

Using Standardised Concentrations of Liquid Medicines in Children

Take home summary

NPPG and the Royal College of Paediatrics and Child Health (RCPCH) strongly recommend that when children require liquid medications, they should receive the RCPCH and NPPG recommended concentration, where one exists. There are currently 15 such recommended concentrations detailed in Table 1, 14 of which are published in relevant drug monographs of the BNF for Children. The recommendation for each medicine is made either in terms of drug salt or drug base, in line with the relevant BNF monograph.

By standardising the prescribed concentration of these medicines, we will reduce the risk of errors being made in the doses given to children and prevent hospitalisation from accidental under and overdoses. When selecting an appropriate product for children, the excipient content should also be considered; further details can be found in the position statement [Choosing an oral liquid medicine for children](#).

Table 1: Standard concentrations which should be prescribed

Drug	Concentration
Azathioprine (as base)	10mg/mL
Calcium Carbonate (for use as a phosphate binder)	100mg/mL
Chloral Hydrate	100mg/mL
Clopidogrel (as base)	5mg/mL*
Ethambutol hydrochloride	80mg/mL
Hydrocortisone (as base)	1mg/mL
Isoniazid (as base)	10mg/mL
Lisinopril (as base)	1mg/mL
Morphine sulphate	100micrograms/mL**
Phenobarbital (as base- alcohol free)	10mg/mL
Pyrazinamide (as base)	100mg/mL
Sertraline	10mg/mL
Sodium chloride	5mmol/mL
Spironolactone (as base)	10mg/mL
Tacrolimus (as base)	1mg/mL

*Clopidogrel concentration agreed, but as no monograph for this drug exists in the BNFC it is not included there.

** Only to be used where the required dose is too small to allow safe use of a licensed 2mg/mL oral solution.

Further Information

Every year there is harm to patients caused by accidental under and overdosing of medicines in children solely due to the fact that the concentration of their liquid medication changed and the person administering the medicine did not realise they needed to change the volume given.

A study by Rawlence *et al* was undertaken to establish through evidence and Delphi review of experts the most suitable concentration of each of the top 20 prescribed liquid special medications in children¹. When selecting initial concentration for review the following criteria were used:

1. Ideal : Dose for 1kg patient should not be less than 0.2mL, and for a 50kg patient should not be more than 10mL
2. Satisfactory: Dose for 1kg patients should not be below 0.1mL, and for a 50kg patient should not be above 20mL

Consensus on a standard concentration was found for 17 of the top 20 liquid special medications and these have been endorsed by the Medicines Committee at the RCPC and published through the BNF for Children which NPPG and RCPC publish with the Royal Pharmaceutical Society. The first version of this position statement included all 17 medicines, though some were removed from later versions as licensed products have become available. Lisinopril and calcium carbonate have been added following a later (currently unpublished) consensus-finding exercise amongst NPPG members.

This position statement has been written to highlight that these standardised concentrations exist and to encourage all prescribers to prescribe these concentrations. We also encourage the use of these concentrations to be supported through their inclusion in local guidance. This will help prevent errors in children whilst enabling further work to look at excipient suitability and cost control.

The recommended concentrations can be found in the prescribing and dispensing section of the BNFC monographs for each of the drugs, whether accessed in paper or electronic form.

References

1. Rawlence E *et al*. Is the provision of paediatric oral liquid medicines safe? *Arch Dis Child Educ Pract Ed*. 2018;103(6):310-313.

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Key changes from Version 9 (published July 2023):

- Reintroduction of sertraline recommendation as licensed 50mg /5mL product now available.
- A licensed 5mmol/mL sodium chloride liquid now available, so justification for using unlicensed 5mmol/mL over licensed 1mmol/mL removed.

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