

# World Health Organization Model List of Essential Medicines

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22nd List  
(2021)



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## Explanatory notes

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The **core list** presents a list of minimum medicine needs for a basic health-care system, listing the most efficacious, safe and cost-effective medicines for priority conditions. Priority conditions are selected on the basis of current and estimated future public health relevance, and potential for safe and cost-effective treatment.

Where the [c] symbol is placed next to an individual medicine or strength of medicine on the core list it signifies that there is a specific indication for restricting its use to children.

The **complementary list** presents essential medicines for priority diseases, for which specialized diagnostic or monitoring facilities, and/or specialist medical care, and/or specialist training are needed. In case of doubt medicines may also be listed as complementary on the basis of consistent higher costs or less attractive cost-effectiveness in a variety of settings.

Where the [c] symbol is placed next to an individual medicine or strength of medicine on the complementary list it signifies that the medicine(s) require(s) specialist diagnostic or monitoring facilities, and/or specialist medical care, and/or specialist training for their use in children.

The **square box symbol (□)** is intended to indicate therapeutic alternatives to the listed medicine that may be considered for selection in national essential medicines lists. Alternatives may be individual medicines, or multiple medicines within a pharmacological class or chemical subgroup, defined at the 4th level of the [Anatomical Therapeutic Chemical \(ATC\) classification](#), which have similar clinical effectiveness and safety. The listed medicine should be the example of the class or subgroup for which there is the best evidence for effectiveness and safety. In some cases, this may be the first medicine that is licensed for marketing; in other instances, subsequently licensed compounds may be safer or more effective. Where there is no difference in terms of efficacy and safety data, the listed medicine should be the one that is generally available at the lowest price, based on international drug price information sources. Not all square box listings are applicable to medicine selection for children. A square box is not used to indicate alternative generic brands of the same small molecule medicines, nor alternative biosimilars of biological medicines. However, the selection and use of quality-assured generics and biosimilars of essential medicines at country level is recommended.

National lists should not use a similar symbol and should be specific in their final selection, which would depend on local availability and price.

The **a** symbol indicates that there is an age or weight restriction on use of the medicine; details for each medicine can be found in Table 1.1.

The presence of an entry on the Essential Medicines List carries no assurance as to pharmaceutical quality. It is the responsibility of the relevant national or regional drug regulatory authority to ensure that each product is of appropriate pharmaceutical quality (including stability) and that, when relevant, different products are interchangeable.

For recommendations and advice concerning all aspects of the quality assurance of medicines see the WHO website <https://www.who.int/teams/health-product-and-policy-standards/standards-and-specifications/norms-and-standards-for-pharmaceuticals/guidelines/quality-assurance>

Medicines and dosage forms are listed in alphabetical order within each section and the order of listing does not imply preference for one form over another. Standard treatment guidelines should be consulted for information on appropriate dosage forms.

The main terms used for dosage forms in the Essential Medicines List can be found in Table 1.2.

Definitions of many of these terms and pharmaceutical quality requirements applicable to the different categories are published in the current edition of *The International Pharmacopoeia*. <https://www.who.int/teams/health-product-and-policy-standards/standards-and-specifications/norms-and-standards-for-pharmaceuticals/pharmacopoeia>.

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<b>1. ANAESTHETICS, PREOPERATIVE MEDICINES AND MEDICAL GASES</b>	
<b>1.1 General anaesthetics and oxygen</b>	
<b>1.1.1 Inhalational medicines</b>	
halothane	<b>Inhalation.</b>
isoflurane	<b>Inhalation.</b>
nitrous oxide	<b>Inhalation.</b>
oxygen	<b>Inhalation</b> (medical gas).
<b>1.1.2 Injectable medicines</b>	
ketamine	<b>Injection:</b> 50 mg/mL (as hydrochloride) in 10 mL vial.
<input type="checkbox"/> propofol Therapeutic alternatives: - thiopental	<b>Injection:</b> 10 mg/mL; 20 mg/mL.
<b>1.2 Local anaesthetics</b>	
<input type="checkbox"/> bupivacaine Therapeutic alternatives to be reviewed (2023)	<b>Injection:</b> 0.25%; 0.5% (hydrochloride) in vial. <b>Injection for spinal anaesthesia:</b> 0.5% (hydrochloride) in 4 mL ampoule to be mixed with 7.5% glucose solution.
<input type="checkbox"/> lidocaine Therapeutic alternatives to be reviewed (2023)	<b>Injection:</b> 1%; 2% (hydrochloride) in vial. <b>Injection for spinal anaesthesia:</b> 5% (hydrochloride) in 2 mL ampoule to be mixed with 7.5% glucose solution. <b>Topical forms:</b> 2% to 4% (hydrochloride).
lidocaine + epinephrine (adrenaline)	<b>Dental cartridge:</b> 2% (hydrochloride) + epinephrine 1:80 000. <b>Injection:</b> 1%; 2% (hydrochloride or sulfate) + epinephrine 1:200 000 in vial.
<b>Complementary List</b>	
<i>ephedrine</i>	<b>Injection:</b> 30 mg/mL (hydrochloride) in 1 mL ampoule. <i>(For use in spinal anaesthesia during delivery, to prevent hypotension).</i>
<b>1.3 Preoperative medication and sedation for short-term procedures</b>	
atropine	<b>Injection:</b> 1 mg (sulfate) in 1 mL ampoule.
<input type="checkbox"/> midazolam Therapeutic alternatives to be reviewed (2023)	<b>Injection:</b> 1 mg/mL. <b>Oral liquid:</b> 2 mg/mL [c]. <b>Tablet:</b> 7.5 mg; 15 mg.
morphine	<b>Injection:</b> 10 mg (sulfate or hydrochloride) in 1 mL ampoule.

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<b>1.4 Medical gases</b>	
oxygen*	<p><b>Inhalation</b></p> <p>For use in the management of hypoxaemia.</p> <p>*No more than 30% oxygen should be used to initiate resuscitation of neonates less than or equal to 32 weeks of gestation.</p>
<b>2. MEDICINES FOR PAIN AND PALLIATIVE CARE</b>	
<b>2.1 Non-opioids and non-steroidal anti-inflammatory medicines (NSAIDs)</b>	
acetylsalicylic acid	<p><b>Suppository:</b> 50 mg to 150 mg.</p> <p><b>Tablet:</b> 100 mg to 500 mg.</p>
ibuprofen <sup>a</sup>	<p><b>Oral liquid:</b> 200 mg/5 mL.</p> <p><b>Tablet:</b> 200 mg; 400 mg; 600 mg.</p> <p><sup>a</sup> Not in children less than 3 months.</p>
paracetamol*	<p><b>Oral liquid:</b> 120 mg/5 mL; 125 mg/5 mL.</p> <p><b>Suppository:</b> 100 mg.</p> <p><b>Tablet:</b> 100 mg to 500 mg.</p> <p>*Not recommended for anti-inflammatory use due to lack of proven benefit to that effect.</p>
<b>2.2 Opioid analgesics</b>	
codeine	<b>Tablet:</b> 30 mg (phosphate).
fentanyl*	<p><b>Transdermal patch:</b> 12 micrograms/hr; 25 micrograms/hr; 50 micrograms/hr; 75 micrograms/hr; 100 micrograms/hr</p> <p>*For the management of cancer pain</p>
<input type="checkbox"/> morphine Therapeutic alternatives: - hydromorphone - oxycodone	<p><b>Granules (slow release; to mix with water):</b> 20 mg to 200 mg (morphine sulfate).</p> <p><b>Injection:</b> 10 mg (morphine hydrochloride or morphine sulfate) in 1 mL ampoule.</p> <p><b>Oral liquid:</b></p> <p><b>Tablet (slow release):</b> 10 mg to 200mg (morphine hydrochloride or morphine sulfate).</p> <p><b>Tablet (immediate release):</b> 10 mg (morphine sulfate).</p>
<i>Complementary list</i>	
methadone*	<p><b>Tablet:</b> 5 mg; 10 mg (hydrochloride)</p> <p><b>Oral liquid:</b> 5 mg/5 mL; 10 mg/5 mL (hydrochloride)</p> <p><b>Concentrate for oral liquid:</b> 5 mg/mL; 10 mg/mL (hydrochloride)</p> <p>*For the management of cancer pain.</p>

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2.3 Medicines for other common symptoms in palliative care	
amitriptyline	<b>Tablet:</b> 10 mg; 25 mg; 75 mg.
cyclizine [c]	<b>Injection:</b> 50 mg/mL. <b>Tablet:</b> 50 mg.
dexamethasone	<b>Injection:</b> 4 mg/mL (as disodium phosphate salt) in 1 mL ampoule. <b>Oral liquid:</b> 2 mg/5 mL. <b>Tablet:</b> 2 mg [c]; 4 mg.
diazepam	<b>Injection:</b> 5 mg/mL. <b>Oral liquid:</b> 2 mg/5 mL. <b>Rectal solution:</b> 2.5 mg; 5 mg; 10 mg. <b>Tablet:</b> 5 mg; 10 mg.
docusate sodium	<b>Capsule:</b> 100 mg. <b>Oral liquid:</b> 50 mg/5 mL.
fluoxetine [a]	<b>Solid oral dosage form:</b> 20 mg (as hydrochloride). [a] > 8 years.
haloperidol	<b>Injection:</b> 5 mg in 1 mL ampoule. <b>Oral liquid:</b> 2 mg/mL. <b>Solid oral dosage form:</b> 0.5 mg; 2mg; 5 mg.
hyoscine butylbromide	<b>Injection:</b> 20 mg/mL.
hyoscine hydrobromide [c]	<b>Injection:</b> 400 micrograms/mL; 600 micrograms/mL. <b>Transdermal patches:</b> 1 mg/72 hours.
lactulose [c]	<b>Oral liquid:</b> 3.1 to 3.7 g/5 mL.
loperamide	<b>Solid oral dosage form:</b> 2 mg.
metoclopramide	<b>Injection:</b> 5 mg/mL (hydrochloride) in 2 mL ampoule. <b>Oral liquid:</b> 5 mg/5 mL. <b>Solid oral form:</b> 10 mg (hydrochloride).
midazolam	<b>Injection:</b> 1 mg/mL; 5 mg/mL. <b>Oral liquid:</b> 2mg/mL [c]. <b>Solid oral dosage form:</b> 7.5 mg; 15 mg.
<input type="checkbox"/> ondansetron [a] Therapeutic alternatives: - dolasetron - granisetron - palonosetron - tropisetron	<b>Injection:</b> 2 mg base/mL in 2 mL ampoule (as hydrochloride). <b>Oral liquid:</b> 4 mg base/5 mL. <b>Solid oral dosage form:</b> Eq 4 mg base; Eq 8 mg base. [a] > 1 month.
senna	<b>Oral liquid:</b> 7.5 mg/5 mL.

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3. ANTIALLERGENICS AND MEDICINES USED IN ANAPHYLAXIS	
dexamethasone	<b>Injection:</b> 4 mg/mL (as disodium phosphate salt) in 1 mL ampoule.
epinephrine (adrenaline)	<b>Injection:</b> 1 mg/mL (as hydrochloride or hydrogen tartrate) in 1 mL ampoule.
hydrocortisone	<b>Powder for injection:</b> 100 mg (as sodium succinate) in vial.
<input type="checkbox"/> loratadine* Therapeutic alternatives: - cetirizine - fexofenadine	<b>Oral liquid:</b> 1 mg/mL. <b>Tablet:</b> 10 mg. <i>*There may be a role for sedating antihistamines for limited indications (EMLC).</i>
<input type="checkbox"/> prednisolone Therapeutic alternatives: - prednisone	<b>Oral liquid:</b> 5 mg/mL [c]. <b>Tablet:</b> 5 mg; 25 mg.
4. ANTIDOTES AND OTHER SUBSTANCES USED IN POISONINGS	
4.1 Non-specific	
charcoal, activated	<b>Powder.</b>
4.2 Specific	
acetylcysteine	<b>Injection:</b> 200 mg/mL in 10 mL ampoule. <b>Oral liquid:</b> 10% [c]; 20% [c].
atropine	<b>Injection:</b> 1 mg (sulfate) in 1 mL ampoule.
calcium gluconate	<b>Injection:</b> 100 mg/mL in 10 mL ampoule.
methylthioninium chloride (methylene blue)	<b>Injection:</b> 10 mg/mL in 10 mL ampoule.
naloxone	<b>Injection:</b> 400 micrograms (hydrochloride) in 1 mL ampoule.
penicillamine	<b>Solid oral dosage form:</b> 250 mg.
potassium ferric hexacyano-ferrate(II) $-2\text{H}_2\text{O}$ (Prussian blue)	<b>Powder for oral administration.</b>
sodium nitrite	<b>Injection:</b> 30 mg/mL in 10 mL ampoule.
sodium thiosulfate	<b>Injection:</b> 250 mg/mL in 50 mL ampoule.
<i>Complementary List</i>	
<i>deferoxamine</i>	<b>Powder for injection:</b> 500 mg (mesilate) in vial.
<i>dimercaprol</i>	<b>Injection in oil:</b> 50 mg/mL in 2 mL ampoule.
<i>fomepizole</i>	<b>Injection:</b> 5 mg/mL (sulfate) in 20 mL ampoule or 1 g/mL (base) in 1.5 mL ampoule.
<i>sodium calcium edetate</i>	<b>Injection:</b> 200 mg/mL in 5 mL ampoule.
<i>succimer</i>	<b>Solid oral dosage form:</b> 100 mg.

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5. ANTICONVULSANTS/ANTIEPILEPTICS	
carbamazepine	<p><b>Oral liquid:</b> 100 mg/5 mL.</p> <p><b>Tablet (chewable):</b> 100 mg; 200 mg.</p> <p><b>Tablet (scored):</b> 100 mg; 200 mg.</p>
diazepam	<p><b>Gel or rectal solution:</b> 5 mg/mL in 0.5 mL; 2 mL; 4 mL tubes.</p>
lamotrigine*	<p><b>Tablet:</b> 25 mg; 50 mg; 100 mg; 200 mg.</p> <p><b>Tablet (chewable, dispersible):</b> 2 mg; 5 mg; 25 mg; 50 mg; 100 mg; 200 mg.</p> <p>*For use as adjunctive therapy for treatment-resistant partial or generalized seizures.</p>
<input type="checkbox"/> lorazepam Therapeutic alternatives: - diazepam (injection) - midazolam (injection)	<p><b>Injection:</b> 2 mg/mL in 1 mL ampoule; 4 mg/mL in 1 mL ampoule.</p>
magnesium sulfate*	<p><b>Injection:</b> 0.5 g/mL in 2 mL ampoule (equivalent to 1 g in 2 mL; 50% weight/volume); 0.5 g/mL in 10 mL ampoule (equivalent to 5 g in 10 mL; 50% weight/volume).</p> <p>*For use in eclampsia and severe pre-eclampsia and not for other convulsant disorders.</p>
midazolam	<p><b>Solution for oromucosal administration:</b> 5 mg/mL; 10 mg/mL.</p> <p><b>Ampoule*:</b> 1 mg/mL; 10 mg/mL.</p> <p>*For buccal administration when solution for oromucosal administration is not available.</p>
phenobarbital	<p><b>Injection:</b> 200 mg/mL (sodium).</p> <p><b>Oral liquid:</b> 15 mg/5 mL.</p> <p><b>Tablet:</b> 15 mg to 100 mg.</p>
phenytoin	<p><b>Injection:</b> 50 mg/mL (sodium) in 5 mL vial.</p> <p><b>Oral liquid:</b> 25 mg to 30 mg/5 mL.*</p> <p><b>Solid oral dosage form:</b> 25 mg; 50 mg; 100 mg (sodium).</p> <p><b>Tablet (chewable):</b> 50 mg.</p>

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