

Measuring Topical Medication Adherence: Validation Study of An Electronic Monitoring Cap



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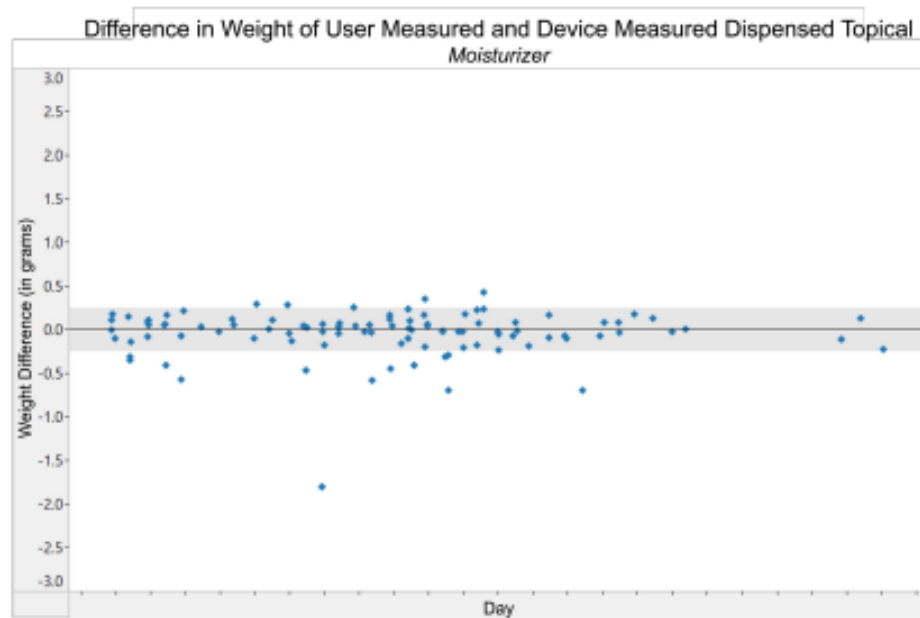


Figure 1: The differences in the weight of the moisturizer dispensed by the user versus the device over the 14-day study period.

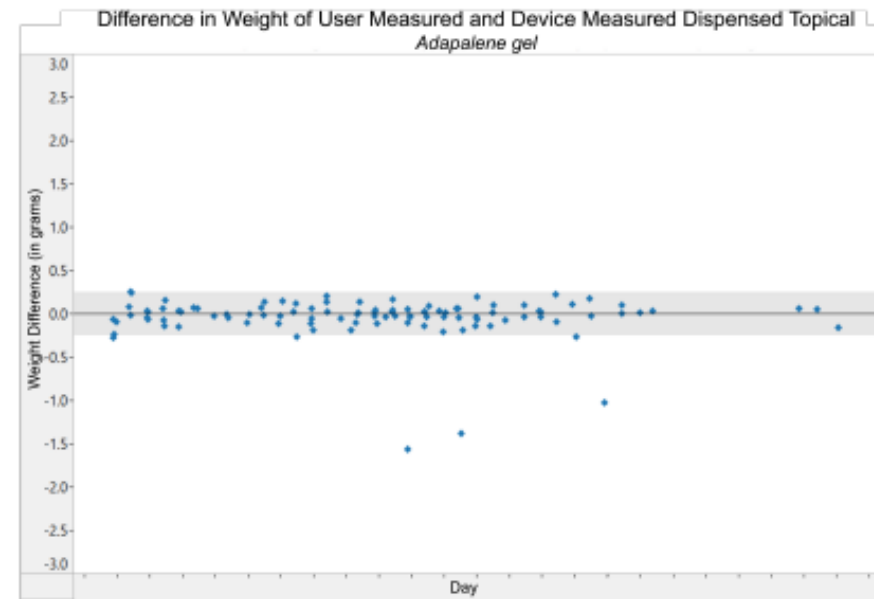


Figure 2: The differences in the weight of the adapalene gel dispensed by the user versus the device over the 14-day study period.



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Introduction

- Non-adherence occurs in approximately one-third to one-half of dermatological patients¹, and topical medications lack a standardized method of dosage administration.²
- In such cases, inappropriate dosage (using too much or too little) is an important cause of treatment failure, and measurements of adherence for topical medications should consider the amount of medication administered.²

Purpose

To assess a novel adherence tracking device for the accuracy of the weight of medication dispensed, time of dispense, and temperature at dispense for use in clinical and research settings.

Methods

- Five test users tested two electronic monitoring devices (EMD); one with a vicious moisturizer and one with adapalene gel.
- Each user administered 2 fingertip units (FTU) twice per day for 14 days. Users did not travel with the adherence devices.
- The EMDs were connected to a mobile app with iOS compatible software and synced at each dose.

Outcomes:

- Amount dispensed (change in weight of device with topical tube attached before and after dispense)
- Time at dispense
- Ambient temperature at dispense

Outcomes recorded by the device were compared to the manually reported user values.

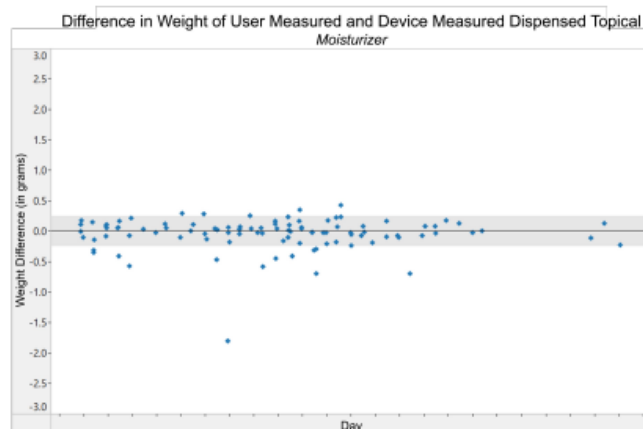


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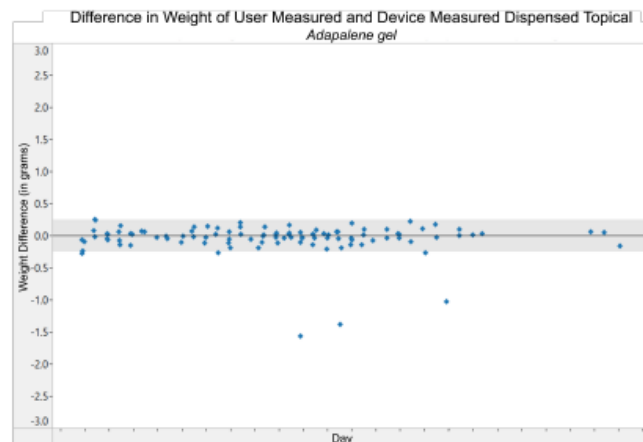


Figure 2: The differences in the weight of the adapalene gel dispensed by the user versus the device over the 14-day study period.

Results

- 208 dispenses were recorded over 14 days (98% of dispenses)
- Cohen's kappa was conducted to evaluate for agreeability between user-recorded and device-recorded measures for the three outcomes (in parenthesis) where values greater than 0.81 represent strong agreement.
 - Weight was within 0.5 FTU in 94% of instances (0.96)
 - Time was within 3 minutes in 95% of instances (0.98)
 - Temperature was within 3 degrees Celsius in 97% if instances (0.96)

Discussion

- With the development of advanced topical treatments for dermatological conditions, monitoring and managing adherence to topical treatments becomes even more critical.
- Electronic devices combined with a mobile application app allow patients to track and adjust their adherence and provide insight for clinical interventions.
- Further research in clinical and real-world settings will allow for validation of the value of the electronic monitors, beyond the controlled conditions in which they were tested in this study.
- Additional parameters including user experience and clinical satisfaction should be assessed to provide a comprehensive picture of the viability of the solution.

References:

1. Greenlaw SM, Yentzer BA, O'Neill JL, Balakrishnan R, Feldman SR. Assessing adherence to dermatology treatments: a review of self-report and electronic measures. *Skin research and technology: official journal of International Society for Bioengineering and the Skin (ISBS) [and] International Society for Digital Imaging of Skin (ISDIS) [and] International Society for Skin Imaging (ISSI)*. 2010;16(2):253-258. doi:10.1111/j.1600-0846.2010.00431.x
2. Osborne JE, Hutchinson PE. The importance of accurate dosage of topical agents: a method of estimating involved area and application to calcipotriol treatment failures. *Journal of the European Academy of Dermatology and Venereology: JEADV*. 2002;16(4):367-373. doi:10.1046/j.1468-3083.2002.00432.x