Validating the accuracy of the Doser™: A replication study

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The Doser™ (MEDITRACK S. Easton, MA) is a commercially available medication tracker (see Figure 1) that uses a microcomputer to record the number of times per day that a metered-dose inhaler (MDI) is activated, providing patients the ability to track daily doses even when they are using a MDI without a self-contained counter. In addition, the Doser™ has a 30 day memory and can be programmed to alert the user when the MDI is nearly empty.

When the Doser was released in the1990s, a rigorous validation study was conducted by Simmons and colleagues[1] at five sites in the United States and Canada to test the accuracy of the Doser™ using different medication canisters under controlled clinical, and real-life, situations. Agreement with measures was high and few mechanical errors occurred in this study. As no additional validation studies have been reported since 1998, we conducted this project to replicate two of the validation studies reported by Simmons.

Table 1.

	Day 1	Day 2	Day 3	Mean	S.D.	Rank Sums
Actual activations	23	23	24	23.33	0.5774	17.5
Recalled at 4 days	23	23	24	23.33	0.5774	17.5
Recalled at 8 days	23	23	22	22.66	0.5735	10

In the first study, a Doser™ was attached to a MDI trainer (placebo) and was actuated a set number of times in succession over a consecutive three day period to approximate one-third of the canister's content (~70 activations). The number of actuations and doses remaining, as displayed by the Doser™, were recorded on a diary card and then entered into an Excel spreadsheet. Four and eight days after the study was completed, the daily totals were recalled from the Doser™ memory. As seen in Table 1, the MDI with Doser™ was activated 23 times on Days 1 and 2 and 24 times on Day 3 (actual activations). Variation in the actual number of actuations occurred on Day 3 at the 8 day recall period: instead of displaying the value of 24, the device recalled a value of 22.

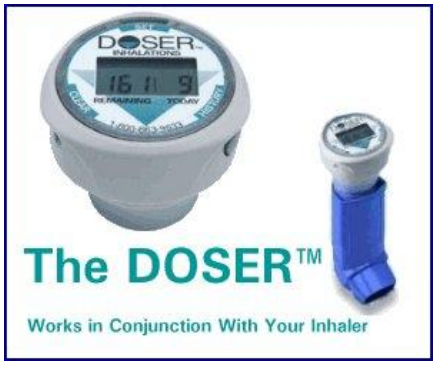
In the second study, the trainer MDI was carried in pants pockets or a backpacks and was actuated in the morning and in the evening for 28 consecutive days according to a predetermined protocol created by a random number generator. The number of actuations and doses remaining, as displayed by the Doser™, were recorded on a diary card and then entered into an Excel spreadsheet. On the 30th day, or two days after the study was completed, the daily totals were recalled from the Doser™ memory. In this second study, there was no discrepancy in the number of actual activations compared to the number of activations recalled from the memory.

To analyze these results, we conducted a chi-square test and a Kruskal-Wallis rank sum analysis of variance (ANOVA). When a chi-square goodness of fit test was conducted, the X^2 (3)= 0.1818, demonstrating a p-value of .02. The Kruskal Wallis test statistic was 1.666 (2) and a non-significant p value of $0.30 < p < 0.50$). Those results suggest no significant difference between the samples. In conclusion, although there was some minor variation between actual and recalled activations, this study validates the accuracy of the Doser's™ memory.

Reference

Simmons MS, Nides MA, Kleerup EC, Chapman KR, Milgrom H, Rand CS, Spector SL, Tashkin DP. Validation of the Doser, a new device for monitoring metered-dose inhaler use. Allergy Clin Immunol. 1998 Sep;102(3):409-13.

Figure 1. .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