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ORIGINAL ARTICLE

# The Dutch list of essential drugs for undergraduate medical education: A modified Delphi study

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**Aims:** Prescribing errors among junior doctors are common in clinical practice because many lack prescribing competence after graduation. This is in part due to inadequate education in clinical pharmacology and therapeutics (CP&T) in the undergraduate medical curriculum. To support CP&T education, it is important to determine which drugs medical undergraduates should be able to prescribe safely and effectively without direct supervision by the time they graduate. Currently, there is

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no such list with broad-based consensus. Therefore, the aim was to reach consensus on a list of essential drugs for undergraduate medical education in the Netherlands.

**Methods:** A two-round modified Delphi study was conducted among pharmacists, medical specialists, junior doctors and pharmacotherapy teachers from all eight Dutch academic hospitals. Participants were asked to indicate whether it was essential that medical graduates could prescribe specific drugs included on a preliminary list. Drugs for which ≥80% of all respondents agreed or strongly agreed were included in the final list.

**Results:** In all, 42 (65%) participants completed the two Delphi rounds. A total of 132 drugs (39%) from the preliminary list and two (3%) newly proposed drugs were included.

**Conclusions:** This is the first Delphi consensus study to identify the drugs that Dutch junior doctors should be able to prescribe safely and effectively without direct supervision. This list can be used to harmonize and support the teaching and assessment of CP&T. Moreover, this study shows that a Delphi method is suitable to reach consensus on such a list, and could be used for a European list.

KEYWORDS
clinical pharmacology, medical education, pharmacology teaching, pharmacotherapy

## 1 | INTRODUCTION

The transition from medical student to junior doctor is often experienced as being challenging, especially when it comes to prescribing drugs.[1] Not only is the list of available drugs exhaustive and ever expanding, drugs are also available in various formulations for different routes of administration. Not surprisingly, junior doctors often feel unprepared for their prescribing duties and lack confidence.[2] In clinical practice, junior doctors make many, potentially avoidable, prescribing errors.[3,4] For example, in the UK, juniors doctors write most prescriptions (70%) but unfortunately have a high rate of prescribing errors (9%) compared with experienced prescribers (5%).[5] In the Netherlands, approximately 6% of all unplanned hospital admissions are drug related.[6] Similar numbers have been reported in other European countries.[7] One explanation for the large number of errors and lack of prescribing competence among medical graduates is inadequate education and training in clinical pharmacology and therapeutics (CP&T) in undergraduate medical curricula.[2] Improving undergraduate training in CP&T is therefore a pivotal step to reduce future prescribing errors.[8]

To support CP&T education, it is important to limit the number of drugs that medical undergraduates should be able to prescribe safely and effectively without direct supervision. Incorporating a core drug list together with the list of essential diseases for prescribing and a final pharmacotherapy assessment into the undergraduate medical curriculum would ensure optimal knowledge and prescribing skills of the drugs at the time of graduation.[9] This has also been recommended

### What is already known about this subject

- Essential drug lists are used in several countries to ensure safe prescribing and to meet the needs of the national health care system.
- For medical education purposes, existing lists are in practice too extensive or outdated.
- There is as yet no broad-based consensus list of commonly prescribed drugs that junior doctors should be able to prescribe safely and effectively without direct supervision.

### What this study adds

- This study shows that the Delphi method is feasible to reach consensus within a country about a list of essential drugs for medical education.
- A list of essential drugs will harmonize and support the teaching and assessment of clinical pharmacology and therapeutics in undergraduate medical curricula.
- This is the first study to identify drugs that Dutch junior doctors should be able to prescribe safely and effectively without direct supervision.

by the World Health Organization.[10] There are existing drug formularies and drug lists, such as the 'core drug list' in the UK and 'The Wise List' in Sweden.[11–15] However, these lists may not be directly applicable in the Netherlands because of differences in local preferences, guidelines and drug accessibility. More importantly, some are outdated or are not developed with the goal to improve medical education but more for use in daily clinical practice. Therefore, together with all eight Dutch medical schools, we aim to develop a list of essential drugs that junior doctors in the Netherlands should be able to prescribe safely and effectively without direct supervision. This list can be used to harmonize and support training and assessment of CP&T in the undergraduate medical curriculum.

## 2 | METHODS

### 2.1 | Study design

The Delphi method is a commonly used approach in research to reach consensus on subjects with a lack of evidence or diverse opinions.[16–20] A Delphi usually consists of multiple rounds. In each round, participating experts are asked to evaluate statements or items in a questionnaire. Based on the average scores, items are added or removed in subsequent rounds.[21] Our modified Delphi study was conducted between November 2020 and April 2021 and comprised the following: selecting an expert panel; creating a preliminary drug list; and carrying out a two-round Delphi procedure.

This study was initiated by the Pharmacotherapy Education working group of the Dutch Society for Clinical Pharmacology & Biopharmacy and was approved by the Dutch Association for Medical Education Ethical Review Board (NERB: 2020.5) and the Medical Ethics Review Committee of VU University Medical Center (2020.337).

### 2.2 | Delphi panel

All eight Dutch medical faculties were invited to participate in the study. A representative from each medical faculty, appointed by the Pharmacotherapy Education working group, was asked to select at least nine participants affiliated to their faculty, to form a broadly representative expert panel with different clinical interests. Participation was voluntary and informed consent was obtained from all participants. The following selection criteria were applied.

- Two experienced (≥3 years of teaching experience) teachers of CP&T in the undergraduate medical curriculum, of which at least one teacher is a registered clinical pharmacologist.
- Five healthcare professionals, preferably a surgeon; an internist (e.g., general internist, gastroenterologist, pulmonologist or cardiologist); a general practitioner; a specialist in geriatric medicine; and a (hospital) pharmacist.
- Two recently graduated junior doctors (graduated ≤1 year ago) working in clinical practice and prescribing drugs on a regular basis.

### 2.3 | Drug list

We developed a preliminary list of 337 drugs including various formulations, based on the WHO model list of essential medicines,[15] the most commonly prescribed drugs in the Netherlands,[22] the drugs associated with medication-related hospital admissions in the Netherlands,[6] a local formulary used in the undergraduate program of the Erasmus Medical University, and the website of

**TABLE 1** Participant characteristics

| | Round 1 ($n = 51$) | Round 2 ($n = 42$) |
|---|---|---|
| **Affiliation** | | |
| Amsterdam University Medical Centers, location AMC | 4 (7.8) | 3 (7.1) |
| Amsterdam University Medical Centers, location VUMC | 13 (25.5) | 11 (26.2) |
| Erasmus University Medical Center | 5 (9.8) | 5 (11.9) |
| Leiden University Medical Center | 4 (7.8) | 1 (2.4) |
| Maastricht University Medical Center | 3 (5.9) | 2 (4.8) |
| Radboud University Medical Center | 6 (11.8) | 5 (11.9) |
| Affiliated regional centers | 6 (11.8) | 6 (14.3) |
| University Medical Center Groningen | 1 (2.0) | 1 (2.4) |
| University Medical Center Utrecht | 9 (17.6) | 8 (19.0) |
| **Primary profession** | | |
| Junior doctor/resident | 12 (23.5) | 11 (26.2) |
| Geriatrician | 4 (7.8) | 4 (9.5) |
| General practitioner | 3 (5.9) | 2 (4.8) |
| Internist | 8 (15.7) | 5 (11.9) |
| Paediatrician | 4 (7.8) | 4 (9.5) |
| Psychiatrist | 1 (2.0) | 1 (2.4) |
| Surgeon | 3 (5.9) | 3 (7.1) |
| Community pharmacist | 1 (2.0) | 1 (2.4) |
| Hospital pharmacist | 3 (5.9) | 3 (7.1) |
| Pharmacotherapy teacher | 12 (23.5) | 8 (19.0) |
| **Clinical pharmacologist (or in training)** | | |
| Yes | 27 (52.9) | 21 (50.0) |
| No | 24 (47.1) | 21 (50.0) |
| **Experience** | | |
| Clinical experience | 8 (0–46) | 8 (0–46) |
| Teaching experience | 4 (0–35) | 5.5 (0–35) |

*Note*: Data are expressed as numbers and percentages (in brackets). Clinical and teaching experience are expressed as median and range in years.

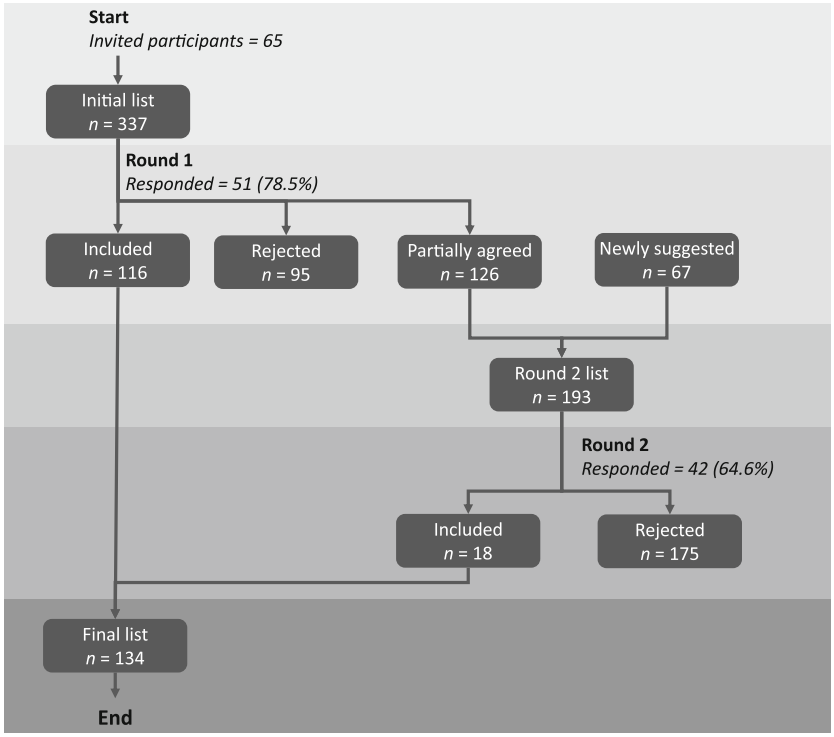


**FIGURE 1** Overview of the results of the Delphi rounds Response rates are indicated as percentages of invited participants.

the Dutch College of General Practitioners.[23] The list was broadly sorted on the Anatomical Therapeutic Chemical classification (ATC) code, and drugs were shown on the level of their route of administration.[24]

## 2.4 | Data collection and analysis

Participants were approached by email to complete a questionnaire about the relevance of the drugs on the preliminary drug list, using the web-based platform Qualtrics (Qualtrics International Inc. [XM], Provo, UT, USA). Participants were anonymous and scored all items without conferring with others. In the first round, participants had to evaluate each drug based on a 5-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neither agree, nor disagree; 4 = agree; 5 = strongly agree) indicating their agreement that junior doctors should be able to prescribe the drug without direct supervision. Participants could also provide arguments for their choices and suggestions of drugs or dosing forms missing from the preliminary list. Drugs rated 4 or 5 by ≥80% of participants were immediately included in the list. Drugs rated 4 or 5 by 50%–80% of the participants (partial agreement) and newly suggested drugs in round 1 were included for (re)evaluation in round 2. Round 2 had the same set-up as the first round. Only the items for which ≥80% of all respondents gave a rating of 4 or 5 were added to the final list of essential drugs. All other drugs were rejected. For each round, participants were given 3 weeks to respond. The statistical software SPSS (version 26, IBM, Armonk, NY, USA) and Microsoft Excel 2016 (Microsoft, Albuquerque, NM, USA) were used to analyse the data using descriptive statistics.

# 3 | RESULTS

## 3.1 | Demographic data

Sixty-five eligible experts were asked to participate, 51 (78.5%) of whom completed round 1 and 42 (64.6%) round 2. The experts had a wide range of clinical and teaching experience (Table 1).

## 3.2 | Essential list of drugs

Of the 337 drugs in the preliminary list, 116 were accepted after round one, and another 18 after round two. Of the 67 newly suggested drugs, two were accepted (Figure 1). The final list of essential drugs is shown in Table 2: there are 134 drugs in the list, consisting of 124 different drugs, and ten being different formulations (e.g., different routes of administration). The top three ATC code groups are (1) alimentary tract and metabolism ($n = 26$), (2) cardiovascular ($n = 15$) and (3) anti-infective for systemic use ($n = 19$). Appendix Table A1 shows the list of all assessed drugs in rounds 1 and 2, and Appendix Table B1 shows the final list.

# 4 | DISCUSSION

This Delphi study identified 134 drugs that Dutch junior doctors, according to our expert panel, should be able to prescribe safely and effectively without direct supervision. This essential list of drugs is the first of its kind in the Netherlands and is a crucial step to improve CP&T teaching with a view to reduce the number of prescribing errors

**TABLE 2** Delphi scores for all accepted items

| Drug groups | Drug names | Round 1 (% score 4 or 5) | Round 2 (% score 4 or 5) |
|---|---|---|---|
| **Alimentary tract and metabolism (*N* = 26)** | | | |
| Drugs for intestinal infections and inflammations (*N* = 2) | Miconazole | 82.4 | - |
| | Nystatin | 74.5 | 88.1 |
| Drugs for acid related disorders (*N* = 5) | Esomeprazole | 82.4 | - |
| | Omeprazole | 96.1 | - |
| | Pantoprazole | 96.1 | - |
| | Ranitidine | 92.2 | - |
| | Magnesium hydroxide | 82.4 | - |
| Drugs affecting gastrointestinal motility (*N* = 10) | Bisacodyl | 88.2 | - |
| | Macrogol | 96.1 | - |
| | Macrogol/electrolytes | - | 88.1 |
| | Psyllium seed | 74.5 | 81.0 |
| | Lactulose | 94.1 | - |
| | Loperamide | 100 | - |
| | Metoclopramide | 98.0 | - |
| | Domperidone | 90.2 | - |
| | Ondansetron | 90.2 | - |
| | Oral rehydration solution | 94.1 | - |
| Drugs used in diabetes (*N* = 9) | Gliclazide | 94.1 | - |
| | Glimepiride | 80.4 | - |
| | Metformin | 94.1 | - |
| | Insulin (SC) | 84.3 | - |
| | Insulin aspart (SC) | 86.3 | - |
| | Insulin aspart/insulin aspart protamine (SC) | 84.3 | - |
| | Insulin glargine (SC) | 76.5 | 88.1 |
| | Glucose solution (IV) | 86.3 | - |
| | Glucagon (IM) | 90.2 | - |
| **Blood and blood forming organs (*N* = 12)** | | | |
| Drugs affecting blood platelets or coagulation (*N* = 9) | Acetylsalicylic acid | 100 | - |
| | Carbasalate calcium | 94.1 | - |
| | Clopidogrel | 94.1 | - |
| | Acenocoumarol | 98.0 | - |
| | Phenprocoumon | 92.2 | - |
| | Apixaban | 94.1 | - |
| | Dabigatran | 88.2 | - |
| | Rivaroxaban | 88.2 | - |
| | Nadroparin (SC) | 80.4 | - |
| Drugs for treating anaemia (*N* = 2) | Ferrous fumarate | 98.0 | - |
| | Folic acid | 96.1 | - |
| Intravenous fluids (*N* = 1) | Sodium chloride solution 0.9% (IV) | 92.2 | - |
| **Cardiovascular system (*N* = 25)** | | | |
| Drugs affecting cardiac contractility (*N* = 1) | Adrenaline autoinjector (IM) | - | 83.3 |
| Drugs for treating high blood pressure (*N* = 20) | Amlodipine | 96.1 | - |
| | Nifedipine | 86.3 | - |
| | Atenolol | 86.3 | - |

(Continues)

**TABLE 2** (Continued)

| Drug groups | Drug names | Round 1 (% score 4 or 5) | Round 2 (% score 4 or 5) |
|---|---|---|---|
| | Metoprolol | 98.0 | - |
| | Propranolol | 86.3 | - |
| | Bumetanide | 80.4 | - |
| | Furosemide (IV) | 74.5 | 81.0 |
| | Furosemide | 100 | - |
| | Spironolactone | 92.2 | - |
| | Enalapril | 96.1 | - |
| | Lisinopril | 88.2 | - |
| | Perindopril | 84.3 | - |
| | Hydrochlorothiazide | 100 | - |
| | Isosorbide dinitrate | 78.4 | 83.3 |
| | Isosorbide dinitrate (SL) | 82.4 | - |
| | Isosorbide mononitrate | 86.3 | - |
| | Potassium chloride | 76.5 | 85.7 |
| | Losartan | 96.1 | - |
| | Valsartan | 84.3 | - |
| | Nitroglycerin (SL) | 96.1 | - |
| Drugs for treating dyslipidaemias ($N = 4$) | Atorvastatin | 94.1 | - |
| | Pravastatin | 72.5 | 81.0 |
| | Rosuvastatin | 88.2 | - |
| | Simvastatin | 96.1 | - |
| **Dermatologicals ($N = 5$)** | | | |
| Creams and ointments ($N = 2$) | Soft paraffin and fat products (dermal) | 94.1 | - |
| | Zinc oxide (dermal) | 84.3 | - |
| Antimicrobial drugs and steroids ($N = 3$) | Fusidic acid (dermal) | 90.2 | - |
| | Hydrocortisone (dermal) | 96.1 | - |
| | Miconazole (dermal) | 96.1 | - |
| **Genito-urinary system and sex hormones ($N = 3$)** | | | |
| Drugs for treating vaginal infections ($N = 1$) | Miconazole (mucosal) | 86.3 | - |
| Drugs affecting reproductive function ($N = 1$) | Ethinyl oestradiol/levonorgestrel | 94.1 | - |
| Drugs for treating benign prostate hyperplasia ($N = 1$) | Tamsulosin | 92.2 | - |
| **Systemic hormonal preparations excluding sex steroids ($N = 4$)** | | | |
| Corticosteroids for systemic use ($N = 3$) | Dexamethasone | 80.4 | - |
| | Hydrocortisone | 84.3 | - |
| | Prednisolone | 96.1 | - |
| Drugs for treating thyroid disorders ($N = 1$) | Levothyroxine | 96.1 | - |
| **Antiinfective for systemic use ($N = 19$)** | | | |
| Antibacterial drugs ($N = 13$) | Amoxicillin | 100 | - |
| | Amoxicillin (IV) | 70.6 | 83.3 |
| | Amoxicillin/clavulanic acid | 100 | - |
| | Amoxicillin/clavulanic acid (IV) | 70.6 | 83.3 |
| | Flucloxacillin | 98.0 | - |
| | Azithromycin | 90.2 | - |
| | Clarithromycin | 88.2 | - |
| | Ciprofloxacin | 96.1 | - |

**TABLE 2** (Continued)

| Drug groups | Drug names | Round 1 (% score 4 or 5) | Round 2 (% score 4 or 5) |
|---|---|---|---|
| | Clindamycin | 86.3 | - |
| | Nitrofurantoin | 100 | - |
| | Cotrimoxazole | 96.1 | - |
| | Trimethoprim | 86.3 | - |
| | Doxycycline | 98.0 | - |
| Antifungal drugs ($N = 1$) | Fluconazole | 80.4 | - |
| Antiviral drugs ($N = 1$) | Acyclovir | 84.3 | - |
| Vaccines and immunoglobulins ($N = 3$) | Influenza vaccine (IM) | 82.4 | - |
| | Tetanus immunoglobulin (IM) | 84.3 | - |
| | Tetanus toxoid (IM) | 78.4 | 85.7 |
| Antiprotozoal drugs ($N = 1$) | Metronidazole | 82.4 | - |
| **Musculoskeletal system ($N = 15$)** | | | |
| Drugs used for pain management including treatment of gout ($N = 12$) | Allopurinol | 84.3 | - |
| | Colchicine | 86.3 | - |
| | Diclofenac | 100 | - |
| | Ibuprofen | 100 | - |
| | Naproxen | 98.0 | - |
| | Fentanyl (dermal) | 86.3 | - |
| | Morphine | 92.2 | - |
| | Morphine (SC) | 76.5 | 88.1 |
| | Oxycodone | 92.2 | - |
| | Tramadol | 92.2 | - |
| | Acetaminophen | 100 | - |
| | Acetaminophen (rectal) | 90.2 | - |
| Drugs affecting bone homeostasis ($N = 3$) | Alendronic acid | 84.3 | - |
| | Calcium with vitamin D | 96.1 | - |
| | Cholecalciferol | 92.2 | - |
| **Nervous system ($N = 12$)** | | | |
| Local anaesthetics ($N = 1$) | Lidocaine/adrenaline (SC) | 72.5 | 81.0 |
| Drugs for treating depression, anxiety disorders, psychosis and addiction ($N = 10$) | Amitriptyline | 80.4 | - |
| | Citalopram | 88.2 | - |
| | Diazepam | 92.2 | - |
| | Diazepam (rectal) | 78.4 | 92.9 |
| | Lorazepam | 90.2 | - |
| | Oxazepam | 92.2 | - |
| | Temazepam | 92.2 | - |
| | Zolpidem | 74.5 | 83.3 |
| | Haloperidol | 92.2 | - |
| | Thiamine | 74.5 | 81.0 |
| Drugs for treating migraine ($N = 1$) | Sumatriptan | 76.5 | 81.0 |
| **Respiratory system ($N = 13$)** | | | |
| Nasal decongestants ($N = 1$) | Xylometazoline (nasal) | 88.2 | - |
| Bronchodilators ($N = 8$) | Beclomethasone (inhalation) | 90.2 | - |
| | Budesonide (inhalation) | 92.2 | - |
| | Fluticasone (inhalation) | 84.3 | - |

(Continues)

**TABLE 2** (Continued)

| Drug groups | Drug names | Round 1 (% score 4 or 5) | Round 2 (% score 4 or 5) |
|---|---|---|---|
| | Formoterol (inhalation) | 84.3 | - |
| | Salbutamol (inhalation) | 100 | - |
| | Salmeterol (inhalation) | 88.2 | - |
| | Ipratropium (inhalation) | 98.0 | - |
| | Tiotropium (inhalation) | 84.3 | - |
| Drugs for treating allergies ($N = 4$) | Cetirizine | 88.2 | - |
| | Clemastine | 84.3 | - |
| | Desloratadine | 80.4 | - |
| | Levocetrizine | 82.4 | - |

*Note*: *N* indicates the number of accepted items per drug group. The route of administration is oral, unless otherwise stated. Other routes of administration include dermal, inhalation, intramuscular (IM), intravenous (IV), rectal, subcutaneous (SC) and sublingual (SL) routes.

made by junior doctors. Used alongside the list of essential diseases and the Dutch National Pharmacotherapy Assessment,[19,25,26] this list will provide a solid framework for CP&T education in medical curricula in the Netherlands. This will enable students to become acquainted with these drugs in their preclinical years,[28] thereby forming a sound basis on which their prescribing skills and knowledge can be developed further during clinical training and clerkships.

Drug formularies can be effective for developing skills in pharmacotherapy in problem-based curricula,[29] such as those used in Dutch medical schools.[30] Over the years, a number of national formularies have been developed.[11–14] While many national formularies overlap with regard to the drugs included, there are between-country differences in prescribing practice and regulations. Examples include prescriptions of antibiotics and analgesics.[31,32] Moreover, these formularies are based mainly on the most frequently prescribed drugs in general, and not on drugs where undergraduate medical education should focus. This might also lead to differences. For example, the 'core drug list' in the UK also included secondary, or even tertiary, care drugs (e.g., methotrexate, acetylcholinesterase inhibitors, alteplase).[11] This all underlines the need for national formularies focusing on medical education, such as the one proposed here.

The current study used a Delphi approach whereby a panel of experts was asked to evaluate a list of drugs. This list was based on the drugs most frequently prescribed in The Netherlands.[22] The panel included both primary and secondary health-care professionals as well as pharmacotherapy teachers. The broad representation of the various medical disciplines (general physician, internist, surgeon, paediatrician, etc.), including the response from all medical universities, ensured a full coverage and proper representation of the field of work of medical graduates. We also included junior doctors because they write the bulk of prescriptions in hospitals.[5] Almost 50% of the panel participants were either clinical pharmacologists or in training, which would ensure an expert opinion concerning pharmacotherapy. This approach is unique compared to that of other studies in which only a limited number of experts were consulted to reach consensus.[14] Furthermore, in contrast to other lists, the current list includes different formulations of individual drugs. This gives students a concrete idea on the expected learning outcomes and it could also avoid unsupervised prescription of high-risk drugs. The list did not include many intravenously administered formulations, probably because unsupervised prescription of these high-risk drugs was considered inappropriate.

The findings of current study should be interpreted in the light of some limitations. Firstly, the composition of the panel has a strong influence on the outcome of the study. For example, a relatively large number of experts were affiliated to the Amsterdam University Medical Centers, location VUmc. As research on CP&T education is one of the focus points of this centre, participants might have been more intrinsically motivated to fill in the questionnaire. This uneven distribution may affect the reproducibility of the current study. However, this is a drawback of all panel-based studies. Secondly, the number of participants per medical faculty varied greatly and not all faculties provided the minimum of nine participants, nor did all faculties have representatives of the five professions mentioned in the inclusion criteria. Junior doctors or residents in training were well represented in the panel, but this was not the case for general physicians (primary health care). Although a homogeneous distribution is preferred, this is not always possible in studies with volunteers. Thirdly, the questionnaire took a considerable amount of time, which could have affected the attention span of participants and could have led to dropouts. In an attempt to avoid this, participants did not have to complete the questionnaire in one sitting. The high response rate for both rounds (79% and 82%, respectively) supports the idea that the length of the questionnaire was not a problem for most participants.

It is important to mention that two drugs (lidocaine subcutaneous for local anaesthesia and promethazine for motion sickness) were not evaluated in round 2 because of a technical error. Nevertheless, lidocaine in combination with adrenaline (subcutaneous) was evaluated in round 2 and was included in the final list. Similarly, although promethazine was not evaluated for motion sickness in round 2, it was

suggested in round 1 as an anti-allergic drug (Appendix B), but was not included in the final list. Although ranitidine was included in the final list, it has recently been withdrawn from the market and therefore another, currently available, histamine type 2 receptor antagonist (famotidine or cimetidine) could be a suitable alternative.

### 4.1 | Implications and future direction

In the upcoming year, the current list will be integrated into the undergraduate medical curriculum of Dutch medical faculties, enabling students to become acquainted with the drugs right from their early years of medical training. Prescribing knowledge and skills of these drugs can be educated with the use of the list of essential diseases for prescribing and the Essential Drug Knowle dge item list defined by Brinkman and colleagues (e.g., lectures, role-playing workgroups, bed-side teaching).[19,28] The Dutch National Pharmacotherapy Assessment could be one of the ways to assess students during the clinical years. It is important to bear in mind that the essential drug list is to provide a framework for medical students, not to suppress academic curiosity or to limit medical education solely to the drugs on the list. In the Netherlands, physician assistants and specialist nurses have prescribing powers, and this list could also be used to train these professionals. Similar lists could also be considered for pharmacists, as dispensing errors are not uncommon,[33] as well as for dentists.

Also, other European countries could benefit from this study. Indeed, there are between-country differences in accessibility and guidelines, but on the group level of drugs there is a large overlap. Moreover, this study shows that the Delphi method is a feasible way to reach consensus on a national drug list. However, to perform this in all European countries would require a lot of effort. By using the European Association for Clinical Pharmacology and Therapeutics (EACPT) Network of Teachers in Pharmacotherapy, a European list, with if necessary national adjustments, could be developed.[34] This will contribute to the continuity of the path taken by the EACPT (i.e., the Key Learning Outcomes for Clinical Pharmacology and Therapeutics Education, the European Prescribing Exam and the European Open Platform for Prescribing Education).[20,27,35,36]

Having compiled an essential list of drugs, the question arises about how often the list should be updated. While 'the top-100' drug list in the UK was updated after 6 years, the WHO updates the Model List of Essential Medicines every 2 years. Interestingly, 'the Wise list' in Sweden and 'the core drug list' of the UK are stable over time and show only minimal changes in specific drugs.[11,37] Nevertheless, a similar study should be performed every 2–3 years to keep up with recent advances in pharmacotherapy. An alternative is the establishment of a reviewing panel of experts from the medical faculties. This panel updates the list, for example, when existing guidelines are updated (e.g., sodium glucose cotransporter 2 inhibitors for diabetes or discovery of new drugs such as biologicals) or drugs are withdrawn (e.g., ranitidine). Although studies show a high adherence of prescribers to drug formularies,[37] it is not known whether the use of formularies leads to fewer prescribing errors. While national studies on drug errors would be the best parameter for this, such studies are usually complicated to perform as they involve multiple stakeholders. Instead, prescriber knowledge and prescribing confidence, both key factors that contribute to prescribing errors,[38] could be used as a surrogate marker to measure the effectiveness of educational interventions such as the current one.

## 5 | CONCLUSION

The current study provides a list of 134 drugs that, according to a panel of experts, medical students and graduates should be able to prescribe safely and effectively without direct supervision. This list provides a lean learning structure and can be used to harmonize and improve pharmacotherapy education in Dutch medical faculties. Moreover, this study shows that a Delphi method is suitable to reach consensus on such a list, and could be used for a European list of essential medicines.

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### COMPETING INTERESTS

All authors declare that they had no financial support; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; J.v.S., M.v.A. and J.T. are member of the Pharmacotherapy Education working group of the Dutch Society for Clinical Pharmacology & Biopharmacy. M.v.A. and J.T. are member of the Education working group of the European Association for Clinical Pharmacology and Therapeutics. There are no other relationships or activities that could appear to have influenced the submitted work.

### CONTRIBUTORS

E.D., R.P., M.P., D.B. and J.T. contributed to study design. E.D., R.P., M.P., D.B. and J.T. contributed to data collection and analysis. E.D., R.P., M.P., D.B. and J.T. contributed to writing the report. All authors contributed to data interpretation and approved the final version of the submitted report.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## APPENDIX A. LIST OF DRUGS IN ROUND 1 AND ROUND 2

**TABLE A1** List of drugs and dosage forms for rounds 1 ($N = 337$) and 2 ($N = 193$). The number of newly suggested drugs is indicated in brackets and the individual drugs are indicated in bold. The route of administration is oral, unless otherwise stated. Other routes of administration include dermal, inhalation, intramuscular (IM), intravenous (IV), rectal, subcutaneous (SC) and sublingual (SL) routes

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| **Alimentary tract and metabolism $N = 45$** | **$N = 17$ (8)** |
| 1. Miconazole | 1. **Lidocaine (oral gel)** |
| 2. Nystatin | 3. Nystatin |
| 4. Aluminium hydroxide/magnesium hydroxide | 5. Aluminium hydroxide/magnesium hydroxide |
| 6. Esomeprazole (IV) | 7. **Pantoprazole (IV)** |
| 8. Esomeprazole | 9. Bisacodyl (rectal) |
| 10. Magnesium hydroxide | 11. **Erythromycin** |
| 12. Misoprostol | 13. **Macrogol/electrolytes** |
| 14. Omeprazole | 15. Metoclopramide (IV) |
| 16. Pantoprazole | 17. Metoclopramide (rectal) |
| 18. Ranitidine | 19. **Sodium phosphate (rectal)** |
| 20. Atropine (IV) | 21. Ondansetron (IV) |
| 22. Bisacodyl | 23. Ondansetron (rectal) |
| 24. Bisacodyl (rectal) | 25. Psyllium seed |
| 26. Butylscopolamine | 27. **Insulin degludec (SC)** |
| 28. Domperidone | 29. Insulin glargine (SC) |
| 30. Lactulose | 31. **Semaglutide (SC)** |
| 32. Loperamide | 33. **Tolbutamide** |
| 34. Macrogol | |
| 35. Mebeverine | |
| 36. Metoclopramide (IV) | |
| 37. Metoclopramide | |
| 38. Metoclopramide (rectal) | |
| 39. Ondansetron (IV) | |
| 40. Ondansetron | |
| 41. Ondansetron (rectal) | |
| 42. Oral rehydration solution | |
| 43. Psyllium seed | |
| 44. Acarbose | |
| 45. Canagliflozin | |
| 46. Empagliflozin | |
| 47. Exenatide (SC) | |
| 48. Gliclazide | |
| 49. Glimepiride | |
| 50. Glucagon (IM) | |
| 51. Glucose solution (IV) | |
| 52. Insulin (SC) | |
| 53. Insulin aspart (SC) | |
| 54. Insulin aspart/insulin aspart protamine (SC) | |
| 55. Insulin glargine (SC) | |
| 56. Linagliptin | |

**TABLE A1** (Continued)

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| 57. Liraglutide (SC) | |
| 58. Metformin | |
| 59. Pioglitazone | |
| 60. Repaglinide | |
| 61. Sitagliptin | |
| **Blood and blood forming organs *N* = 31** | ***N* = 16 (5)** |
| 62. Acenocoumarol | 63. Dipyridamole |
| 64. Acetylsalicylic acid (IV) | 65. **Edoxaban** |
| 66. Acetylsalicylic acid | 67. Enoxaparin (SC) |
| 68. Apixaban | 69. Phytomenadione |
| 70. Carbasalate calcium | 71. Heparin (iv) |
| 72. Clopidogrel | 73. Prasugrel |
| 74. Dabigatran | 75. Ticagrelor |
| 76. Dipyridamole | 77. **Cyanocobalamin** |
| 78. Enoxaparin (SC) | 79. Hydroxocobalamin (IM) |
| 80. Phenprocoumon | 81. Hydroxocobalamin (SC) |
| 82. Fondaparinux (IV) | 83. **Glucose 5% (IV)** |
| 84. Fondaparinux (SC) | 85. **Glucose 10% (IV)** |
| 86. Phytomenadione (IV) | 87. Sodium chloride 0.45% + glucose 2.5% (IV) |
| 88. Phytomenadione | 89. Sodium chloride solution 3% (IV) |
| 90. Heparin (IV) | 91. **Sodium bicarbonate (IV)** |
| 92. Nadroparin (SC) | 93. Ringer'slactate solution (IV) |
| 94. Prasugrel | |
| 95. Protamine (IV) | |
| 96. Prothrombin complex (IV) | |
| 97. Rivaroxaban | |
| 98. Ticagrelor | |
| 99. Tranexamic acid (IV) | |
| 100. Tranexamic acid | |
| 101. Ferrous fumarate | |
| 102. Folic acid | |
| 103. Hydroxocobalamin (IM) | |
| 104. Hydroxocobalamin (SC) | |
| 105. Sodium chloride 0.45% + glucose 2.5% (i.v.) | |
| 106. Sodium chloride solution 0.9% (IV) | |
| 107. Sodium chloride solution 3% (IV) | |
| 108. Ringer's lactate solution (IV) | |
| **Cardiovascular system *N* = 53** | ***N* = 24 (3)** |
| 109. Amiodarone (IV) | 110. **Adrenaline pen (IM)** |
| 111. Amiodarone | 112. Amiodarone |
| 113. Digoxin (IV) | 114. Digoxin |
| 115. Digoxin | 116. Epinephrine (IM) |
| 117. Epinephrine (IM) | 118. Barnidipine |
| 119. Flecainide | 120. Bisoprolol |
| 121. Amlodipine | 122. Bumetanide (IV) |
| 123. Atenolol | 124. Candesartan |

(Continues)

**TABLE A1** (Continued)

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| 125. Barnidipine | 126. Chlorthalidone |
| 127. Bisoprolol | 128. Diltiazem |
| 129. Bumetanide (IV) | 130. **Eplerenone** |
| 131. Bumetanide | 132. Fosinopril |
| 133. Candesartan | 134. **Furosemide (IM)** |
| 135. Chlorthalidone | 136. Furosemide (IV) |
| 137. Diltiazem | 138. Irbesartan |
| 139. Enalapril | 140. Isosorbide dinitrate |
| 141. Fosinopril | 142. Potassium chloride (IV) |
| 143. Furosemide (IV) | 144. Potassium chloride |
| 145. Furosemide | 146. Labetalol |
| 147. Hydrochlorothiazide | 148. Ramipril |
| 149. Irbesartan | 150. Sotalol |
| 151. Isosorbide dinitrate | 152. Verapamil |
| 153. Isosorbide dinitrate (SL) | 154. Ezetimib |
| 155. Isosorbide mononitrate | 156. Pravastatin |
| 157. Potassium chloride (IV) | |
| 158. Potassium chloride | |
| 159. Labetalol (IV) | |
| 160. Labetalol | |
| 161. Lercanidipine | |
| 162. Lisinopril | |
| 163. Losartan | |
| 164. Methyldopa | |
| 165. Metoprolol (IV) | |
| 166. Metoprolol | |
| 167. Nicardipine (IV) | |
| 168. Nifedipine | |
| 169. Nitroglycerin (SL) | |
| 170. Perindopril | |
| 171. Propranolol | |
| 172. Ramipril | |
| 173. Sotalol | |
| 174. Spironolactone | |
| 175. Valsartan | |
| 176. Verapamil (IV) | |
| 177. Verapamil | |
| 178. Atorvastatin | |
| 179. Cholestyramine | |
| 180. Evolocumab (SC) | |
| 181. Ezetimibe | |
| 182. Gemfibrozil | |
| 183. Pravastatin | |
| 184. Rosuvastatin | |
| 185. Simvastatin | |

**TABLE A1** (Continued)

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| **Dermatologicals *N* = 12** | ***N* = 10 (4)** |
| 186. Emolliantia (e.g., cremor vaselini cetomacrogolis) (dermal) | 187. Emolliantia (e.g., cremor vaselini cetomacrogolis) (dermal) |
| 188. Lidocaine cream (dermal) | 189. **Isosorbide dinitrate cream (dermal)** |
| 190. Menthol in hydrophilic cream (dermal) | 191. Lidocaine cream (dermal) |
| 192. Soft paraffin and fat products (dermal) | 193. Menthol in hydrofilic cream (dermal) |
| 194. Zinc oxide (dermal) | 195. Betamethasone (dermal) |
| 196. Betamethasone (dermal) | 197. **Clotrimazole cream (dermal)** |
| 198. Clobetasol (dermal) | 199. **Ketoconazol cream (dermal)** |
| 200. Fusidic acid (dermal) | 201. Mometasone (dermal) |
| 202. Hydrocortisone (dermal) | 203. Triamcinolone acetonide (dermal) |
| 204. Miconazole (dermal) | 205. **Silver sulfadiazine cream (dermal)** |
| 206. Mometasone (dermal) | |
| 207. Triamcinolone acetonide (dermal) | |
| **Genito urinary system and sex hormones *N* = 13** | ***N* = 11 (4)** |
| 208. Clotrimazole (dermal) | 209. Clotrimazole (dermal) |
| 210. Miconazole (mucosal) | 211. Desogestrel |
| 212. Desogestrel | 213. Intra-uterine device (IUD) met progestins |
| 214. Ethinyl oestradiol/levonorgestrel | 215. Levonorgestrel |
| 216. Etonogestrel (SC) | 217. **Ethinyl oestradiol/etonogestrel (vaginal use)** |
| 218. Intra-uterine device (IUD) met progestins | 219. **Dutasteride** |
| 220. Levonorgestrel | 221. Finasteride |
| 222. Medroxyprogesterone (SC) | 223. **Tadalafil** |
| 224. Finasteride | 225. **Tolterodine** |
| 226. Oxybutynin | 227. Oxybutynin |
| 228. Sildenafil | 229. Sildenafil |
| 230. Solifenacin | |
| 231. Tamsulosin | |
| **Systemic hormonal preparations excluding sex steroids *N* = 9** | ***N* = 9 (5)** |
| 232. Betamethasone (IV) | 233. Betamethasone |
| 234. Betamethasone | 235. **Dexamethasone (IM)** |
| 236. Dexamethasone (IV) | 237. Dexamethasone (IV) |
| 238. Dexamethasone | 239. Hydrocortisone (IV) |
| 240. Hydrocortisone (IV) | 241. **Methylprednisolone (intra articular)** |
| 242. Hydrocortisone | 243. **Prednisolone (IM)** |
| 244. Prednisolone (IV) | 245. Prednisolone (IV) |
| 246. Prednisolone | 247. **Triamcinolone hexacetonide (IM)** |
| 248. Levothyroxine | 249. **Thiamazole** |
| **Antiinfective for systemic use *N* = 60** | ***N* = 31 (14)** |
| 250. Amoxicillin (IV) | 251. Amoxicillin (IV) |
| 252. Amoxicillin | 253. Amoxicillin/clavulanic acid (IV) |
| 254. Amoxicillin/clavulanic acid (IV) | 255. Ceftriaxone (IV) |
| 256. Amoxicilline/clavulanic acid | 257. Cefuroxime (IV) |
| 258. Azitromycin (IV) | 259. Ciprofloxacin (IV) |
| 260. Azitromycin | 261. Clindamycin (IV) |
| 262. Cefaclor | 263. Cotrimoxazole (IV) |
| 264. Cephalexin | 265. Erytromycin |

(Continues)

**TABLE A1** (Continued)

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| 266. Cefazolin (IM) | 267. Pheneticillin |
| 268. Cefazolin (IV) | 269. Flucloxacillin (IV) |
| 270. Cefotaxime (IM) | 271. Fosfomycin |
| 272. Cefotaxime (IV) | 273. Fusidic acid |
| 274. Ceftaroline fosamil (IV) | 275. Gentamycin (IV) |
| 276. Ceftazidime (IM) | 277. Meropenem (IV) |
| 278. Ceftazidime (IV) | 279. Vancomycin (IV) |
| 280. Ceftazidime/avibactam (IV) | 281. **Vancomycine** |
| 282. Ceftibuten | 283. **Itraconazol** |
| 284. Ceftolozane/tazobactam (IV) | 285. **Posaconazole** |
| 286. Ceftriaxone (IM) | 287. **Voriconazole** |
| 288. Ceftriaxone (IV) | 289. **Voriconazole (IV)** |
| 290. Cefuroxime (IM) | 291. **Ganciclovir (IV)** |
| 292. Cefuroxime (IV) | 293. Valacyclovir |
| 294. Cefuroxime axetil | 295. **Valganciclovir** |
| 296. Ciprofloxacin (IV) | 297. **Mumps/measles/rubella vaccine (IM)** |
| 298. Ciprofloxacin | 299. **Covid-19 mrna vaccine (IM)** |
| 300. Clarithromycin (IV) | 301. **Papillomavirus vaccine (IM)** |
| 302. Clarithromycin | 303. **Pneumococcal vaccine (IM)** |
| 304. Clindamycin (IV) | 305. Tetanus toxoid (IM) |
| 306. Clindamycin | 307. **Artesunate (IV)** |
| 308. Cotrimoxazole (IV) | 309. **Artemether/lumefantrine** |
| 310. Cotrimoxazole | 311. **Terbinafine** |
| 312. Doxycycline | |
| 313. Erythromycin (IV) | |
| 314. Erythromycin | |
| 315. Pheneticillin (IV) | |
| 316. Pheneticillin | |
| 317. Flucloxacillin (IV) | |
| 318. Flucloxacillin | |
| 319. Fosfomycin | |
| 320. Fusidic acid | |
| 321. Gentamycin (IV) | |
| 322. Meropenem (IV) | |
| 323. Nitrofurantoin | |
| 324. Rifampicin (IV) | |
| 325. Rifampicin | |
| 326. Trimethoprim | |
| 327. Vancomycin (IV) | |
| 328. Fluconazole (IV) | |
| 329. Fluconazole | |
| 330. Acyclovir (IV) | |
| 331. Acyclovir | |
| 332. Oseltamivir | |
| 333. Valacyclovir | |
| 334. Influenza vaccine (IM) | |

**TABLE A1** (Continued)

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| 335. Tetanus immunoglobulin (IM) | |
| 336. Tetanus toxoid (IM) | |
| 337. Atovaquone/proguanil | |
| 338. Mefloquine | |
| 339. Metronidazole (IV) | |
| 340. Metronidazole | |
| **Antineoplasia and immunomodulatory agents *N* = 4** | ***N* = 1** |
| 341. Methotrexate (IM) | 342. Methotrexate |
| 343. Methotrexate (IV) | |
| 344. Methotrexate | |
| 345. Methotrexate (SC) | |
| **Musculoskeletal system *N* = 31** | ***N* = 20 (8)** |
| 346. Acetylcysteine (IV) | 347. **Acetylcysteine (IV)** |
| 348. Allopurinol | 349. **Buprenorphine (IV)** |
| 350. Colchicine | 351. **Buprenorphine (oro-mucosal)** |
| 352. Diclofenac (IV) | 353. **Buprenorphine (transdermal)** |
| 354. Diclofenac | 355. **Diclofenac (IM)** |
| 356. Fentanyl (dermal) | 357. Diclofenac (IV) |
| 358. Fentanyl (IV) | 359. **Diclofenac (rectal)** |
| 360. Fentanyl (nasal) | 361. Fentanyl (nasal) |
| 362. Fentanyl | 363. Fentanyl |
| 364. Fentanyl (SL) | 365. Fentanyl (SL) |
| 366. Ibuprofen | 367. **Metamizole (IV)** |
| 368. Morphine | 369. Morphine (SC) |
| 370. Morphine (SC) | 371. Naloxone (IV) |
| 372. Naloxone (IV) | 373. Oxycodone (SC) |
| 374. Naproxen | 375. Acetaminophen (IV) |
| 376. Oxycodone | 377. Tramadol (rectal) |
| 378. Oxycodone (SC) | 379. Diclofenac (dermal) |
| 380. Acetaminophen (IV) | 381. Ibuprofen (dermal) |
| 382. Acetaminophen | 383. Risedronic acid |
| 384. Acetaminophen (rectal) | 385. **Zoledronic acid (IV)** |
| 386. Pyramidal (SC) | |
| 387. Tramadol | |
| 388. Tramadol (rectaal) | |
| 389. Diclofenac (dermal) | |
| 390. Ibuprofen (dermal) | |
| 391. Alendronic acid | |
| 392. Calcium with vitamin D | |
| 393. Cholecalciferol | |
| 394. Denosumab (SC) | |
| 395. Oestradiol | |
| 396. Risedronic acid | |
| **Nervous system *N* = 44** | ***N* = 37 (11)** |
| 397. Lidocaine (SC) | 398. Lidocaïne/adrenaline (SC) |
| 399. Lidocaine/adrenaline (SC) | 400. **Carbamazepine** |

(Continues)

**TABLE A1** (Continued)

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| 401. Levetiracetam (IV) | 402. **Clonazepam** |
| 403. Levetiracetam | 404. **Phenytoine** |
| 405. Pregabalin (IV) | 406. **Lamotrigine** |
| 407. Pregabalin | 408. Levetiracetam |
| 409. Valproic acid (IV) | 410. Pregabalin |
| 411. Valproic acid | 412. Valproic acid |
| 413. Amitriptyline | 414. Clozapine |
| 415. Citalopram | 416. Diazepam (rectal) |
| 417. Clomipramine | 418. Escitalopram |
| 419. Clozapine | 420. Fluoxetine |
| 421. Diazepam | 422. **Haloperidol (IM)** |
| 423. Diazepam (rectal) | 424. Haloperidol (IV) |
| 425. Escitalopram | 426. Lorazepam (IM) |
| 427. Flumazenil (IV) | 428. **Methylphenidate** |
| 429. Fluoxetine | 430. Midazolam (IV) |
| 431. Haloperidol (IV) | 432. Midazolam |
| 433. Haloperidol | 434. **Midazolam (nasal spray)** |
| 435. Lithium | 436. Mirtazapine |
| 437. Lorazepam (IM) | 438. Nortriptyline |
| 439. Lorazepam (IV) | 440. Olanzapine |
| 441. Lorazepam | 442. Paroxetine |
| 443. Midazolam (IV) | 444. Quetiapine |
| 445. Midazolam | 446. Risperidone |
| 447. Mirtazapine | 448. Sertraline |
| 449. Nortriptyline | 450. Thiamine (IV) |
| 451. Olanzapine | 452. Thiamine |
| 453. Oxazepam | 454. Venlafaxine |
| 455. Paroxetine | 456. **Zopiclon** |
| 457. Quetiapine | 458. Zolpidem |
| 459. Risperidon (IM) | 460. **Propranolol** |
| 461. Risperidon | 462. **Rizatriptan** |
| 463. Sertraline | 464. Sumatriptan (nasal) |
| 465. Temazepam | 466. Sumatriptan |
| 467. Thiamine (vitamin B1) (IV) | 468. Cinnarizine |
| 469. Thiamine (vitamin B1) | 470. **Varenicline** |
| 471. Venlafaxine | |
| 472. Zolpidem | |
| 473. Sumatriptan (nasaal) | |
| 474. Sumatriptan | |
| 475. Sumatriptan (SC) | |
| 476. Cinnarizine | |
| 477. Promethazine | |
| **Respiratory system *N* = 23** | ***N* = 10 (3)** |
| 478. Beclometasone (nasal) | 479. Beclometasone (nasal) |
| 480. Budesonide (nasal) | 481. Budesonide (nasal) |
| 482. Fluticasone furoate (nasal) | 483. Fluticasone furoate (nasal) |

**TABLE A1** (Continued)

| Questionnaire round 1 | Questionnaire round 2 |
|---|---|
| 484. Levocabastine (nasal) | 485. Ciclesonide (inhalation) |
| 486. Mometasone (nasal) | 487. **Glycopyrronium (inhalation)** |
| 488. Xylometazoline (nasal) | 489. **Clemastine (IM)** |
| 490. Beclometasone (inhalation) | 491. Clemastine (IV) |
| 492. Budesonide (inhalation) | 493. Codeine |
| 494. Ciclesonide (inhalation) | 495. Loratidine |
| 496. Fluticasone (inhalation) | 497. **Promethazine** |
| 498. Formoterol (inhalation) | |
| 499. Ipratropium (inhalation) | |
| 500. Salbutamol (inhalation) | |
| 501. Salmeterol (inhalation) | |
| 502. Tiotropium (inhalation) | |
| 503. Cetirizine | |
| 504. Clemastine (IV) | |
| 505. Clemastine | |
| 506. Codeine | |
| 507. Desloratidine | |
| 508. Levocetrizine | |
| 509. Loratidine | |
| 510. Meclozine | |
| **Sensory system $N = 12$** | **$N = 7$ (2)** |
| 511. Chloramphenicol (ocular) | 512. **Atropine (ocular)** |
| 513. Dexamethasone (ocular) | 514. Chloramphenicol (ocular) |
| 515. Erytromycin (ocular) | 516. **Dextran/hypromellose (ocular)** |
| 517. Fusidic acid (ocular) | 518. Fusidic acid (ocular) |
| 519. Levocabastine (ocular) | 520. Hydrocortisone/acetic acid (ear) |
| 521. Predinisolone (ocular) | 522. Miconazole (ear) |
| 523. Trimethoprim/polymyxin B (ocular) | 524. Triamcinolone/acetic acid (ear) |
| 525. Aluminium acetotarrate (ear) | |
| 526. Hydrocortisone/acetic acid (ear) | |
| 527. Miconazol (ear) | |
| 528. Ofloxacin (ear) | |
| 529. Triamcinolone/acetic acid (ear) | |

## APPENDIX B. FINAL LIST

**TABLE B1** The route of administration is oral, unless otherwise stated. Other routes of administration include rectal, inhalation, subcutaneous (SC), intramuscular (IM), intravenous (IV) and sublingual (SL) routes

| Drug groups | Drug names |
|---|---|
| **Alimentary tract and metabolism** | ***N* = 26** |
| Drugs for intestinal infections and inflammations (*N* = 2) | Miconazole, nystatin |
| Drugs for treating acid-related disorders (*N* = 5) | Esomeprazole, omeprazole, pantoprazole, ranitidine, magnesium hydroxide |
| Drugs affecting gastrointestinal motility (*N* = 10) | Bisacodyl, macrogol, macrogol/electrolytes, psyllium seed, lactulose, loperamide, metoclopramide, domperidone, ondansetron, oral rehydration solution |
| Drugs used in diabetes (*N* = 9) | Gliclazide, glimepiride, metformin, insulin (SC), insulin aspart (SC), insulin aspart/insulin aspart protamine (SC), insulin glargine (SC), glucose solution (IV), glucagon (IM) |
| **Blood and blood forming organs** | ***N* = 12** |
| Drugs affecting blood platelets or coagulation (*N* = 9) | Acetylsalicylic acid, carbasalate calcium, clopidogrel acenocoumarol, phenprocoumon, apixaban, dabigatran, rivaroxaban, nadroparin (SC) |
| Drugs for treating anaemia (*N* = 2) | Ferrous fumarate, folic acid |
| Intravenous fluids (*N* = 1) | Sodium chloride solution 0.9% (IV) |
| **Cardiovascular system** | ***N* = 25** |
| Drugs affecting cardiac contractility (*N* = 1) | Adrenaline pen (IM) |
| Drugs for high blood pressure (*N* = 20) | Amlodipine, nifedipine, atenolol, metoprolol, propranolol, bumetanide, furosemide (IV), furosemide, spironolactone, enalapril, lisinopril, perindopril, hydrochlorothiazide, isosorbide dinitrate, isosorbide dinitrate (SL), isosorbide mononitrate, potassium chloride, losartan, valsartan, nitroglycerine (SL) |
| Drugs for treating dyslipidaemia (*N* = 4) | Atorvastatin, pravastatin, rosuvastatin, simvastatin |
| **Dermatologicals** | ***N* = 5** |
| Creams and ointments (*N* = 2) | Soft paraffin and fat products (dermal), zinc oxide (dermal) |
| Antimicrobial drugs and steroids (*N* = 3) | Fusidic acid (dermal), hydrocortisone (dermal), miconazole (dermal) |
| **Genitourinary system and sex hormones** | ***N* = 3** |
| Drugs for treating vaginal infections (*N* = 1) | Miconazole (mucosal) |
| Drugs affecting reproductive function (*N* = 1) | Ethinyl oestradiol/levonorgestrel |
| Drugs for treating benign prostate hyperplasia (*N* = 1) | Tamsulosin |
| **Systemic hormonal preparations excluding sex steroids** | ***N* = 4** |
| Corticosteroids for systemic use (*N* = 3) | Dexamethasone, hydrocortisone, prednisolone |
| Drugs for treating thyroid disorders (*N* = 1) | Levothyroxine |
| **Anti-infective for systemic use** | ***N* = 19** |
| Antibacterial drugs (*N* = 13) | Amoxicillin, amoxicillin (IV), amoxicillin/clavulanic acid amoxicillin/clavulanic acid (IV), flucloxacillin, azithromycin, clarithromycin, ciprofloxacin, clindamycin, nitrofurantoin, cotrimoxazole, trimethoprim, doxycycline |
| Antifungal drugs (*N* = 1) | Fluconazole |
| Antiviral drugs (*N* = 1) | Aciclovir |
| Vaccines and immunoglobulins (*N* = 3) | Influenza vaccine (IM), tetanus immunoglobulin (IM), tetanus toxoid (IM) |
| Antiprotozoal drugs (*N* = 1) | Metronidazole |
| **Musculoskeletal system** | ***N* = 15** |
| Drugs used for pain management including treatment of gout (*N* = 12) | Allopurinol, colchicine, diclofenac, ibuprofen, naproxen, fentanyl (dermal), morphine, morphine (SC), oxycodone, tramadol, acetaminophen, acetaminophen (rectal) |
| Drugs affecting bone homeostasis (*N* = 3) | Alendronic acid, calcium with vitamin D, cholecalciferol |

**TABLE B1** (Continued)

| Drug groups | Drug names |
|---|---|
| **Nervous system** | ***N* = 12** |
| Local anaesthetics (*N* = 1) | Lidocaine/adrenaline (SC) |
| Drugs for treating depression, anxiety disorders, psychosis and addiction (*N* = 10) | Amitriptyline, citalopram, diazepam, diazepam (rectal), lorazepam, oxazepam, temazepam, zolpidem, haloperidol, thiamine |
| Drugs for treating migraine (*N* = 1) | Sumatriptan |
| **Respiratory system** | ***N* = 13** |
| Nasal decongestants (*N* = 1) | Xylometazoline (nasal) |
| Bronchodilators (*N* = 8) | Beclomethasone (inhalation), budesonide (inhalation), fluticasone (inhalation), formoterol (inhalation), salbutamol (inhalation), salmeterol (inhalation), ipratropium (inhalation), tiotropium (inhalation) |
| Drugs for treating allergies (*N* = 4) | Cetirizine, clemastine, desloratidine, levocetrizine |