Liquid Controlled Drug Medication Discrepancies Caused by ENFit Oral Dispensers

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Background

Discrepancies in recording liquid Schedule 8 medications is a problem within our organisation. It has been suggested the remaining liquid in the dead space of oral dispensers is the likely cause of this issue.[1] Some Victorian public hospitals have recently moved to using ENFit devices for administration of oral liquid medications in inpatient settings.

Aim

The aim of this medication safety investigation is to suggest an acceptable variance, when recording Schedule 8 liquid medication withdrawn using ENFit devices within inpatient settings.

Method

1. All bottles were pre-weighed and weight recorded.
2. 100mL of simple syrup (chosen to simulate viscous liquid S8 medication) was carefully measured using a 100mL measure and filled each bottle.
3. The weight of the bottles including the syrup was recorded.
4. Each ENFit adpater (size BA05L) was weighed prior to insertion in bottle.
5. Each bottle was allocated a particular size oral ENFit syringe to be drawn: bottle 1, 1mL; bottle 2, 2.5mL; bottle 3, 5mL; bottle 4,10mL and bottle 5 used a mixture of 1mL, 2.5mL, 5mL and 10mL sizes to simulate real conditions.
6. From bottle 1, each 1mL syringe was pre-weighed, then a dose of 1mL was withdrawn and the liquid discarded in a separate container. The same syringe was weighed post discarding the liquid to determine the weight of liquid left behind. This occurred until liquid could no longer be withdrawn using the ENFit system.
7. The difference between the weight of the oral syringe prior to withdrawing liquid and post was calculated using a formula in Microsoft Excel to determine amount of liquid in grams left behind.
8. The amount in mL not able to be drawn from each bottle, determined by total number mLs from syringes used, was recorded.
9. Steps 6-8 were repeated for bottles 2, 3, 4 and 5.

Equipment

5x 100mL medical grade glass amber bottles
15x 10mL ENFit oral syringes
25x 5mL ENFit oral syringes
50x 2.5mL ENFit oral syringes
100x 1mL ENFit oral syringes
5x BA05L ENFit adapters
1x scale (Precisa 310M)
2x bottles of Simple Syrup (Halmed)
1x 100mL measure
1x conical flask for disposing liquid into
Computer with Excel spreadsheet

Data analysis	Bottle 1 1mL syringes	Bottle 2 2.5mL syringes	Bottle 3 5mL syringes	Bottle 4 10mL syringes	Bottle 5 Mix syringes
Number of doses withdrawn	93	38	18	10	27
Volume of syrup withdrawn from bottle (mL)	92.9	95.0	93.0	93.3	94.3
Discrepancy per 100mL (mL)	7.1	5.0	7.0	6.7	5.7
Discrepancy per withdrawal (mL)	0.08	0.13	0.39	0.67	0.21
Weight of syrup remaining in the bottle (unable to remove) (g)	4.45	4.83	4.07	2.96	4.86
Weight difference of ALL syringes (weight remining in tips) (g)	2.25	0.88	3.45	2.85	2.32
Discrepancy per 100mL (%)	7.1%	5.0%	7.0%	6.7%	5.7%

Table 1. Summary of results

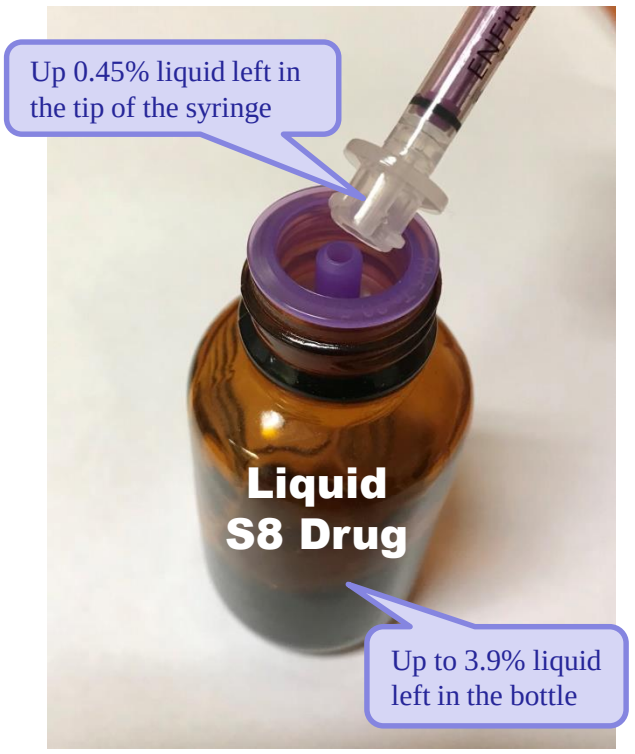

Figure 1. 100mL bottle with a ENFit adapter (BA05L size) insitu

Figure 2. ENFit oral syringes. Left to right: 1mL, 2.5mL, 5mL and 10mL

Results

Gravimetric analysis confirmed that a portion of liquid remained in the tips of oral dispensers. The weight and volume of liquid remaining in the tip increased with the size of the oral dispensers. The weight and volume of the missing liquid was found to proportionally increase as the number of doses withdrawn increased with the largest discrepancy seen in bottle 1 (7.1%). See Table 1.

Conclusion

The expected discrepancy using ENFit is up to 7% of the initial volume depending on the size of the oral dispensers used and the number of doses withdrawn.

Implications for practice

Using an adapter with oral syringe is the most accurate technique for withdrawing liquid medication.[1]

A discrepancy of up to 7% can be expected when recording S8 liquid medication in inpatient registers.

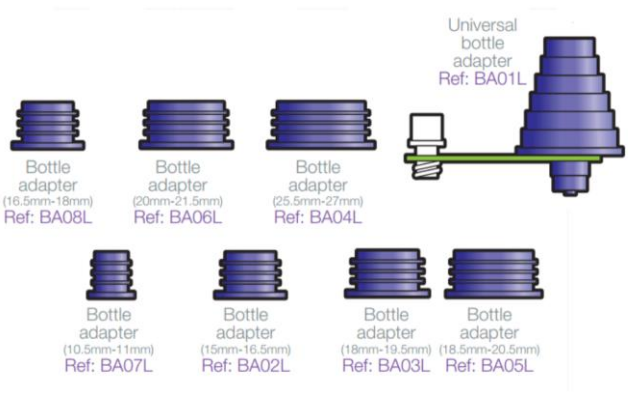

Figure 3. ENFit adapter sizing guide

Acknowledgments

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Reference

1. Santoro, V.A., Hilmi, S.C., Hort, A.L. and Jenkins, B.G., 2013. Management of Controlled Drug (Schedule 8) Liquid Discrepancies to Achieve Best Practice. Journal of Pharmacy Practice and Research, 43(3), pp.194-197.