Trialling a weight-based method for confirming balances of oral liquid controlled drugs

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Background:

To meet legislative requirements in Australia, the balance of controlled drugs (CDs) must be confirmed after each transaction.[1-4]

To ensure this requirement is met for liquid CDs, health organisations have implemented methods including the use of visual aids or conversion of bulk formulations to individual unit doses.[1,5-7] These methods have a number of limitations therefore this study aimed to evaluate a trial of a weight-based method for confirming oral liquid CD balances packed in multi-dose containers.

Objective:

To develop and evaluate a weight-based method of confirming oral liquid CD balances when packed in multi-dose containers.

Action:

Morphine mixture 5mg/1mL, 200mL (Mundipharma®) was selected for the trial in a single hospital ward. The new process involved weighing the bottle before and after each transaction (**Figure 1**). The weight was converted to volume using a locally developed computer application (**Figure 2**) which took into account the bottle weight, cap weight, adaptor weight and the density of the liquid being measured. The trial was accompanied by a quick-reference guide, face-to-face education and a demonstration video for nursing staff.

Suitable transaction tolerance was determined prior to go-live based on 80 test transactions. Test transactions were undertaken using the same multi-dose container and consumables that were to be used in the trial.

Post-implementation, nursing staff who participated in the trial were invited to provide feedback via an anonymous online survey.

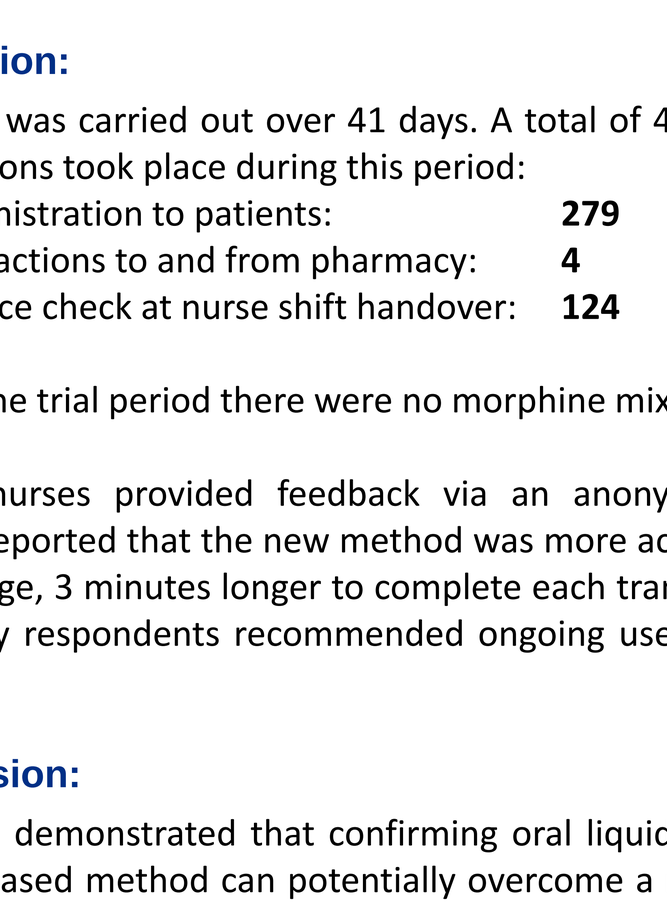

Figure 1: Weight Based Method for confirming CD balances

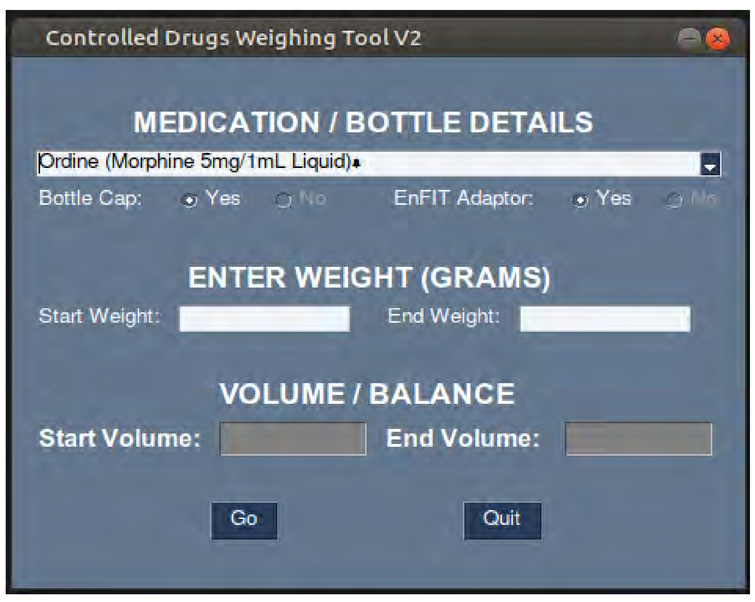

Figure 2: Locally developed computer application used in the trial

Evaluation:

The trial was carried out over 41 days. A total of 407 morphine mixture transactions took place during this period:

- Administration to patients: **279**
- Transactions to and from pharmacy: **4**
- Balance check at nurse shift handover: **124**

During the trial period there were no morphine mixture discrepancies.

Eleven nurses provided feedback via an anonymous online survey. Nurses reported that the new method was more accurate although took, on average, 3 minutes longer to complete each transaction. Overall, 56% of survey respondents recommended ongoing use of the weight-based method.

Discussion:

This trial demonstrated that confirming oral liquid CD balances using a weight-based method can potentially overcome a number of limitations of commonly used alternatives.

Depending on the context, the preferred method to confirm oral liquid CD balances may differ. Characteristics of three different methods that can be considered are summarised in **Table 1**.

It should be acknowledged that this trial took place using a single medication in a ward that frequently uses liquid CDs. Further study in areas with infrequent liquid CD use may be required. Research is also needed to determine acceptable tolerances for medications with differing viscosities to that included in this study.

Table 1: Comparison of different methods of confirming CD transaction balances

	Method	Precision	Training Complexity	Cost	Advantages	Limitations
A	Weight-Based	High	High	Intermediate	• Potential for future integration with electronic registers or medical records • In-built electronic logging of each CD transaction may assist when investigating discrepancies • Liquid CD loss due to spillage can be quantified • Liquid CD overfill can be quantified	• Requires development and ongoing maintenance of computer application • Novel process and concept. Additional training and education likely to be required • May require more time to complete a transaction
B	Visual Aid	Low	Low	Low	• Cost effective • Simple to implement and scale	• Unable to detect small discrepancies • Discrepancies may not be identified until the bottle is empty • May not be able to accurately account for overfill • Difficult to quantify CD loss due to spillage
C	Unit Dose	High	Low	High	• May prevent some forms of diversion and tampering • Challenges associated with quantifying overfill and spillage avoided • Simple process for confirming CD balance (count the number of unit-doses)	• Logistical considerations (additional CD storage and inventory requirements) • Possible medication safety concerns (look-alike packaging)

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