	1 (100)	-	-

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bleomycin	parenteral preparation	1	-	-	-	-	-	-	1 (100)
bosentan	tablet	1	-	1 (100)	-	-	-	-	-
brentuximab vedotin	parenteral preparation	1	-	-	-	-	-	1 (100)	-
bromodiphenhydramine	oral liquid	1	-	-	-	-	1 (100)	-	-
budesonide	oral liquid	1	-	-	-	-	-	1 (100)	-
budesonide	topical	1	-	-	-	-	1 (100)	-	-
bumetanide	parenteral preparation	1	-	1 (100)	-	-	-	-	-
bumetanide	tablet	1	-	-	-	-	-	1 (100)	-
buprenorphine	oral liquid	1	-	-	1 (100)	-	-	-	-
busulfan	parenteral preparation	1	1 (100)	-	-	-	-	-	-
caffeine	tablet	1	1 (100)	-	-	-	1 (100)	-	-
calcitriol	tablet	1	-	1 (100)	-	-	-	-	-
calcium acetate	tablet	1	-	-	-	-	-	1 (100)	-
calcium carbonate	tablet	1	-	-	1 (100)	-	-	-	-
calcium glucoheptonate	parenteral preparation	1	1 (100)	-	-	-	-	-	-
carboplatin	parenteral preparation	1	-	-	-	-	-	-	1 (100)
carboprost tromethamine	parenteral preparation	1	-	-	-	-	-	-	1 (100)
cefdinir	oral liquid	1	-	-	-	-	-	-	1 (100)
cefixime	capsule	1	-	1 (100)	-	-	-	-	-
cefixime	tablet	1	-	-	-	-	-	-	1 (100)
cefprozil	oral liquid	1	-	-	-	1 (100)	-	-	-
ceftazidime + avibactam	parenteral preparation	1	-	-	-	-	-	-	1 (100)
ceftriaxone	oral liquid	1	-	-	-	1 (100)	-	-	-
cefuroxime	parenteral preparation	1	-	-	-	-	-	-	1 (100)
cephalexin	tablet	1	1 (100)	-	-	1 (100)	-	-	-
cephalexin	oral liquid	1	-	-	-	1 (100)	-	-	-
cephalexin	capsule	1	-	-	1 (100)	-	-	-	-
cephaloglycin	tablet	1	-	-	-	1 (100)	-	-	-
cetirizine	oral liquid	1	1 (100)	-	-	1 (100)	-	-	-
cetirizine	tablet	1	1 (100)	-	-	-	-	1 (100)	1 (100)
chloramphenicol	oral liquid	1	-	-	-	-	-	-	1 (100)
chloramphenicol	tablet	1	1 (100)	-	-	1 (100)	1 (100)	1 (100)	1 (100)
chlorhexidine	topical	1	-	-	-	-	-	-	1 (100)
chlorpheniramine	tablet	1	1 (100)	-	-	-	-	-	-
cholecalciferol	oral liquid	1	-	-	-	1 (100)	-	-	-
clindamycin	parenteral preparation	1	-	-	-	-	1 (100)	-	-
clinoleic lipids	parenteral preparation	1	-	-	-	-	-	-	1 (100)
clobazam	capsule	1	-	-	-	-	1 (100)	-	-
clobazam	parenteral preparation	1	-	-	-	-	-	-	1 (100)
clobetasol propionate	topical	1	-	-	-	-	1 (100)	-	-
clonazepam	oral liquid	1	-	1 (100)	-	-	-	-	-

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clopidogrel	oral liquid	1	-	1 (100)	-	-	-	-	-
cloxacillin	capsule	1	-	-	-	1 (100)	-	-	-
coagulation factor viia recombinant human	parenteral preparation	1	-	-	-	-	-	-	1 (100)
colchicine	tablet	1	-	-	-	-	1 (100)	-	-
colistin	preparation for inhalation	1	-	-	-	1 (100)	-	-	-
cyclosporine	tablet	1	-	-	-	-	-	-	1 (100)
dantrolene	tablet	1	-	-	-	1 (100)	-	-	-
dantrolene	capsule	1	-	1 (100)	1 (100)	-	-	-	-
dapsone	tablet	1	1 (100)	-	-	-	-	-	-
darunavir	tablet	1	-	-	-	-	-	1 (100)	-
dasatinib	tablet	1	-	1 (100)	-	-	-	-	-
desloratadine	tablet	1	1 (100)	-	-	-	-	1 (100)	1 (100)
desloratadine	oral liquid	1	-	-	-	-	-	1 (100)	1 (100)
desmopressin	oral liquid	1	1 (100)	-	-	1 (100)	1 (100)	-	-
desoximetasone	tablet	1	1 (100)	-	-	-	-	-	-
dexmedetomidine	oral liquid	1	-	-	-	-	-	1 (100)	-
dextromethorphan	oral liquid	1	-	-	-	1 (100)	-	-	-
diamorphine	tablet	1	-	-	-	-	-	1 (100)	1 (100)
diazepam	oral liquid	1	-	-	-	1 (100)	1 (100)	-	-
diazoxide	oral liquid	1	-	-	-	-	1 (100)	-	-
diazoxide	capsule	1	-	1 (100)	-	-	-	-	-
diclofenac	tablet	1	-	-	-	1 (100)	-	-	-
diclofenac	parenteral preparation	1	-	-	-	-	-	1 (100)	-
dicyclomine	tablet	1	-	-	-	1 (100)	-	-	-
diloxanide furoate	oral liquid	1	-	-	-	-	-	-	1 (100)
diphenhydramine	oral liquid	1	-	-	-	1 (100)	-	-	-
dobutamine	parenteral preparation	1	-	-	-	-	-	1 (100)	-
docetaxel	preparation for inhalation	1	-	1 (100)	-	-	-	-	-
domperidone	rectal preparation	1	1 (100)	-	-	-	-	-	-
domperidone	tablet	1	-	1 (100)	-	-	-	-	-
doxycycline	oral liquid	1	-	-	-	-	-	1 (100)	-
doxycycline	parenteral preparation	1	-	-	-	-	-	-	1 (100)
eculizumab	parenteral preparation	1	-	-	-	-	-	1 (100)	-
efavirenz	capsule	1	-	-	-	-	-	1 (100)	-
efavirenz	tablet	1	-	1 (100)	-	-	-	-	-
efavirenz + emtricitabine + tenofovir	tablet	1	1 (100)	-	-	-	-	-	-
emtricitabine + tenofovir	tablet	1	-	1 (100)	-	-	-	-	-
erythromycin	oral liquid	1	-	1 (100)	-	-	-	-	-
etanercept	parenteral preparation	1	-	-	-	1 (100)	-	-	-
ethanol	parenteral preparation	1	-	1 (100)	-	-	-	1 (100)	-
ethinylestradiol	tablet	1	1 (100)	-	-	-	-	-	-



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ethionamide	tablet	1	1 (100)	-	-	1 (100)	1 (100)	-	-
etoposide	capsule	1	-	1 (100)	-	-	-	-	-
etoposide	parenteral preparation	1	-	-	1 (100)	-	-	-	-
exemestane	oral liquid	1	-	1 (100)	-	-	-	-	-
factor ix complex human	parenteral preparation	1	1 (100)	-	-	1 (100)	-	-	-
felbamate	oral liquid	1	1 (100)	-	-	-	-	-	-
felodipine	tablet	1	-	-	-	1 (100)	-	-	-
ferrous gluconate	tablet	1	1 (100)	-	-	-	-	-	-
flecainide	tablet	1	-	1 (100)	-	-	-	-	-
flucytosine	tablet	1	-	-	-	-	-	1 (100)	-
fluorometholone	topical	1	-	-	-	1 (100)	1 (100)	-	-
fluoxetine	capsule	1	-	-	-	-	-	-	1 (100)
fluoxetine	oral liquid	1	-	-	-	1 (100)	-	-	-
fluticasone + salmeterol	preparation for inhalation	1	-	-	-	1 (100)	1 (100)	-	-
fosfomycin	oral liquid	1	1 (100)	-	-	-	-	-	-
furosemide	parenteral preparation	1	1 (100)	-	-	-	-	-	-
furosemide	capsule	1	-	1 (100)	-	-	-	-	-
gabapentin	capsule	1	-	1 (100)	-	-	-	-	-
gabapentin	oral liquid	1	-	1 (100)	1 (100)	-	-	-	-
ganciclovir	capsule	1	-	-	-	-	-	-	1 (100)
gentamicin	topical	1	-	-	-	-	-	-	-
gentamicin	ophthalmological preparation	1	-	-	1 (100)	-	-	-	1 (100)
glucosamine 6 phosphate	tablet	1	-	-	-	-	-	1 (100)	-
glycopyrronium	oral liquid	1	-	1 (100)	-	-	-	-	-
hydralazine	oral liquid	1	-	1 (100)	1 (100)	-	-	-	-
hydrochlorothiazide	oral liquid	1	-	1 (100)	1 (100)	-	-	-	-
hydrochlorothiazide	tablet	1	-	-	-	-	-	-	1 (100)
hydrocortisone	parenteral preparation	1	1 (100)	-	-	-	-	-	-
hydrocortisone	topical	1	-	-	-	-	-	-	1 (100)
hydromorphone	parenteral preparation	1	-	1 (100)	-	-	-	-	-
hydroxocobalamin	parenteral preparation	1	-	-	-	-	-	1 (100)	-
hydroxyzine	capsule	1	-	1 (100)	-	-	-	-	-
hypertonic saline	preparation for inhalation	1	-	1 (100)	-	-	-	-	-
ibrutinib	tablet	1	-	1 (100)	-	-	-	-	-
ibuprofen	tablet	1	1 (100)	-	-	-	-	-	-
imatinib	tablet	1	-	1 (100)	-	-	-	-	-
indomethacin	capsule	1	1 (100)	-	-	-	-	-	-
indomethacin	tablet	1	1 (100)	-	-	-	-	-	-
indomethacin	rectal preparation	1	-	1 (100)	-	-	-	-	-
infliximab	parenteral preparation	1	1 (100)	-	-	1 (100)	-	1 (100)	-



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insulin	parenteral preparation	1	-	-	1 (100)	-	-	-	-
insulin human	subcutaneous preparation	1	-	-	-	1 (100)	1 (100)	-	-
insulin pork	parenteral preparation	1	-	-	-	-	1 (100)	-	-
interferon alfa a recombinant	parenteral preparation	1	-	-	-	-	-	-	1 (100)
iron dextran	oral liquid	1	1 (100)	-	-	-	-	-	-
isoniazid + pyrazinamide + rifampicin + etambutol	oral liquid	1	-	-	-	1 (100)	-	-	-
isoniazid + pyridoxine + sulfamethoxazole + trimethoprim	tablet	1	-	-	1 (100)	-	-	-	1 (100)
isoniazid	capsule	1	-	1 (100)	-	-	-	-	-
isoprinosine	oral liquid	1	-	-	-	-	-	1 (100)	-
itraconazole	capsule	1	-	1 (100)	1 (100)	-	-	-	1 (100)
ivabradine	oral liquid	1	-	-	-	-	-	1 (100)	-
ivermectin	tablet	1	1 (100)	-	-	1 (100)	-	1 (100)	-
kanamycin	parenteral preparation	1	1 (100)	-	-	1 (100)	-	-	1 (100)
lactulose	oral liquid	1	-	-	-	-	1 (100)	-	-
lamivudine	oral liquid	1	-	-	1 (100)	-	-	-	-
lamivudine + nevirapine + zidovudine	oral liquid	1	-	-	-	-	1 (100)	-	-
lamivudine + tenofovir	tablet	1	-	-	-	1 (100)	-	-	-
lamivudine + zidovudine	oral liquid	1	1 (100)	-	-	-	-	-	-
latanoprost	topical	1	-	-	-	-	-	1 (100)	-
levetiracetam	parenteral preparation	1	-	-	-	1 (100)	-	-	-
levofloxacin	parenteral preparation	1	1 (100)	-	-	-	-	1 (100)	-
levofloxacin	oral liquid	1	-	-	-	-	-	1 (100)	-
levosalbutamol	oral liquid	1	-	-	-	-	1 (100)	-	-
linezolid	oral liquid	1	-	-	-	-	-	1 (100)	-
lisinopril	tablet	1	-	1 (100)	-	-	-	-	-
lopinavir	oral liquid	1	-	-	-	1 (100)	-	-	-
lopinavir + ritonavir	other	1	-	-	-	1 (100)	1 (100)	-	-
lopinavir + ritonavir	pellet formulation	1	-	-	-	-	1 (100)	-	-
lorazepam	oral liquid	1	-	1 (100)	-	-	-	-	-
magnesium sulfate	parenteral preparation	1	-	-	-	-	-	-	1 (100)
mannitol	preparation for inhalation	1	-	-	-	1 (100)	-	-	-
meclizine	oral liquid	1	-	1 (100)	-	-	-	-	-
methotrexate	oral liquid	1	-	1 (100)	-	-	-	-	-
methylphenidate	capsule	1	-	-	-	1 (100)	-	-	-
methylphenidate	oral liquid	1	-	1 (100)	-	-	-	-	-
methylprednisolone	oral liquid	1	-	-	-	1 (100)	-	-	-
methylprednisolone	parenteral preparation	1	1 (100)	-	-	-	1 (100)	-	-
metoclopramide	parenteral preparation	1	1 (100)	-	-	-	-	-	-
metoclopramide	oral liquid	1	-	-	-	-	1 (100)	-	-
metoprolol	tablet	1	-	1 (100)	-	-	-	-	-

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metronidazole	capsule	1	-	-	-	1 (100)	-	-	-
mexiletine	capsule	1	-	1 (100)	1 (100)	-	-	-	-
midazolam	preparation for inhalation	1	1 (100)	-	-	-	-	-	-
midodrine	tablet	1	-	1 (100)	-	-	-	-	-
miltefosine	capsule	1	1 (100)	-	-	1 (100)	-	-	-
mirtazapine	tablet	1	-	-	-	-	-	1 (100)	-
montelukast	tablet	1	1 (100)	-	-	-	-	-	-
morphine	capsule	1	-	-	1 (100)	-	-	-	-
morphine	tablet	1	-	1 (100)	-	-	-	-	-
moxifloxacin	capsule	1	1 (100)	-	-	-	-	-	-
moxifloxacin	tablet	1	-	-	1 (100)	-	-	-	-
multivitamins	oral liquid	1	-	-	-	1 (100)	-	-	-
mycophenolate mofetil	oral liquid	1	1 (100)	-	-	-	-	-	-
mycophenolate mofetil	tablet	1	-	-	-	1 (100)	-	-	-
mycophenolic acid	tablet	1	1 (100)	-	-	1 (100)	-	-	-
nalidixic acid	tablet	1	1 (100)	-	-	-	-	-	-
nicardipine	parenteral preparation	1	-	-	-	-	-	1 (100)	-
nifedipine	oral liquid	1	-	-	-	-	-	1 (100)	-
nifurtimox	tablet	1	1 (100)	-	-	-	-	-	-
nitazoxanide	tablet	1	-	-	-	1 (100)	-	-	-
nitrofurantoin	capsule	1	1 (100)	-	-	1 (100)	-	-	-
olanzapine	tablet	1	-	-	1 (100)	-	-	1 (100)	-
omalizumab	parenteral preparation	1	1 (100)	-	-	-	-	1 (100)	-
omega acid ethyl esters	capsule	1	-	1 (100)	-	-	-	-	-
ondansetron	tablet	1	-	-	-	-	-	-	1 (100)
oral rehydration salts	oral liquid	1	-	-	-	1 (100)	-	-	-
oxacillin	parenteral preparation	1	-	-	-	1 (100)	-	-	-
oxcarbazepine	oral liquid	1	-	-	-	-	1 (100)	-	-
oxytocin	parenteral preparation	1	-	-	-	-	-	1 (100)	-
palivizumab	parenteral preparation	1	-	-	-	-	-	-	1 (100)
pantoprazole	tablet	1	-	-	-	1 (100)	-	1 (100)	-
pantoprazole	capsule	1	-	1 (100)	-	-	-	-	-
pegaspargase	parenteral preparation	1	-	-	-	-	-	-	1 (100)
pemetrexed	preparation for inhalation	1	-	1 (100)	-	-	-	-	-
pentazocine	parenteral preparation	1	1 (100)	-	-	-	-	-	-
phenoxymethylpenicillin	parenteral preparation	1	-	-	-	1 (100)	-	-	-
phenoxymethylpenicillin	tablet	1	-	-	-	1 (100)	-	-	-
phenylephrine	ophthalmological preparation	1	-	1 (100)	-	-	-	-	-
phenytoin	capsule	1	-	-	-	-	1 (100)	-	-
phenytoin	parenteral preparation	1	1 (100)	-	-	-	-	-	-

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picosulphate sodium	oral liquid	1	1 (100)	-	-	-	-	-	-
piperacillin	parenteral preparation	1	-	-	-	-	-	-	1 (100)
piperacillin + tazobactam	parenteral preparation	1	-	-	1 (100)	-	-	-	-
polyethylene glycol	dispersable tablet	1	-	-	-	-	-	1 (100)	-
posaconazole	oral liquid	1	-	-	-	-	-	1 (100)	-
posaconazole	tablet	1	-	-	-	-	-	-	1 (100)
potassium chloride	oral liquid	1	-	1 (100)	1 (100)	-	-	-	-
potassium chloride	parenteral preparation	1	-	1 (100)	-	-	-	-	-
potassium citrate	tablet	1	-	-	-	1 (100)	-	-	-
praziquantel	tablet	1	-	-	1 (100)	-	-	-	-
prednisone	rectal preparation	1	1 (100)	-	-	-	-	-	-
probenecid	tablet	1	-	-	1 (100)	-	-	1 (100)	-
procaine	parenteral preparation	1	-	-	-	1 (100)	-	-	-
proparacaine	topical	1	-	1 (100)	-	-	-	-	-
propranolol	parenteral preparation	1	-	-	1 (100)	-	-	-	-
prostaglandin d2	tablet	1	-	-	-	-	1 (100)	-	-
pyrazinamide	tablet	1	-	-	-	-	1 (100)	-	-
pyrimethamine	oral liquid	1	-	1 (100)	-	-	-	-	-
ramelteon	tablet	1	-	1 (100)	1 (100)	-	-	-	1 (100)
renal replacement fluids premix from manufacturers	parenteral preparation	1	-	-	1 (100)	-	-	1 (100)	1 (100)
riboflavin	tablet	1	-	-	-	-	-	1 (100)	-
rifabutin	capsule	1	-	-	-	1 (100)	-	-	-
rifabutin	oral liquid	1	-	1 (100)	-	-	-	-	-
rifampicin	capsule	1	-	1 (100)	-	-	-	-	-
rifamycin	topical	1	-	-	-	1 (100)	1 (100)	-	-
rifapentine	tablet	1	-	-	-	-	-	1 (100)	-
risperidone	oral liquid	1	-	-	-	-	-	1 (100)	-
ritonavir	capsule	1	-	-	-	1 (100)	1 (100)	-	1 (100)
ritonavir	tablet	1	-	-	-	1 (100)	-	-	-
rufinamide	tablet	1	-	1 (100)	-	-	-	-	-
ruxolitinib	tablet	1	-	1 (100)	-	-	-	-	-
salbutamol	parenteral preparation	1	1 (100)	-	-	1 (100)	-	-	-
salbutamol	tablet	1	-	-	-	1 (100)	-	-	-
salbutamol	topical	1	-	-	-	1 (100)	1 (100)	-	-
salicylic acid	oral liquid	1	-	-	-	1 (100)	-	-	-
sertraline	oral liquid	1	-	-	-	1 (100)	-	-	-
sertraline	tablet	1	-	-	-	-	-	1 (100)	-
sevelamer	capsule	1	1 (100)	-	-	-	-	-	-
sevelamer	tablet	1	-	-	-	1 (100)	-	-	-
sodium bicarbonate	tablet	1	-	-	-	-	-	1 (100)	-
sodium chloride	tablet	1	-	-	1 (100)	-	-	-	-



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sodium phosphate dibasic	oral liquid	1	-	1 (100)	-	-	-	-	-
soldactone	parenteral preparation	1	1 (100)	-	-	-	-	-	-
sorafenib	tablet	1	-	1 (100)	1 (100)	-	-	1 (100)	-
spironolactone	parenteral preparation	1	-	1 (100)	-	-	-	-	-
streptomycin	parenteral preparation	1	1 (100)	-	-	-	-	-	-
sulfadiazine	tablet	1	-	-	-	-	-	-	1 (100)
sulfamethoxazole	tablet	1	-	1 (100)	-	-	-	-	-
tazobactam	oral liquid	1	-	-	-	-	-	1 (100)	-
temocillin	parenteral preparation	1	-	-	-	-	-	1 (100)	-
temozolomide	capsule	1	-	-	-	-	1 (100)	-	-
temozolomide	oral liquid	1	-	1 (100)	-	-	-	-	-
tenofovir alafenamide	tablet	1	-	-	-	-	-	1 (100)	-
teriparatide	tablet	1	-	1 (100)	-	-	-	-	-
tetracycline	capsule	1	-	-	-	-	-	1 (100)	-
theophylline	oral liquid	1	1 (100)	-	-	-	-	-	-
thymol	preparation for inhalation	1	-	1 (100)	-	-	-	-	-
tiagabine	tablet	1	-	-	-	-	-	1 (100)	-
timolol	topical	1	-	-	-	-	-	1 (100)	-
tinidazole	tablet	1	-	-	-	1 (100)	-	-	-
treprostinil	preparation for inhalation	1	-	-	-	-	-	-	1 (100)
trihexyphenidyl	tablet	1	1 (100)	-	-	-	-	-	-
trimethoprim	oral liquid	1	-	1 (100)	-	-	-	-	-
trimethoprim + sulfamethoxazole	capsule	1	-	-	-	1 (100)	-	-	-
trimethoprim + sulfamethoxazole	preparation for inhalation	1	1 (100)	-	-	-	-	-	1 (100)
trimethoprim + sulfamethoxazole	parenteral preparation	1	-	-	1 (100)	-	-	-	-
trimethoprim + sulfamethoxazole	tablet	1	-	-	-	-	-	-	1 (100)
urea	oral liquid	1	-	-	-	-	-	1 (100)	-
ursodeoxycholic acid	oral liquid	1	-	1 (100)	-	-	-	-	-
ustekinumab	parenteral preparation	1	-	-	-	-	-	1 (100)	-
valaciclovir	ophthalmological preparation	1	-	1 (100)	-	-	-	-	-
vancomycin	capsule	1	-	1 (100)	1 (100)	-	-	-	-
varicella vaccine	parenteral preparation	1	-	-	-	-	1 (100)	-	-
vasopressin	preparation for inhalation	1	-	-	-	-	1 (100)	-	-
vedolizumab	parenteral preparation	1	-	-	-	-	-	1 (100)	-
vencuronium	parenteral preparation	1	-	-	-	-	-	-	1 (100)
venetoclax	tablet	1	-	-	-	-	-	1 (100)	-
verapamil	oral liquid	1	-	-	-	-	-	1 (100)	-
vitamin a	capsule	1	-	-	-	1 (100)	-	-	-
vitamin a	oral liquid	1	-	-	-	1 (100)	-	-	-
vitamin e	capsule	1	-	-	-	1 (100)	1 (100)	-	-



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voriconazole	oral liquid	1	-	-	1 (100)	-	-	-	-
voriconazole	tablet	1	-	-	-	-	-	-	1 (100)
zanamivir	parenteral preparation	1	1 (100)	-	-	-	-	-	-
zinc acetate	tablet	1	-	-	-	-	-	1 (100)	-
zinc ascorbate	oral liquid	1	-	-	-	1 (100)	-	-	-
zinc ascorbate	tablet	1	-	-	-	1 (100)	-	-	-
zinc chloride	tablet	1	-	-	-	1 (100)	-	-	-



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Table 22a. Countries and setting of practice of specialists who reported at least one medicine as missing. Data are shown as numbers, N and percentages (%) of the total by row.

Country	Hospital			Primary care			Total Hospital	Total Primary care	Grand Total
	Medical Doctor	Nurse	Pharmacist	Medical Doctor	Nurse	Pharmacist			
Overall	159 (67)	8 (3)	72 (30)	28 (61)	2 (4)	16 (35)	239 (84)	46 (16)	285 (100)
Albania	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Argentina	2 (1)	-	-	1 (4)	-	-	2 (1)	1 (2)	3 (1)
Armenia	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Australia	5 (3)	-	4 (6)	-	-	-	9 (4)	-	9 (3)
Belgium	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Botswana	-	-	-	1 (4)	-	-	-	1 (2)	1 (0)
Brazil	2 (1)	-	-	1 (4)	-	3 (19)	2 (1)	4 (9)	6 (2)
Burkina Faso	-	-	1 (1)	-	-	-	1 (0)	-	1 (0)
Canada	7 (4)	-	3 (4)	-	-	-	10 (4)	-	10 (4)
Central African Republic	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Chile	4 (3)	-	1 (1)	-	-	-	5 (2)	-	5 (2)
Congo Kinshasa	3 (2)	-	-	-	-	-	3 (1)	-	3 (1)
Denmark	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
El Salvador	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Ethiopia	4 (3)	-	1 (1)	2 (7)	-	-	5 (2)	2 (4)	7 (2)
Fiji	1 (1)	-	3 (4)	-	-	-	4 (2)	-	4 (1)
Germany	1 (1)	-	2 (3)	-	-	-	3 (1)	-	3 (1)
Ghana	4 (3)	-	-	1 (4)	-	-	4 (2)	1 (2)	5 (2)
Hungary	3 (2)	-	-	-	-	-	3 (1)	-	3 (1)
India	2 (1)	-	1 (1)	-	-	-	3 (1)	-	3 (1)
Indonesia	12 (8)	1 (13)	-	-	-	-	13 (5)	-	13 (5)
Italy	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Japan	1 (1)	-	2 (3)	-	-	-	3 (1)	-	3 (1)
Jordan	-	-	1 (1)	-	-	-	1 (0)	-	1 (0)
Kenya	3 (2)	-	-	-	-	-	3 (1)	-	3 (1)
Madagascar	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Mexico	2 (1)	-	-	1 (4)	-	-	2 (1)	1 (2)	3 (1)
Mozambique	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)



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Myanmar	3 (2)	-	-	-	-	-	3 (1)	-	3 (1)
Namibia	1 (1)	1 (13)	-	-	-	-	2 (1)	-	2 (1)
Nepal	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Netherlands	7 (4)	-	1 (1)	-	-	-	8 (3)	-	8 (3)
New Zealand	-	-	3 (4)	-	-	-	3 (1)	-	3 (1)
Nigeria	8 (5)	-	2 (3)	2 (7)	2 (100)	2 (13)	10 (4)	6 (13)	16 (6)
Norway	2 (1)	1 (13)	4 (6)	-	-	-	7 (3)	-	7 (2)
Pakistan	-	-	-	-	-	1 (6)	-	1 (2)	1 (0)
Palestinian Territory	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Panama	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Philippines	7 (4)	-	-	4 (14)	-	-	7 (3)	4 (9)	11 (4)
Portugal	6 (4)	-	-	-	-	-	6 (3)	-	6 (2)
Puerto Rico	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Russia	3 (2)	-	-	-	-	-	3 (1)	-	3 (1)
Rwanda	-	1 (13)	-	-	-	-	1 (0)	-	1 (0)
Saudi Arabia	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Serbia	1 (1)	-	3 (4)	-	-	6 (38)	4 (2)	6 (13)	10 (4)
Slovenia	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
South Africa	5 (3)	-	-	3 (11)	-	-	5 (2)	3 (7)	8 (3)
Spain	7 (4)	-	-	1 (4)	-	-	7 (3)	1 (2)	8 (3)
Sri Lanka	6 (4)	-	-	1 (4)	-	-	6 (3)	1 (2)	7 (2)
Sudan	-	-	-	1 (4)	-	-	-	1 (2)	1 (0)
Swaziland	-	-	-	1 (4)	-	-	-	1 (2)	1 (0)
Sweden	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Switzerland	4 (3)	-	-	-	-	-	4 (2)	-	4 (1)
Taiwan	-	-	7 (10)	-	-	1 (6)	7 (3)	1 (2)	8 (3)
Tanzania	5 (3)	-	-	1 (4)	-	-	5 (2)	1 (2)	6 (2)
Thailand	1 (1)	-	3 (4)	2 (7)	-	1 (6)	4 (2)	3 (7)	7 (2)
Turkey	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
Uganda	4 (3)	-	-	2 (7)	-	-	4 (2)	2 (4)	6 (2)
Ukraine	1 (1)	-	-	-	-	-	1 (0)	-	1 (0)
United Arab Emirates	-	3 (38)	-	-	-	-	3 (1)	-	3 (1)
United Kingdom	8 (5)	1 (13)	6 (8)	-	-	-	15 (6)	-	15 (5)
United States	3 (2)	-	18 (25)	1 (4)	-	1 (6)	21 (9)	2 (4)	23 (8)
Uruguay	-	-	1 (1)	-	-	-	1 (0)	-	1 (0)
Venezuela	1 (1)	-	-	2 (7)	-	-	1 (0)	2 (4)	3 (1)



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Zambia	1 (1)	-	5 (7)	-	-	-	6 (3)	-	6 (2)
Zimbabwe	2 (1)	-	-	-	-	1 (6)	2 (1)	1 (2)	3 (1)



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Table 23a. Missing products for paediatric care according to physicians, nurses, and pharmacists.

Medicine	N t o t	N c o u n t r i e s	Only Available As Adult Formulation	Not Marketed In The Country	Only Available In The Private Sector	Overly Expensive	Not In The Drug Formulary	Shortages	Other	NA
<i>ciprofloxacin</i>	18	9	Australia Chile Nigeria Philippines Portugal Serbia Uganda Zambia	Chile Philippines					Switzerland	
<i>phenobarbital</i>	18	12	Ethiopia Germany Indonesia Myanmar Philippines Serbia Zambia	Mexico Netherlands Serbia Thailand Zambia		Zambia	South Africa Zambia	Indonesia Philippines South Africa Zambia	Argentina South Africa	
<i>omeprazole</i>	16	14	Brazil Chile Hungary Indonesia Philippines Saudi Arabia Thailand Zambia	Chile Netherlands Spain Sri Lanka Zambia	Brazil	Australia Germany	Fiji Germany Zambia	Zambia	Australia Germany	
<i>abacavir + dolutegravir + lamivudine</i>	15	10	Australia Brazil Chile Congo Kinshasa Indonesia Uganda	Botswana Chile Indonesia South Africa			Zambia		Indonesia	



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			United Kingdom							
<i>furosemide</i>	1 5	9	Brazil Ethiopia Myanmar Nigeria Serbia Switzerland Tanzania Zimbabwe	Philippines Serbia			Rwanda	Ethiopia Rwanda		
<i>levothyroxine</i>	1 3	9	Canada Nigeria Palestinian Territory Portugal Taiwan United Kingdom United States	Canada New Zealand Palestinian Territory Taiwan United Kingdom		United States			Portugal United States	
<i>caffeine</i>	1 2	9	Tanzania	Nepal Tanzania United Arab Emirates Venezuela	Ghana	Myanmar United States	Argentina Tanzania Thailand United States	Nepal	Argentina Thailand	
<i>prednisolone</i>	1 2	10	Ghana Hungary Nigeria Norway Portugal United Arab Emirates Zambia Zimbabwe	Albania Nigeria Zimbabwe	Zimbabwe	Zimbabwe				Sri Lanka
<i>clindamycin</i>	1 1	8	Australia Ethiopia Nigeria Portugal	Argentina Spain United States				Switzerland	Switzerland	



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<i>clonidine</i>	10	7	Australia Japan Norway United States	Canada Netherlands						Sri Lanka
<i>tacrolimus</i>	10	9	Japan Puerto Rico Taiwan United Kingdom	United Kingdom		Indonesia United Kingdom	Taiwan Zambia	Netherlands Sri Lanka	Japan	Sri Lanka
<i>valproic acid</i>	10	9	Myanmar Tanzania Germany	Indonesia		Fiji Ghana Indonesia Nigeria Sri Lanka	Ghana	Fiji Jordan Sri Lanka		
<i>isoniazid + pyrazinamide + rifampicin</i>	9	4		Philippines					South Africa	Germany
<i>sildenafil</i>	9	9	Ethiopia Japan Serbia United Kingdom	Australia Brazil Indonesia Taiwan			Sri Lanka		Japan	Canada
<i>spironolactone</i>	9	6	Brazil India Nigeria Norway Tanzania					Ghana		
<i>valacyclovir</i>	9	7	Australia Chile Taiwan Ukraine United Kingdom	Brazil Canada	Ukraine	United Kingdom	Taiwan		United Kingdom	
<i>iloprost</i>	8	8				Indonesia	Indonesia	Indonesia		
<i>levetiracetam</i>	8	7	Zambia	Indonesia Serbia		Ghana Taiwan Zambia	Ghana Tanzania		Tanzania	Nigeria Tanzania



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<i>metronidazole</i>	8	6	Japan Portugal Switzerland Zambia		Fiji					
<i>amoxicillin</i>	7	6	Taiwan Tanzania Zambia		Nigeria	Nigeria Zambia	Nigeria United States	Burkina Faso Nigeria Zambia	United States	
<i>captopril</i>	7	7	Chile Sri Lanka United Arab Emirates Uruguay	India		Sri Lanka	Namibia Nigeria			
<i>digoxin</i>	7	4	Nigeria Zambia	Tanzania Zambia			Zambia			United States
<i>fluconazole</i>	7	7	Brazil Uganda			Congo Kinshasa United States	South Africa	Indonesia Philippines		
<i>human immunoglobulin g</i>	7	6			Ethiopia	Ethiopia Hungary Indonesia Philippines Sri Lanka	Ethiopia	Ethiopia Indonesia	Ethiopia Indonesia	
<i>hydromorphone</i>	7	5	Canada					Canada		Ethiopia
<i>phenoxymethylpenicillin</i>	7	6	Canada Norway Zambia	Portugal		Canada Zambia		Norway Serbia South Africa		
<i>propranolol</i>	7	6	Canada Nigeria Serbia Sweden Taiwan Thailand	Sweden Taiwan						Tanzania
<i>amphotericin b</i>	6	6	South Africa			Ethiopia Netherlands	Indonesia	Nigeria	Philippines	



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<i>ibuprofen</i>	6	6	Nigeria Serbia Spain	Canada	Fiji Nigeria	Canada	Canada Indonesia Nigeria	Mexico	Canada	
<i>ondansetron</i>	6	6	Fiji Russia Serbia	Madagascar		Philippines	Philippines	Mozambique		
<i>trimethoprim + sulfamethoxazole</i>	6	6	Australia Japan			Congo Kinshasa		Australia India Indonesia	Australia Germany Indonesia	
<i>acetaminophen</i>	5	3	Nigeria United States			Nigeria	Nigeria	Nigeria Philippines		Denmark
<i>albumin human</i>	5	3	Nepal		Venezuela	Indonesia Nepal Venezuela		Venezuela		
<i>atenolol</i>	5	5	Australia Taiwan Tanzania Zimbabwe	Zimbabwe				New Zealand		
<i>azithromycin</i>	5	5	Taiwan					Fiji Indonesia Nigeria Tanzania		
<i>budesonide</i>	5	5		Portugal	Ghana	Ghana Indonesia Venezuela		Venezuela	United Kingdom	
<i>dexamethasone</i>	5	5	Japan Nigeria Russia	Madagascar Uruguay						
<i>diazepam</i>	5	5		Mexico			Russia	Australia Norway United Arab Emirates		
<i>dolutegravir + lamivudine</i>	5	4	Brazil South Africa Uganda							
<i>erythromycin</i>	5	4	Zambia	Hungary Serbia		Zambia	Indonesia	Serbia Zambia		



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<i>esomeprazole</i>	5	4	Nigeria Portugal Serbia United Arab Emirates	Serbia						
<i>ethambutol</i>	5	4	Australia Philippines	Netherlands						Nigeria
<i>isoniazid + rifampicin</i>	5	6	Spain					Spain		
<i>moxifloxacin</i>	5	3	Australia Canada	United Kingdom			United Kingdom			
<i>abacavir + lamivudine</i>	4	4	Australia Spain United Kingdom				South Africa			Spain
<i>acetylsalicylic acid</i>	4	4	Ethiopia Russia Taiwan United States	Taiwan						
<i>acyclovir</i>	4	2	Ethiopia				Ethiopia	Ethiopia Zimbabwe		
<i>baclofen</i>	4	4	Japan United States	New Zealand					United States	
<i>benzylpenicillin</i>	4	4	Brazil Portugal	Nepal				Indonesia Nepal		
<i>cloxacillin</i>	4	4	Zimbabwe	Zimbabwe	Zimbabwe	Zimbabwe	Norway	Ethiopia South Africa		
<i>domperidone</i>	4	4	Sri Lanka	New Zealand United Arab Emirates United States						Germany
<i>enalapril</i>	4	4	Nigeria Serbia Uruguay	Serbia					Japan	
<i>epinephrine</i>	4	4		Russia		Belgium Philippines		Ethiopia	Belgium	



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<i>ethosuximide</i>	4	3		Hungary Italy	South Africa	South Africa				
<i>folic acid</i>	4	4	Brazil Sri Lanka Thailand				Thailand	Jordan		
<i>fosfomycin</i>	4	3	Australia Kenya	Australia Kenya	Australia		Australia India	India		
<i>ganciclovir</i>	4	4	Myanmar Tanzania			Kenya Myanmar		Kenya Myanmar Philippines		
<i>lamivudine</i>	4	4						Fiji		
<i>mercaptopurine</i>	4	4	Hungary Serbia	Hungary Serbia Taiwan			Albania			
<i>pantoprazole</i>	4	4	Hungary United Arab Emirates United States	Serbia						
<i>raltegravir</i>	4	3	El Salvador	Chile				Kenya		
<i>vancomycin</i>	4	4		United Kingdom	Ethiopia	Ethiopia Zambia		Ethiopia Indonesia		
<i>vasopressin</i>	4	4		Spain				Namibia Philippines Venezuela		
<i>vigabatrin</i>	4	3		India		Ghana South Africa	Ghana South Africa		South Africa	
<i>zidovudine</i>	4	3	Indonesia	Indonesia Tanzania					Indonesia Tanzania	
<i>alprostadil</i>	3	3	United States				Indonesia Myanmar	Indonesia		
<i>amiodarone</i>	3	3	Canada Nigeria						Australia	
<i>amoxicillin + clavulanic acid</i>	3	3	Japan Sudan					Russia		Chile



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<i>budesonide + formoterol</i>	3	3	Ghana			United Kingdom				
<i>carvedilol</i>	3	3	Japan Sweden Uganda							
<i>diclofenac</i>	3	2	Serbia							
<i>griseofulvin</i>	3	2	Ethiopia				Swaziland			Nigeria
<i>interferon recombina</i> <i>nt</i> <i>alfa-2a</i>	3	3					Philippines			
<i>levofloxacin</i>	3	3	Chile Ukraine	Canada						Denmark
<i>linezolid</i>	3	3	Chile South Africa Taiwan							
<i>methotrexate</i>	3	3	Japan	Netherlands New Zealand						
<i>metoclopramide</i>	3	3	Japan Madagascar				Serbia			
<i>morphine</i>	3	3	Zimbabwe	Norway Zimbabwe	Zimbabwe	Zimbabwe	United States		United States	
<i>nitrofurantoin</i>	3	3	Australia Canada	Canada		Canada United Kingdom				
<i>piperacillin + tazobactam</i>	3	3			Kenya	Armenia Ethiopia		Ethiopia		
<i>primaquine</i>	3	1	Thailand	Thailand						
<i>ranitidine</i>	3	3	Sri Lanka	Argentina Brazil						
<i>rifampicin</i>	3	3	Japan Switzerland						Spain	
<i>vitamin e</i>	3	3	Indonesia Sri Lanka	United States	Sri Lanka		Indonesia			
<i>voriconazole</i>	3	3	Taiwan			India Taiwan United States		India		



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<i>abacavir</i>	2	2	Thailand					Fiji		
<i>acebutolol</i>	2	1	Pakistan							
<i>adenosine</i>	2	2	United Arab Emirates		Nigeria					
<i>albendazole</i>	2	2	Indonesia						Burkina Faso	
<i>allopurinol</i>	2	1	United States							
<i>amikacin</i>	2	2				Congo Kinshasa				
<i>artemether + lumefantrine</i>	2	2				Burkina Faso Nigeria		Nigeria		
<i>azathioprine</i>	2	2	Hungary Japan						Japan	
<i>bedaquiline</i>	2	1	United Kingdom						United Kingdom	Brazil
<i>bosentan</i>	2	2	India United States			United States			India	
<i>bumetanide</i>	2	2	Canada Serbia	Canada						
<i>carbamazepine</i>	2	1				Sri Lanka		Sri Lanka		
<i>ceftriaxone</i>	2	2				Uganda		Mexico		
<i>cefuroxime</i>	2	2	Mexico					Canada Mexico		
<i>chloramphenicol</i>	2	2				Philippines		Philippines Sri Lanka		
<i>clofazimine</i>	2	2	South Africa United Kingdom							
<i>colchicine</i>	2	1								
<i>cyclosporine</i>	2	2	Madagascar				Philippines			
<i>dalteparin</i>	2	1	Norway						Norway	



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<i>darunavir</i>	2	2		South Africa				Kenya		Netherlands
<i>emtricitabine + tenofovir</i>	2	2	Chile United Kingdom	Chile					United Kingdom	
<i>flecainide</i>	2	2	India Sweden							
<i>fludrocortisone</i>	2	2			Palestinian Territory		Philippines			
<i>gentamicin</i>	2	2	Nigeria		Nigeria	Nigeria	Norway		Norway	
<i>hydrochlorothiazide</i>	2	2	Netherlands United States							
<i>imipramine</i>	2	1					Indonesia			
<i>isoniazid</i>	2	1	Germany Spain Tanzania	Spain			Spain			
<i>ivermectin</i>	2	1	Norway Switzerland	Switzerland Tanzania			Canada	Canada	Norway	
<i>lamivudine + tenofovir</i>	2	2								
<i>leuprolide</i>	2	2						Venezuela		Nigeria
<i>levosalbutamol</i>	2	2		Madagascar Venezuela		Venezuela				
<i>lorazepam</i>	2	2		Netherlands	Zambia					Brazil
<i>methylphenidate</i>	2	1					South Africa	South Africa		
<i>midazolam</i>	2	2					Namibia	Serbia		
<i>nevirapine</i>	2	2						Fiji Panama		
<i>nitric oxide</i>	2	2			Venezuela		Myanmar			
<i>nystatin</i>	2	1				Zambia		Zambia		
<i>phenytoin</i>	2	2	Nigeria					Tanzania		
<i>praziquantel</i>	2	2	Nigeria Switzerland							



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<i>pregabalin</i>	2	2	New Zealand	Spain						
<i>pyrimethamine</i>	2	2	Argentina Brazil							
<i>rifabutin</i>	2	2	Australia Uganda							
<i>rifapentine</i>	2	2		Germany United Kingdom						
<i>sirolimus</i>	2	2		Indonesia			Indonesia Taiwan	Indonesia		
<i>sodium bicarbonate</i>	2	2	Portugal	Nigeria						
<i>somatotropin</i>	2	2	Portugal					Venezuela		
<i>sulfadiazine</i>	2	2	Brazil					Panama		
<i>topiramate</i>	2	2	Germany United States							
<i>tramadol</i>	2	2	Ghana	New Zealand						
<i>vitamin a</i>	2	2	Canada	Canada			Canada	Philippines		
<i>warfarin</i>	2	2	United States					Rwanda		
<i>zonisamide</i>	2	2	Hungary United States							
<i>abacavir + lamivudine + efavirenz</i>	1	1					Zimbabwe			
<i>abacavir + lamivudine + zidovudine</i>	1	2	Ethiopia							
<i>abacavir + zidovudine</i>	1	1					Zimbabwe			
<i>acetamide</i>	1	1				Jordan				
<i>acetazolamide</i>	1	1							Philippines	
<i>aminocaproic acid</i>	1	1						Spain		
<i>aminophylline</i>	1	1							Philippines	
<i>amitriptyline</i>	1	1	New Zealand							



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<i>amlodipine</i>	1	1	Nigeria							
<i>amodiaquine - sulfadoxine + pyrimethamine</i>	1	1	Uganda							
<i>ampicillin + sulbactam</i>	1	1		Serbia						
<i>anakinra</i>	1	1		Ukraine		Ukraine				
<i>angiotensin</i>	1	1		Spain						
<i>antihemophilic factor human recombinant</i>	1	1		India						
<i>aripiprazole</i>	1	1		Spain						
<i>arsenic trioxide</i>	1	1				Netherlands				
<i>artesunate + pyronaridine tetrphosphate</i>	1	1				Congo Kinshasa				
<i>ascorbic acid</i>	1	1	Sudan							
<i>asparaginase</i>	1	1					United States			
<i>atazanavir</i>	1	1	South Africa							
<i>atovaquone</i>	1	1	Canada							
<i>beclomethasone dipropionate</i>	1	1				Zambia		Zambia		
<i>bendroflumethiazide</i>	1	1	Nigeria							
<i>betamethasone phosphate</i>	1	1						Philippines		
<i>bisoprolol</i>	1	1	Taiwan							
<i>botulinum toxin type a and b</i>	1	1		Ghana						
<i>calcium glycerophosphate</i>	1	1		United Kingdom						
<i>cannabidiol</i>	1	1		Slovenia						
<i>cefnidir</i>	1	1		Panama						
<i>cefotaxime</i>	1	1						United States		



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<i>ceftazidime</i>	1	1				Armenia		Armenia		
<i>cephalexin</i>	1	1		Spain						
<i>chloralhydrate</i>	1	1		Slovenia						
<i>chlorhexidine</i>	1	1		United Kingdom					United Kingdom	
<i>cisapride</i>	1	1		Ghana						
<i>clobazam</i>	1	1								
<i>clonazepam</i>	1	1	United States							
<i>clopidogrel</i>	1	1	United States							
<i>codeine</i>	1	1		Nigeria						Italy
<i>colistin</i>	1	1		Armenia		Armenia				
<i>corticotropin</i>	1	1				Mexico				
<i>cosyntropin</i>	1	1		Canada		Canada	Canada			
<i>cypheptadine</i>	1	1	Indonesia							
<i>dantrolene</i>	1	1	Japan							
<i>delamanid</i>	1	1	United Kingdom						United Kingdom	
<i>diamorphine</i>	1	1	United Kingdom							
<i>diazoxide</i>	1	1						Canada		
<i>dihydroartemisin + piperaquine phosphate</i>	1	1	Thailand							
<i>dimenhydrinate</i>	1	1	Spain							
<i>dolutegravir</i>	1	1	Thailand							
<i>dolutegravir + tenofovir + lamivudine (emtricitabine)</i>	1	1		United Kingdom						
<i>doxycycline</i>	1	1	Portugal							



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<i>efavirenz</i>	1	1		United Kingdom						
<i>efavirenz + emtricitabine + tenofovir</i>	1	1	United Kingdom							
<i>emicizumab</i>	1	1			Serbia					
<i>enoxaparin</i>	1	1	United States						United States	
<i>ergocalciferol</i>	1	1		United States						
<i>esmolol</i>	1	1							Australia	
<i>ethanol</i>	1	1				United States				
<i>ethinylestradiol</i>	1	1						Philippines		
<i>etoposide</i>	1	1	United States							
<i>famotidine</i>	1	1				United States				
<i>felbamate</i>	1	1	Hungary							
<i>fentanyl</i>	1	1			Uganda	Uganda	Uganda			
<i>ferrous gluconate</i>	1	1							Portugal	
<i>ferrous glycine sulfate</i>	1	1		Portugal						
<i>ferrous sulfate anhydrous</i>	1	1						Zimbabwe		
<i>flucloxacillin</i>	1	1	Norway							
<i>flucytosine</i>	1	1	South Africa	South Africa						
<i>fluoxetine</i>	1	1			South Africa				South Africa	
<i>fluticasone + salmeterol</i>	1	1					Mexico	Mexico		
<i>fluticasone propionate</i>	1	1				Indonesia				
<i>gabapentin</i>	1	1	Australia			Australia				
<i>glecaprevir + pivrentasvir</i>	1	1	Australia							

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glycopyrronium	1	1								
hvp vaccine	1	1		Russia						
hydrocortisone	1	1	Japan Netherlands New Zaeland United States Zimbabwe		United States			Canada		
hydroxyurea	1	1	Ghana Nigeria Uganda United States Zambia	Central African Republic		Uganda Zambia				Sri Lanka
infliximab	1	1	Netherlands							
insulin human	1	1			Venezuela	Indonesia Venezuela		Fiji		
ipratropium	1	1		Serbia						
isoniazid + pyrazinamide + rifampicin + etambutol	1	2	Kenya Switzerland Uganda United Kingdom Switzerland	Spain United Kingdom Philippines			United Kingdom			
lamivudine + nevirapine + zidovudine	1	1		South Africa Taiwan						
lamivudine + zidovudine	1	1						Ghana	Ghana	
lamotrigine	1	1	Philippines							
lansoprazole	1	1	India Japan							
levetiracem	1	1				South Africa				
levosimendan	1	1			Nigeria	Nigeria				
lisinopril	1	1	Australia							
lopinavir + ritonavir	1	1						Panama		



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<i>lopinavir + ritonavir + rifampicin</i>	1	1	Mozambique							
<i>loratadine</i>	1	1		Switzerland					Switzerland	
<i>magnesium sulfate</i>	1	1	Sudan							
<i>mannitol</i>	1	1		Armenia		Armenia				
<i>melatonin</i>	1	1	New Zealand							
<i>meropenem</i>	1	1			Ethiopia	Ethiopia		Ethiopia		
<i>metoprolol</i>	1	1					Fiji			
<i>mexiletine</i>	1	1						India		
<i>milrinone</i>	1	1				Turkey			Turkey	
<i>mycophenolate mofetil</i>	1	1	Taiwan				Taiwan			
<i>nafcillin</i>	1	1		India						
<i>nalidixic acid</i>	1	1						Philippines		
<i>naproxen</i>	1	1					Netherlands			
<i>nicardipine</i>	1	1		Canada						
<i>nifedipine</i>	1	1	United States							
<i>olanzapine</i>	1	1					United States			
<i>oxcarbazepine</i>	1	1	Venezuela		Venezuela	Venezuela				
<i>oxybutinin</i>	1	1		New Zealand						
<i>palivizumab</i>	1	1				New Zealand				
<i>paromomycin</i>	1	1						Indonesia		
<i>pegaspargase</i>	1	1				Hungary				
<i>pentazocine</i>	1	1						Nigeria		
<i>phentolamine</i>	1	1		Taiwan						



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<i>phenylephrine</i>	1	1		Taiwan						
<i>pimecrolimus</i>	1	1						Mexico		
<i>piritrexim</i>	1	1	Brazil							
<i>pivmecillinam</i>	1	1	Denmark							
<i>pneumococcal vaccine</i>	1	1			Venezuela					
<i>polyethylene glycol 400</i>	1	1	Sri Lanka		Sri Lanka					
<i>posaconazole</i>	1	1					United Kingdom			
<i>prednisone</i>	1	1	Norway							
<i>prilocaine</i>	1	1		Serbia						
<i>promethazine</i>	1	1						Nigeria		
<i>prostaglandin d2</i>	1	1					Namibia			
<i>pseudoephedrine</i>	1	1		Russia						
<i>pyridoxine</i>	1	1	United Kingdom							
<i>quetiapine</i>	1	1		Spain						
<i>quinine</i>	1	1	Nigeria					Nigeria		
<i>ramelteon</i>	1	1	Japan							
<i>remifentanyl</i>	1	1							South Africa	
<i>riboflavin</i>	1	1		Denmark						
<i>ritonavir</i>	1	1		Brazil						
<i>rivaroxaban</i>	1	1	United States							
<i>salbutamol</i>	1	1						Sri Lanka		
<i>sevelamer</i>	1	1	Portugal							
<i>sodium chloride</i>	1	1	United States							



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<i>sodium phosphate dibasic</i>	1	1		United Kingdom							
<i>tadalafil</i>	1	1	Japan								
<i>tenofovir alafenaimide</i>	1	1	United Kingdom								
<i>tenofovir disoproxil</i>	1	1	Chile	Chile							
<i>teriflunomide</i>	1	1					Congo Kinshasa				
<i>testosterone</i>	1	1						Venezuela			
<i>timolol</i>	1	1					Taiwan				
<i>tioridazine</i>	1	1		Slovenia							
<i>tobramycin</i>	1	1		Armenia		Armenia					
<i>trichloroacetaldehyde</i>	1	1						India			
<i>ursodeoxycholic acid</i>	1	1	United States								
<i>ustekinumab</i>	1	1	Netherlands								
<i>xlomethazoline</i>	1	1	United Kingdom	United Kingdom							
<i>zinc chloride</i>	1	1		Philippines						Philippines	



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Table 24a. Missing products and pharmaceutical forms for paediatric care according to physicians, nurses, and pharmacists



Medicine	Only Available As Adult Formulation	Not Marketed In The Country	Only Available In The Private Sector	Overly Expensive	Not In The Drug Formulary	Shortages	Other	NA ²¹⁵
<i>abacavir</i>	Thailand	D2 – Summary report of survey results, identifying the reasons for the missing formulations and elements of collaboration for prioritization of products missing but deemed critical. Authors: Elisa Barbieri, Marc Lallemand, Tiziana Grossele - Fondazione Penta Onlus Version: 1.0				Fiji		
oral liquid	Thailand					Fiji		
<i>abacavir + dolutegravir + lamivudine</i>	Australia Brazil Chile Congo Kinshasa Indonesia Uganda United Kingdom	Botswana Chile Indonesia South Africa			Zambia		Indonesia	
NA					Zambia			
oral granule	Indonesia	Indonesia					Indonesia	
oral liquid	Uganda United Kingdom							
tablet	Australia Brazil Chile Congo Kinshasa Uganda United Kingdom	Botswana Chile South Africa						
<i>abacavir + lamivudine + efavirenz</i>					Zimbabwe			
tablet					Zimbabwe			
<i>abacavir + lamivudine</i>	Australia Spain United Kingdom				South Africa			



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oral liquid	Australia Spain							
tablet	United Kingdom				South Africa			
<i>abacavir + lamivudine + zidovudine</i>	Ethiopia							
oral liquid	Ethiopia							
<i>abacavir + zidovudine</i>					Zimbabwe			
oral liquid					Zimbabwe			
<i>acebutolol</i>	Pakistan							
tablet	Pakistan							
<i>acetamide</i>				Jordan				
preparation for inhalation				Jordan				
<i>acetaminophen</i>	Nigeria United States			Nigeria	Nigeria	Nigeria Philippines		
rectal preparation	United States			Nigeria		Nigeria Philippines		
tablet	Nigeria				Nigeria	Nigeria		
<i>acetazolamide</i>							Philippines	
oral liquid							Philippines	
<i>acetylsalicylic acid</i>	Ethiopia Russia Taiwan United States	Taiwan						
oral liquid	Russia Taiwan United States	Taiwan						
tablet	Ethiopia							
<i>acyclovir</i>	Ethiopia					Ethiopia Zimbabwe		
oral liquid	Ethiopia							
parenteral preparation						Zimbabwe		
topical						Ethiopia		
<i>acylovir</i>					Ethiopia			
oral liquid					Ethiopia			



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<i>adenosine</i>	United Arab Emirates		Nigeria					
parenteral preparation	United Arab Emirates		Nigeria					
<i>albendazole</i>	Indonesia						Burkina Faso	
oral liquid							Burkina Faso	
tablet	Indonesia							
<i>albumin human</i>	Nepal		Venezuela	Indonesia Nepal Venezuela		Venezuela		
parenteral preparation	Nepal		Venezuela	Indonesia Nepal Venezuela		Venezuela		
<i>allopurinol</i>	United States							
oral liquid	United States							
<i>alprostadil</i>	United States				Indonesia Myanmar	Indonesia		
oral liquid	United States							
parenteral preparation					Indonesia Myanmar	Indonesia		
<i>amikacin</i>				Congo Kinshasa				Brazil
parenteral preparation				Congo Kinshasa				Brazil
<i>aminocaproic acid</i>						Spain		
parenteral preparation						Spain		
<i>aminophylline</i>							Philippines	
oral liquid							Philippines	
<i>amiodarone</i>	Canada Nigeria						Australia	
parenteral preparation							Australia	
tablet	Canada Nigeria							
<i>amitriptyline</i>	New Zealand							
tablet	New Zealand							



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<i>amlodipine</i>	Nigeria							
oral liquid	Nigeria							
<i>amodiaquine - sulfadoxine + pyrimethamine</i>	Uganda							
oral liquid	Uganda							
<i>amoxicillin</i>	Taiwan Tanzania Zambia		Nigeria	Nigeria Zambia	Nigeria United States	Burkina Faso Nigeria Zambia	United States	
capsule	Taiwan							
dispersible tablet			Nigeria	Nigeria	Nigeria United States	Nigeria	United States	
oral liquid	Tanzania					Burkina Faso		
parenteral preparation	Zambia			Zambia		Zambia		
<i>amoxicillin + clavulanic acid</i>	Japan Sudan					Russia		
oral liquid	Japan					Russia		
tablet	Sudan							
<i>amphotericin b</i>	South Africa			Ethiopia Netherlands	Indonesia	Nigeria	Philippines	
oral liquid	South Africa						Philippines	
parenteral preparation				Ethiopia Netherlands	Indonesia			
topical						Nigeria		
<i>ampicillin + sulbactam</i>		Serbia						
parenteral preparation		Serbia						
<i>anakinra</i>		Ukraine		Ukraine				
parenteral preparation		Ukraine		Ukraine				
<i>angiotensin</i>		Spain						
parenteral preparation		Spain						
<i>antihemophilic factor human recombinant</i>		India						
tablet		India						
<i>aripiprazole</i>		Spain						
NA		Spain						
<i>arsenic trioxide</i>				Netherlands				

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parenteral preparation				Netherlands				
<i>artemether + lumefantrine</i>				Burkina Faso Nigeria		Nigeria		
oral liquid				Burkina Faso				
tablet				Nigeria		Nigeria		
<i>artesunate + pyronaridine tetrphosphate</i>				Congo Kinshasa				
tablet				Congo Kinshasa				
<i>ascorbic acid</i>	Sudan							
tablet	Sudan							
<i>asparaginase</i>					United States			
parenteral					United States			
<i>atazanavir</i>	South Africa							
tablet	South Africa							
<i>atenolol</i>	Australia Taiwan Tanzania Zimbabwe	Zimbabwe				New Zealand		
oral liquid	Australia Tanzania Zimbabwe	Zimbabwe				New Zealand		
tablet	Taiwan							
<i>atovaquone</i>	Canada							
oral liquid	Canada							
<i>azathioprine</i>	Hungary Japan						Japan	
oral liquid	Hungary							
tablet	Japan						Japan	
<i>azithromycin</i>	Taiwan					Fiji Indonesia Nigeria Tanzania		
oral liquid						Fiji Nigeria		

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						Tanzania		
tablet	Taiwan					Indonesia		
<i>baclofen</i>	Japan United States	New Zealand					United States	Germany
oral liquid	United States	New Zealand					United States	Germany
tablet	Japan							
<i>beclomethasone dipropionate</i>				Zambia		Zambia		
preparation for inhalation				Zambia		Zambia		
<i>bedaquiline</i>	United Kingdom						United Kingdom	
tablet	United Kingdom						United Kingdom	
<i>bedaquine</i>	United Kingdom							
oral liquid	United Kingdom							
<i>bendroflumethiazide</i>	Nigeria							
tablet	Nigeria							
<i>benzylpenicillin</i>	Brazil Portugal	Nepal				Indonesia Nepal		
oral liquid	Portugal							
parenteral preparation	Brazil	Nepal				Indonesia Nepal		
<i>betamethasone phosphate</i>						Philippines		
oral liquid						Philippines		
<i>bisoprolol</i>	Taiwan							
tablet	Taiwan							
<i>bosentan</i>	India United States			United States			India	
oral liquid	India United States			United States			India	
<i>botulinum toxin type a and b</i>		Ghana						
parenteral preparation		Ghana						
<i>budesonide</i>		Portugal	Ghana	Ghana Indonesia		Venezuela	United Kingdom	

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				Venezuela				
oral liquid		Portugal					United Kingdom	
preparation for inhalation			Ghana	Ghana Indonesia Venezuela		Venezuela		
<i>budesonide + formoterol</i>	Ghana			United Kingdom				Nigeria
oral liquid								Nigeria
preparation for inhalation	Ghana			United Kingdom				
<i>bumetanide</i>	Canada Serbia	Canada						
oral liquid	Canada Serbia	Canada						
<i>caffeine</i>	Tanzania	Nepal Tanzania United Arab Emirates Venezuela	Ghana	Myanmar United States	Argentina Tanzania Thailand United States	Nepal	Argentina Thailand	
NA				Myanmar				
oral liquid	Tanzania	Nepal Tanzania United Arab Emirates		United States	Argentina Tanzania Thailand United States	Nepal	Argentina Thailand	
parenteral preparation		Tanzania Venezuela	Ghana					
<i>calcium glycerophosphate</i>		United Kingdom						
oral liquid		United Kingdom						
<i>cannabidiol</i>		Slovenia						
oral liquid		Slovenia						
<i>captopril</i>	Chile	India		Sri Lanka	Namibia			

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	Sri Lanka United Arab Emirates Uruguay				Nigeria			
oral liquid	Chile Sri Lanka United Arab Emirates	India		Sri Lanka	Namibia Nigeria			
tablet	Uruguay							
<i>carbamazepine</i>				Sri Lanka		Sri Lanka		
oral liquid				Sri Lanka		Sri Lanka		
<i>carvedilol</i>	Japan Sweden Uganda							
tablet	Japan Sweden Uganda							
<i>cefnidir</i>		Panama						
oral liquid		Panama						
<i>cefotaxime</i>						United States		
parenteral preparation						United States		
<i>ceftazidime</i>				Armenia		Armenia		
parenteral preparation				Armenia		Armenia		
<i>ceftriaxone</i>				Uganda		Mexico		
parenteral preparation				Uganda		Mexico		
<i>cefuroxime</i>	Mexico					Canada Mexico		
oral liquid	Mexico					Canada Mexico		
<i>cephalexin</i>		Spain						
oral liquid		Spain						
<i>chloralhydrate</i>		Slovenia						
rectal preparation		Slovenia						
<i>chloramphenicol</i>				Philippines		Philippines Sri Lanka		



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capsule						Sri Lanka		
oral liquid				Philippines		Philippines		
<i>chlorhexidine</i>		United Kingdom					United Kingdom	
topical		United Kingdom					United Kingdom	
<i>ciprofloxacin</i>	Australia Chile Nigeria Philippines Portugal Serbia Uganda Zambia	Chile Philippines					Switzerland	
oral liquid	Australia Chile Nigeria Philippines Portugal Serbia Zambia	Chile Philippines						
tablet	Australia Nigeria Uganda						Switzerland	
<i>cisapride</i>		Ghana						
tablet		Ghana						
<i>clindamycin</i>	Australia Ethiopia Nigeria Portugal	Argentina Spain United States				Switzerland	Switzerland	
capsule	Australia Nigeria	United States						
oral liquid	Australia	Argentina				Switzerland		



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	Ethiopia Portugal	Spain						
tablet							Switzerland	
<i>clobazam</i>								Italy
oral liquid								Italy
<i>clofazimine</i>	South Africa United Kingdom							
capsule	South Africa							
tablet	United Kingdom							
<i>clonazepam</i>	United States							
oral liquid	United States							
<i>clonidine</i>	Australia Japan Norway United States	Canada Netherlands						Germany
oral liquid	Australia Norway United States	Canada Netherlands						Germany
tablet	Japan							
<i>clopidogrel</i>	United States							
oral liquid	United States							
<i>cloxacillin</i>	Zimbabwe	Zimbabwe	Zimbabwe	Zimbabwe	Norway	Ethiopia South Africa		
oral liquid	Zimbabwe	Zimbabwe	Zimbabwe	Zimbabwe				
parenteral preparation					Norway	Ethiopia South Africa		
<i>codeine</i>		Nigeria						
oral liquid		Nigeria						
<i>colchicine</i>								Netherlands
oral liquid								Netherlands
tablet								Netherlands
<i>colistin</i>		Armenia		Armenia				



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rectal preparation		Armenia		Armenia				
<i>corticotropin</i>				Mexico				
parenteral preparation				Mexico				
<i>cosyntropin</i>		Canada		Canada	Canada			
parenteral preparation		Canada		Canada	Canada			
<i>cyclosporine</i>	Madagascar				Philippines			
oral liquid	Madagascar				Philippines			
<i>cypheptadine</i>	Indonesia							
oral liquid	Indonesia							
<i>dalteparin</i>	Norway						Norway	
parenteral preparation	Norway						Norway	
<i>dantrolene</i>	Japan							
capsule	Japan							
<i>darunavir</i>		South Africa				Kenya		
oral liquid		South Africa						
tablet						Kenya		
<i>delamanid</i>	United Kingdom						United Kingdom	
NA	United Kingdom						United Kingdom	
<i>dexamethasone</i>	Japan Nigeria Russia	Madagascar Uruguay						
oral liquid	Nigeria Russia							
parenteral preparation		Madagascar						
tablet	Japan	Uruguay						
<i>diamorphine</i>	United Kingdom							
tablet	United Kingdom							
<i>diazepam</i>		Mexico			Russia	Australia Norway United Arab Emirates		



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parenteral preparation					Russia			
rectal preparation		Mexico				Australia Norway United Arab Emirates		
<i>diazoxide</i>						Canada		
oral liquid						Canada		
<i>diclofenac</i>	Serbia							Denmark
oral liquid	Serbia							Denmark
rectal preparation	Serbia							
<i>digoxin</i>	Nigeria Zambia	Tanzania Zambia			Zambia			Ethiopia
oral liquid	Nigeria Zambia	Tanzania Zambia			Zambia			Ethiopia
tablet	Nigeria							
<i>dihydroartemisin + piperaquine phosphate</i>	Thailand							
tablet	Thailand							
<i>dimenhydrinate</i>	Spain							
tablet	Spain							
<i>dolutegravir</i>	Thailand							
oral liquid	Thailand							
<i>dolutegravir + lamivudine</i>	Brazil South Africa Uganda							Nigeria
NA	Brazil							
oral liquid	South Africa							Nigeria
tablet	Uganda							
<i>dolutegravir + tenofovir + lamivudine (emtricitabine)</i>		United Kingdom						
tablet		United Kingdom						
<i>domperidone</i>	Sri Lanka	New Zealand United Arab Emirates						



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		United States						
oral liquid		New Zealand United States						
rectal preparation	Sri Lanka	United Arab Emirates						
<i>doxycycline</i>	Portugal							
oral liquid	Portugal							
<i>efavirenz</i>		United Kingdom						
capsule		United Kingdom						
<i>efavirenz + emtricitabine + tenofovir</i>	United Kingdom							
oral liquid	United Kingdom							
<i>emicizumab</i>			Serbia					
subcutaneous			Serbia					
<i>emtricitabine + tenofovir</i>	Chile United Kingdom	Chile					United Kingdom	
tablet	Chile United Kingdom	Chile					United Kingdom	
<i>enalapril</i>	Nigeria Serbia Uruguay	Serbia					Japan	
fine granules							Japan	
oral liquid	Serbia	Serbia						
tablet	Nigeria Uruguay							
<i>enoxaparin</i>	United States						United States	
parenteral preparation	United States						United States	
<i>epinephrine</i>		Russia		Belgium Philippines		Ethiopia	Belgium	
intramuscular				Belgium			Belgium	



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parenteral preparation		Russia		Philippines		Ethiopia		
<i>ergocalciferol</i>		United States						
parenteral preparation		United States						
<i>erythromycin</i>	Zambia	Hungary Serbia		Zambia		Serbia Zambia		
oral liquid	Zambia			Zambia		Serbia Zambia		
parenteral preparation		Serbia						
tablet		Hungary			Indonesia			
<i>esmolol</i>							Australia	
parenteral preparation							Australia	
<i>esomeprazole</i>	Nigeria Portugal Serbia United Arab Emirates	Serbia						
oral liquid	Portugal Serbia	Serbia						
sachet	United Arab Emirates							
tablet	Nigeria							
<i>ethambutol</i>	Australia Philippines	Netherlands						Spain
oral liquid	Australia Philippines	Netherlands						Spain
tablet	Philippines							
<i>ethanol</i>				United States				
parenteral preparation				United States				
<i>ethinylestradiol</i>						Philippines		
tablet						Philippines		
<i>ethosuximide</i>		Hungary Italy	South Africa	South Africa				
capsule		Hungary Italy	South Africa	South Africa				
oral liquid		Hungary						



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<i>etoposide</i>	United States							
oral liquid	United States							
<i>famotidine</i>				United States				
oral liquid				United States				
<i>felbamate</i>	Hungary							
oral liquid	Hungary							
<i>fentanyl</i>			Uganda	Uganda	Uganda			
preparation for inhalation			Uganda	Uganda	Uganda			
<i>ferrous gluconate</i>							Portugal	
tablet							Portugal	
<i>ferrous glycine sulfate</i>		Portugal						
oral liquid		Portugal						
<i>ferrous sulfate anhydrous</i>						Zimbabwe		
oral liquid						Zimbabwe		
<i>flecainide</i>	India Sweden							
oral liquid	Sweden							
tablet	India							
<i>flucloxacillin</i>	Norway							
oral liquid	Norway							
<i>fluconazole</i>	Brazil Uganda			Congo Kinshasa United States	South Africa	Indonesia Philippines		
NA	Brazil							
oral liquid				United States	South Africa			
parenteral preparation						Indonesia Philippines		
tablet	Uganda			Congo Kinshasa				
<i>flucytosine</i>	South Africa	South Africa						
tablet	South Africa	South Africa						
<i>fludrocortisone</i>			Palestinian Territory		Philippines			
tablet			Palestinian Territory		Philippines			

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<i>fluoxetine</i>			South Africa				South Africa	
capsule			South Africa				South Africa	
<i>fluticasone + salmeterol</i>					Mexico	Mexico		
preparation for inhalation					Mexico	Mexico		
<i>fluticasone propionate</i>				Indonesia				
preparation for inhalation				Indonesia				
<i>folic acid</i>	Brazil Sri Lanka Thailand				Thailand	Jordan		
oral liquid	Brazil Thailand				Thailand			
rectal preparation						Jordan		
tablet	Sri Lanka							
<i>fosfomycin</i>	Australia Kenya	Australia Kenya	Australia		Australia India	India		
oral liquid	Australia		Australia		Australia			
parenteral preparation	Kenya	Australia Kenya			Australia India	India		
<i>furosemide</i>	Brazil Ethiopia Myanmar Nigeria Serbia Switzerland Tanzania Zimbabwe	Philippines Serbia			Rwanda	Ethiopia Rwanda		
oral liquid	Brazil Ethiopia Nigeria Serbia Tanzania Zimbabwe	Philippines Serbia						
parenteral preparation					Rwanda	Rwanda		

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tablet	Ethiopia Myanmar Nigeria Switzerland					Ethiopia		
<i>gabapentin</i>	Australia			Australia				
oral liquid	Australia			Australia				
<i>ganciclovir</i>	Myanmar Tanzania			Kenya Myanmar		Kenya Myanmar Philippines		
capsule	Myanmar			Myanmar		Myanmar		
oral liquid	Tanzania			Kenya		Kenya		
tablet						Philippines		
<i>gentamicin</i>	Nigeria		Nigeria	Nigeria	Norway		Norway	
parenteral preparation	Nigeria		Nigeria	Nigeria	Norway		Norway	
<i>glecaprevir + pivrentasvir</i>	Australia							
oral liquid	Australia							
<i>glycopyrronium</i>								Sri Lanka
oral liquid								Sri Lanka
<i>griseofulvin</i>	Ethiopia				Swaziland			
oral liquid	Ethiopia				Swaziland			
<i>hvp vaccine</i>		Russia						
parenteral preparation		Russia						
<i>human immunoglobulin g</i>			Ethiopia	Ethiopia Hungary Indonesia Philippines Sri Lanka	Ethiopia	Ethiopia Indonesia	Ethiopia Indonesia	Tanzania
NA				Sri Lanka				
parenteral preparation			Ethiopia	Ethiopia Hungary Indonesia Philippines	Ethiopia	Ethiopia Indonesia	Ethiopia Indonesia	Tanzania
<i>hydrochlorothiazide</i>	Netherlands United States							

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oral liquid	Netherlands United States							
<i>hydrocortisone</i>	Japan Netherlands New Zealand United States Zimbabwe		United States			Canada		
oral liquid	Netherlands United States		United States			Canada		
tablet	Japan New Zealand							
topical	Zimbabwe							
<i>hydromorphone</i>	Canada					Canada		
tablet	Canada					Canada		
<i>hydroxyurea</i>	Ghana Nigeria Uganda United States Zambia	Central African Republic		Uganda Zambia				
capsule	Nigeria Uganda			Uganda				
oral liquid	Ghana United States Zambia	Central African Republic		Zambia				
<i>ibuprofen</i>	Nigeria Serbia Spain	Canada	Fiji Nigeria	Canada	Canada Indonesia Nigeria	Mexico	Canada	Denmark
oral liquid			Fiji			Mexico		Denmark
parenteral preparation		Canada		Canada	Canada Indonesia		Canada	
tablet	Nigeria Spain		Nigeria		Nigeria			
topical	Serbia							
<i>iloprost</i>				Indonesia	Indonesia	Indonesia		

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preparation for inhalation				Indonesia	Indonesia	Indonesia		
<i>imipramine</i>					Indonesia			
tablet					Indonesia			
<i>infliximab</i>	Netherlands							
subcutaneous	Netherlands							
<i>insulin human</i>			Venezuela	Indonesia Venezuela		Fiji		
parenteral preparation			Venezuela	Indonesia Venezuela		Fiji		
<i>interferon alfa-2a recombinant</i>					Philippines			
parenteral preparation					Philippines			
<i>ipratropium</i>		Serbia						
preparation for inhalation		Serbia						
<i>isoniazid + pyrazinamide + rifampicin + etambutol</i>	Kenya Switzerland Uganda United Kingdom	Spain United Kingdom Philippines			United Kingdom			
capsule	United Kingdom							
oral liquid	Kenya Switzerland	Philippines						
tablet	Uganda United Kingdom Switzerland	Spain United Kingdom			United Kingdom			
<i>isoniazid + rifampicin</i>	Spain					Spain		
oral liquid	Spain							
tablet	Spain					Spain		
<i>isoniazid</i>	Germany Spain Tanzania	Spain			Spain			Nigeria
oral liquid	Germany	Spain			Spain			Nigeria

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	Spain Tanzania							
<i>isoniazid + pyrazinamide + rifampicin</i>		Philippines					South Africa	
tablet							South Africa	
oral liquid		Philippines						
<i>ivermectin</i>	Norway Switzerland	Switzerland Tanzania			Canada	Canada	Norway	
capsule					Canada	Canada		
odt mini tablet	Switzerland	Switzerland						
tablet	Norway	Tanzania					Norway	
<i>lamivudine</i>						Fiji		
oral liquid						Fiji		
<i>lamivudine + nevirapine + zidovudine</i>		South Africa Taiwan						
oral liquid		Taiwan						
tablet		South Africa						
<i>lamivudine + tenofovir</i>								Brazil
tablet								Brazil
<i>lamivudine + zidovudine</i>						Ghana	Ghana	
oral liquid						Ghana	Ghana	
<i>lamotrigine</i>	Philippines							
oral liquid	Philippines							
<i>lansoprazole</i>	India Japan							
NA	Japan							
oral liquid	India							
<i>leuprolide</i>						Venezuela		
parenteral preparation						Venezuela		
<i>levetiracetam</i>				South Africa				
parenteral preparation				South Africa				
<i>levetiracetam</i>	Zambia	Indonesia Serbia		Ghana Taiwan Zambia	Ghana Tanzania		Tanzania	
oral liquid	Zambia	Indonesia		Taiwan	Tanzania		Tanzania	



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				Zambia				
parenteral preparation		Serbia		Ghana	Ghana			
tablet				Ghana				
<i>levofloxacin</i>	Chile Ukraine	Canada						
oral liquid	Chile	Canada						
tablet	Ukraine							
<i>levosalbutamol</i>		Madagascar Venezuela		Venezuela				
preparation for inhalation		Madagascar Venezuela		Venezuela				
<i>levosimendan</i>			Nigeria	Nigeria				
parenteral preparation			Nigeria	Nigeria				
<i>levothyroxine</i>	Canada Nigeria Palestinian Territory Portugal Taiwan United Kingdom United States	Canada New Zealand Palestinian Territory Taiwan United Kingdom		United States			Portugal United States	Sri Lanka
oral liquid	Canada Nigeria Palestinian Territory Portugal Taiwan United Kingdom United States	Canada New Zealand Palestinian Territory Taiwan		United States			Portugal	Sri Lanka
parenteral preparation		United Kingdom						



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tablet	United States						United States	
<i>linezolid</i>	Chile South Africa Taiwan							
oral liquid	South Africa Taiwan							
parenteral preparation	Chile							
<i>lisinopril</i>	Australia							
oral liquid	Australia							
<i>lopinavir + ritonavir</i>						Panama		
oral liquid						Panama		
<i>lopinavir + ritonavir + rifampicin</i>	Mozambique							
oral liquid	Mozambique							
<i>loratadine</i>		Switzerland					Switzerland	
tablet		Switzerland					Switzerland	
<i>lorazepam</i>		Netherlands	Zambia					
oral liquid		Netherlands						
parenteral preparation			Zambia					
<i>magnesium sulfate</i>	Sudan							
tablet	Sudan							
<i>mannitol</i>		Armenia		Armenia				
preparation for inhalation		Armenia		Armenia				
<i>melatonin</i>	New Zealand							
tablet	New Zealand							
<i>mercaptopurine</i>	Hungary Serbia	Hungary Serbia Taiwan			Albania			
oral liquid	Hungary Serbia	Hungary Serbia Taiwan			Albania			
<i>meropenem</i>			Ethiopia	Ethiopia		Ethiopia		
parenteral preparation			Ethiopia	Ethiopia		Ethiopia		
<i>methotrexate</i>	Japan	Netherlands						



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		New Zealand						
capsule	Japan							
oral liquid		Netherlands New Zealand						
<i>methylphenidate</i>					South Africa	South Africa		
tablet					South Africa	South Africa		
<i>metoclopramide</i>	Japan Madagascar				Serbia			
oral liquid	Japan Madagascar							
tablet					Serbia			
<i>metoprolol</i>					Fiji			
oral liquid					Fiji			
<i>metronidazole</i>	Japan Portugal Switzerland Zambia		Fiji					United States
oral liquid	Japan Portugal Switzerland Zambia		Fiji					United States
<i>mexiletine</i>						India		
capsule						India		
<i>midazolam</i>					Namibia	Serbia		
oral liquid					Namibia	Serbia		
<i>milrinone</i>				Turkey			Turkey	
parenteral preparation				Turkey			Turkey	
<i>morphine</i>	Zimbabwe	Norway Zimbabwe	Zimbabwe	Zimbabwe	United States		United States	
oral liquid	Zimbabwe	Zimbabwe	Zimbabwe	Zimbabwe	United States		United States	
rectal preparation		Norway						
<i>moxifloxacin</i>	Australia Canada	United Kingdom			United Kingdom			
capsule	Canada							

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oral liquid	Australia	United Kingdom			United Kingdom			
<i>mycophenolate mofetil</i>	Taiwan				Taiwan			
capsule	Taiwan				Taiwan			
<i>nafcillin</i>		India						
parenteral preparation		India						
<i>nalidixic acid</i>						Philippines		
oral liquid						Philippines		
<i>naproxen</i>					Netherlands			
oral liquid					Netherlands			
<i>nevirapine</i>						Fiji Panama		
oral liquid						Fiji Panama		
<i>nicardipine</i>		Canada						
parenteral preparation		Canada						
<i>nifedipine</i>	United States							
oral liquid	United States							
<i>nitric oxide</i>			Venezuela		Myanmar			
preparation for inhalation			Venezuela		Myanmar			
<i>nitrofurantoin</i>	Australia Canada	Canada		Canada United Kingdom				
capsule	Australia							
oral liquid	Canada	Canada		Canada United Kingdom				
<i>nystatin</i>				Zambia		Zambia		
oral liquid				Zambia		Zambia		
<i>olanzapine</i>					United States			
oral liquid					United States			
<i>omeprazole</i>	Brazil Chile Hungary Indonesia	Chile Netherlands Spain Sri Lanka	Brazil	Australia Germany	Fiji Germany Zambia	Zambia	Australia Germany	

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	Philippines Saudi Arabia Thailand Zambia	Zambia						
capsule	Hungary							
oral liquid	Brazil Chile Indonesia Philippines Thailand Zambia	Chile Spain Sri Lanka Zambia	Brazil	Australia Germany	Fiji Germany Zambia	Zambia	Australia Germany	
rectal preparation		Netherlands						
tablet	Saudi Arabia							
<i>ondansetron</i>	Fiji Russia Serbia	Madagascar		Philippines	Philippines	Mozambique		
oral liquid	Russia Serbia	Madagascar				Mozambique		
tablet	Fiji			Philippines	Philippines			
<i>oxcarbazepine</i>	Venezuela		Venezuela	Venezuela				
oral liquid	Venezuela		Venezuela	Venezuela				
<i>oxybutinin</i>		New Zealand						
tablet		New Zealand						
<i>palivizumab</i>				New Zealand				
parenteral preparation				New Zealand				
<i>pantoprazole</i>	Hungary United Arab Emirates United States	Serbia						
oral liquid	Hungary United States	Serbia						
parenteral preparation	United Arab Emirates							

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<i>paromomycin</i>						Indonesia		
tablet						Indonesia		
<i>pegaspargase</i>				Hungary				
parenteral preparation				Hungary				
<i>pentazocine</i>						Nigeria		
parenteral preparation						Nigeria		
<i>phenobarbital</i>	Ethiopia Germany Indonesia Myanmar Philippines Serbia Zambia	Mexico Netherlands Serbia Thailand Zambia		Zambia	South Africa Zambia	Indonesia Philippines South Africa Zambia	Argentina South Africa	
oral liquid	Germany Indonesia Philippines Serbia Zambia	Netherlands Serbia Thailand Zambia			South Africa Zambia	Zambia	South Africa	
parenteral preparation	Ethiopia	Mexico		Zambia		Indonesia South Africa Zambia		
tablet	Ethiopia Myanmar					Philippines	Argentina	
<i>phenoxymethylpenicillin</i>	Canada Norway Zambia	Portugal		Canada Zambia		Norway Serbia South Africa		
oral liquid	Canada Norway Zambia			Canada Zambia		Norway Serbia South Africa		
parenteral preparation		Portugal						
<i>phentolamine</i>		Taiwan						
parenteral preparation		Taiwan						
<i>phenylephrine</i>		Taiwan						



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parenteral preparation		Taiwan						
<i>phenytoin</i>	Nigeria					Tanzania		
capsule	Nigeria							
parenteral preparation						Tanzania		
<i>pimecrolimus</i>						Mexico		
topical						Mexico		
<i>piperacillin + tazobactam</i>			Kenya	Armenia Ethiopia		Ethiopia		
parenteral preparation			Kenya	Armenia Ethiopia		Ethiopia		
<i>piritrexim</i>	Brazil							
capsule	Brazil							
<i>pivmecillinam</i>	Denmark							
oral liquid	Denmark							
<i>pneumococcal vaccine</i>			Venezuela					
parenteral preparation			Venezuela					
<i>polyethylene glycol 400</i>	Sri Lanka		Sri Lanka					
powder	Sri Lanka		Sri Lanka					
<i>posaconazole</i>					United Kingdom			
NA					United Kingdom			
<i>praziquantel</i>	Nigeria Switzerland							
oral liquid	Switzerland							
tablet	Nigeria							
<i>prednisolone</i>	Ghana Hungary Nigeria Norway Portugal United Arab Emirates Zambia	Albania Nigeria Zimbabwe	Zimbabwe	Zimbabwe				Sri Lanka

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	Zimbabwe							
oral liquid	Ghana Hungary Nigeria Norway United Arab Emirates Zimbabwe	Albania Nigeria Zimbabwe	Zimbabwe	Zimbabwe				Sri Lanka
tablet	Nigeria Portugal Zambia							
<i>prednisone</i>	Norway							
oral liquid	Norway							
<i>pregabalin</i>	New Zealand	Spain						
NA		Spain						
tablet	New Zealand							
<i>prilocaine</i>		Serbia						
topical		Serbia						
<i>primaquine</i>	Thailand	Thailand						
oral liquid		Thailand						
tablet	Thailand							
<i>promethazine</i>						Nigeria		
oral liquid						Nigeria		
<i>propranolol</i>	Canada Nigeria Serbia Sweden Taiwan Thailand	Sweden Taiwan						
oral liquid	Serbia Sweden Taiwan Thailand	Sweden Taiwan						



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tablet	Canada Nigeria							
<i>prostaglandin d2</i>					Namibia			
oral liquid					Namibia			
<i>pseudoephedrine</i>		Russia						
tablet		Russia						
<i>pyridoxine</i>	United Kingdom							
tablet	United Kingdom							
<i>pyrimethamine</i>	Argentina Brazil							
oral liquid	Brazil							
tablet	Argentina							
<i>quetiapine</i>		Spain						
NA		Spain						
<i>quinine</i>	Nigeria					Nigeria		
oral liquid	Nigeria					Nigeria		
<i>raltegravir</i>	El Salvador	Chile				Kenya		
fine granules	El Salvador							
oral liquid		Chile						
tablet						Kenya		
<i>ramelteon</i>	Japan							
tablet	Japan							
<i>ranitidine</i>	Sri Lanka	Argentina Brazil						
NA		Argentina						
oral liquid	Sri Lanka	Brazil						
<i>remifentanyl</i>							South Africa	
parenteral preparation							South Africa	
<i>riboflavin</i>		Denmark						
oral liquid		Denmark						
<i>rifabutin</i>	Australia Uganda							
capsule	Uganda							



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oral liquid	Australia							
<i>rifampicin</i>	Japan Switzerland						Spain	
capsule	Japan							
oral liquid	Switzerland						Spain	
<i>rifapentine</i>		Germany United Kingdom						
oral liquid		Germany						
tablet		United Kingdom						
<i>ritonavir</i>		Brazil						
oral liquid		Brazil						
<i>rivaroxaban</i>	United States							
oral liquid	United States							
<i>salbutamol</i>						Sri Lanka		
parenteral preparation						Sri Lanka		
<i>sevelamer</i>	Portugal							
oral liquid	Portugal							
<i>sildenafil</i>	Ethiopia Japan Serbia United Kingdom	Australia Brazil Indonesia Taiwan			Sri Lanka		Japan	
oral liquid	Ethiopia Serbia United Kingdom	Australia Brazil			Sri Lanka			
parenteral preparation		Indonesia						
tablet	Japan						Japan	
topical		Taiwan						
<i>sirolimus</i>		Indonesia			Indonesia Taiwan	Indonesia		
tablet		Indonesia			Indonesia	Indonesia		
topical					Taiwan			



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<i>sodium bicarbonate</i>	Portugal	Nigeria						
oral liquid	Portugal	Nigeria						
<i>sodium chloride</i>	United States							
oral liquid	United States							
<i>sodium phosphate dibasic</i>		United Kingdom						
oral liquid		United Kingdom						
<i>somatotropin</i>	Portugal					Venezuela		
oral liquid	Portugal							
parenteral preparation						Venezuela		
<i>spironolactone</i>	Brazil India Nigeria Norway Tanzania					Ghana		Tanzania
oral liquid	Brazil Nigeria Norway Tanzania					Ghana		Tanzania
tablet	India							
<i>sulfadiazine</i>	Brazil					Panama		
oral liquid	Brazil							
tablet						Panama		
<i>tacrolimus</i>	Japan Puerto Rico Taiwan United Kingdom	United Kingdom		Indonesia United Kingdom	Taiwan Zambia	Netherlands Sri Lanka	Japan	Canada
capsule	Japan Taiwan				Taiwan		Japan	
oral liquid	Puerto Rico United Kingdom	United Kingdom		Indonesia United Kingdom		Netherlands		Canada



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tablet					Zambia	Sri Lanka		
<i>tadalafil</i>	Japan							
tablet	Japan							
<i>tenofovir alafenaimide</i>	United Kingdom							
dispersible tablets	United Kingdom							
<i>tenofovir disoproxil</i>	Chile	Chile						
tablet	Chile	Chile						
<i>teriflunomide</i>					Congo Kinshasa			
tablet					Congo Kinshasa			
<i>testosterone</i>						Venezuela		
parenteral preparation						Venezuela		
<i>timolol</i>					Taiwan			
topical					Taiwan			
<i>tioridazine</i>		Slovenia						
tablet		Slovenia						
<i>tobramycin</i>		Armenia		Armenia				
preparation for inhalation		Armenia		Armenia				
<i>topiramate</i>	Germany United States							
oral liquid	Germany United States							
<i>tramadol</i>	Ghana	New Zealand						
oral liquid	Ghana							
orodispersible tablets		New Zealand						
<i>trichloroacetaldehyde</i>						India		
oral liquid						India		
<i>trimethoprim + sulfamethoxazole</i>	Australia Japan			Congo Kinshasa		Australia India Indonesia	Australia Germany Indonesia	
oral liquid	Australia					Australia	Australia Germany	

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parenteral preparation				Congo Kinshasa		Indonesia	Indonesia	
preparation for inhalation						India		
tablet	Japan							
<i>ursodeoxycholic acid</i>	United States							
oral liquid	United States							
<i>ustekinumab</i>	Netherlands							
parenteral preparation	Netherlands							
<i>valaciclovir</i>	Australia Chile Taiwan Ukraine United Kingdom	Brazil	Ukraine	United Kingdom	Taiwan		United Kingdom	
NA		Canada						
oral liquid	Australia Chile United Kingdom			United Kingdom			United Kingdom	
tablet	Australia Taiwan Ukraine	Brazil	Ukraine		Taiwan			
<i>valproic acid</i>	Myanmar Tanzania Germany	Indonesia		Fiji Ghana Indonesia Nigeria Sri Lanka	Ghana	Fiji Jordan Sri Lanka		
oral liquid	Tanzania			Nigeria Sri Lanka		Jordan Sri Lanka		
parenteral preparation		Indonesia		Ghana	Ghana			
capsule	Germany							
tablet	Myanmar			Fiji Indonesia		Fiji		
<i>vancomycin</i>		United Kingdom	Ethiopia	Ethiopia Zambia		Ethiopia Indonesia		



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oral liquid		United Kingdom						
parenteral preparation			Ethiopia	Ethiopia Zambia		Ethiopia Indonesia		
<i>vasopressin</i>		Spain				Namibia Philippines Venezuela		
parenteral preparation		Spain				Namibia Philippines		
preparation for inhalation						Venezuela		
<i>vigabatrin</i>		India		Ghana South Africa	Ghana South Africa		South Africa	
NA				Ghana				
tablet		India		Ghana South Africa	Ghana South Africa		South Africa	
<i>vitamin a</i>	Canada	Canada			Canada	Philippines		
capsule						Philippines		
oral liquid	Canada	Canada			Canada			
<i>vitamin e</i>	Indonesia Sri Lanka	United States	Sri Lanka		Indonesia			
capsule	Sri Lanka		Sri Lanka					
oral liquid	Indonesia				Indonesia			
parenteral preparation		United States						
<i>voriconazole</i>	Taiwan			India Taiwan United States		India		
oral liquid	Taiwan			Taiwan United States				
parenteral preparation				India		India		
<i>warfarin</i>	United States					Rwanda		
oral liquid	United States							
tablet						Rwanda		
<i>xlomethazoline</i>	United Kingdom	United Kingdom						



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nose drops	United Kingdom	United Kingdom						
<i>zidovudine</i>	Indonesia	Indonesia Tanzania					Indonesia Tanzania	Chile
oral liquid	Indonesia	Indonesia Tanzania					Tanzania	Chile
tablet		Indonesia					Indonesia	
<i>zinc chloride</i>		Philippines					Philippines	
capsule		Philippines					Philippines	
<i>zonisamide</i>	Hungary United States							
oral liquid	Hungary United States							