

Position statement

Selection of Administration Devices for Oral Liquid Medicines Dispensed to Children

Executive Summary

- Accurate dosing of oral liquid medicines requires the use of an administration device. Such devices include medicine spoons, oral syringes and dosing cups, and are used both to measure the required volume of liquid and to deliver the liquid to the patient.
- Choice of administration device in any situation will depend on both availability and patient preference, but there are also important considerations in terms of dosing accuracy.
- Healthcare professionals supplying medicines have a responsibility to ensure that the patient/parent/carer understands how to use the administration device provided.
- Where an administration device is supplied by the medicine manufacturer, the suitability of that device to administer the required dose and its acceptability to patients/parents/carers should be assessed. Provision of an alternative device should be considered where appropriate.
- In the interests of dosing accuracy, NPPG recommend the following approach to oral administration device selection for children:
 1. Where the dose is equal to 5mL or a multiple of 5mL, a medicine spoon or an oral syringe may be used to administer the dose.
 2. Where an oral syringe is being used:
 - The syringe must be marked in millilitres.
 - A single syringe should be used to administer the entire dose.
 - The smallest syringe size above the dose volume should be used, e.g. a 5mL syringe should be supplied to give a 4.5mL dose, and a 10mL syringe supplied to give a 9mL dose.
 - A 1mL syringe must always be used for dose volumes under 1mL.
 - It is not recommended that oral syringes are routinely “marked” to indicate the volume to be given, though this may be appropriate in exceptional circumstances where a patient/parent/carer has specific needs which require this.
 3. Dosing cups should only be used for dose volumes of 10mL or above.

Background

A variety of administration devices are used to enable the administration of oral liquid medicines to children; these include medicines spoons, oral syringes and dosing cups. Whilst availability of a range of devices is useful in supporting patient/parent/carer choice, dosing accuracy varies between device types; this is further influenced by factors including dose volume, viscosity of the liquid medicine, health literacy, and the support provided to help ensure correct device use by patients/parents/carers¹⁻¹².

In 2015 the American Academy of Paediatrics (AAP) issued a policy statement regarding the preferred dosing of oral liquid medicines, a document which was reaffirmed by the AAP in 2025¹. However, there is no such guidance available in the UK, and a recent survey of UK community pharmacies highlighted variability in the availability, selection and provision of oral administration devices issued with oral liquid medicines dispensed to children¹³. This variation, coupled with the known variation in dosing accuracy between different oral administration methods is a significant patient safety concern.

Recommendations

- When dispensing a medicine for a child, patient/parent/carer preference is an important factor in determining the type of administration device to provide. Nonetheless, given the known variation in dosing accuracy between the different device types, some scenarios will require use of a specific device type to ensure dosing accuracy and patient safety.
- NPPG recommend the following approach to oral administration device selection for children:
 1. Where the dose volume is equal to 5mL or a multiple of 5mL, a medicine spoon or an oral syringe may be used to administer the dose, according to patient/parent/carer preference and/or device availability.
 2. Where an oral syringe is being used:
 - The syringe must be marked in millilitres.
 - A single syringe should be used to administer the entire dose.
 - The smallest syringe size above the dose volume should be used, e.g. a 5mL syringe should be supplied to give a 4.5mL dose, and a 10mL syringe supplied to give a 9mL dose. This will limit the magnitude of any inadvertent overdose resulting from a patient/parent/carer drawing up the incorrect amount.
 - A 1mL syringe must always be used for dose volumes under 1mL. Use of larger syringes to administer dose volumes under 1mL can lead to significant dosing variability, even where the graduations on the larger syringe correspond to the volume to be given.
 - Oral syringes should not be routinely “marked” to indicate the volume to be given, though this may be appropriate as a reasonable adjustment where a patient/parent/carer has specific needs requiring this. Although syringe marking can be helpful in some cases, it introduces additional risks, including the use of a syringe marked with the dose volume for one medicine being used to draw up another medicine with a different dose volume.
 3. Dosing cups should only be used for dose volumes of 10mL or above, and only then when the volume to be measured corresponds with the markings on the cup. Use for smaller volumes is likely to result in clinically significant dosing inaccuracy, even where the graduations on the cup correspond to the dose volume required.
- In addition to following the above, the professional supplying the medicine must also:
 1. Ensure that the patient/parent/carer understands how to use the administration device provided. Educational resources and patient information leaflets to support the appropriate use of oral syringes and medicines spoons are available via the Medicines for Children [website](#).
 2. Consider the way in which the dosing instruction, in particular the quantity of liquid to be administered, is communicated on the dispensing label. This includes ensuring that the dose volume indicated on the label can be measured on the administration device provided, and where an administration device is mentioned on the label that this matches the device supplied. NPPG and the Royal College of Pharmacy recommend that the dose to be given is communicated in millilitres only - see further information [here](#).
 3. Check the concentration of oral liquid supplied previously if the patient has had the medicine before, ideally maintaining the same concentration. Where the prescribed concentration has changed from that previously supplied, the prescriber should be contacted to ensure that the change is intentional. If a concentration change is being made, the subsequent need to adjust the dose volume must be made clear to the patient/parent/carer.

Supporting Information

Dispensing of oral liquid medicines (OLMs) to children can be complex. Associated challenges include the selection of an appropriate administration device and a need to round doses so that the volume to be given is accurately measurable^{1,2,3}. Naturally, patient/parent/carer preference should be a key factor in administration device selection. However other factors, principally the volume of OLM to be measured, also need to be considered as the accuracy of the available device types can vary according to the situation.

Medicine Spoons and Oral Syringes

Domestic teaspoons and household measuring devices have been shown to result in clinically significant inaccuracy and variability compared to calibrated medicine spoons^{1,14,15}. Therefore such products should not be used to administer OLMs.

Several studies have compared the reliability of dose measurement with oral syringes with that of medicine spoons^{1,8,11}. One study showed a similar error rate of 8% for both medicine spoons and oral syringes when measuring a 2.5mL dose¹¹; whilst another concluded that whilst accuracy between the two devices is comparable, oral syringes showed less variability in relation to the reference dose¹. A third study demonstrated that the measured dose can also differ significantly from the reference dose regardless of whether an oral syringe or a medicine spoon is used, and that the type of medicine spoon may also affect the nature of any error seen⁸. Two of these studies also demonstrated a higher preference for medicines spoons amongst parents/carers than for oral syringes^{8,11}.

The comparable accuracy between oral syringes and medicines spoons, and the suggestion that parents often prefer to use a medicine spoon indicates that both options should be considered where the dose volume is 5mL or a multiple of 5mL. However, given the lower variance seen with oral syringes, use of an oral syringe may be more appropriate for medicines with a narrow therapeutic window.

Dose Volumes Under 1mL

Where the dose volume is less than 1mL, a 1mL syringe should be used to minimise dosing inaccuracy. Use of larger syringes to measure volumes less than 1mL results in greater inaccuracy and variability, even if the required volume corresponds with available graduations³.

Medicine Cups

Studies have demonstrated that some parents/carers may prefer medicines cups over other devices^{7,9}. However, compared to oral syringes and/or medicines spoons, use of a medicine cup has consistently been shown to result in greater dosing inaccuracy^{5-7,9,11}. In one study parents/carers (n=176) were asked to measure a 2.5mL dose; 43% of errors exceeding 20% occurred when a 15mL measuring cup was used and 37% when a 30mL measuring cup was used, compared to 4.5% with a 5mL oral syringe and 4% with a medicine spoon¹¹. In another investigation, where a 5mL dose volume was measured, the greatest deviation from the reference volume (up to 20% deviation) and the greatest variability occurred when a 30mL medicine cup was used¹⁰. In comparison, use of a 5mL oral syringe resulted in deviation of just 1-4% from the reference value¹⁰. A further comparison of measuring cups and oral syringes, again using a 5mL reference volume, also demonstrated greater accuracy using an oral syringe (mean volume measured 4.5mL, +/- SD 0.7mL) than with a dosing cup (mean 6.3mL +/- 0.7mL)⁶. Measuring cups were again shown to result in a higher degree of inaccuracy when parents (n=302) were asked to measure a 5mL volume. The percentages of parent/carers dosing within 20% of the reference volume were 30.5% using a cup with printed markings, 50.2% using a cup with etched markings and, 85% when using other instruments (droppers, medicines spoons and oral syringes)⁵.

Although some parents/carers may prefer to use a medicine cup, their demonstrated inaccuracy and variability in use indicate that they are not suitable for smaller dose volumes. Use for larger volumes (10mL or above) may be suitable in some circumstances. There is little evidence to suggest that measuring cups are any more accurate and reliable with larger volumes than smaller volumes, however against a larger overall dosing volume, any errors are likely to result in a smaller percentage deviation from the intended dose. Extra caution is required in the case of medicines with a narrow therapeutic index; use of a medicine cup to measure doses of such drugs may be best avoided.

Importance of Ensuring Patient/Parent/Carer Understanding

It is critical that patients, parents and carers are given verbal instructions as to how any medicine should be used. The dispenser should ensure patient/parent/carer understanding of the information given, including providing support with demonstration of the use of administration devices¹⁶. Provision of an appropriate administration device coupled with appropriate support decreases the risk of medication error^{17,18}. The risk of dosing error has been shown to be independent of the role and level of health literacy of the patient/parent/carer, which further underlines the importance of healthcare professional support in relation to safe and effective use of administration devices for all¹¹.

Community Pharmacy Contractual Requirements

The Drug Tariff for England and Wales states the following in relation to prescription items supplied by contractors:

Provision for supply of either a 5ml plastic measuring spoon (which shall comply with BS 3221:Part 6:1987), or a 1ml, 5ml or 10ml plastic oral syringe measure with every oral liquid medicine, except where the manufacturer's pack includes one. Plastic oral syringe measures must be clearly labelled 'oral' and/or 'enteral' in a large font size, comply with appropriate British or European Standards (BS 3221:Part 7:1995 or an equivalent European Standard for the 5ml syringe) and be wrapped together with a bottle adaptor and instructions. Choice of whether a spoon or syringe (and its size) is supplied will depend on the nature of the medication regime.

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