

Use of Personal Motion, Light, and Temperature Loggers to Verify Continuous Wearing of Personal Exposure Monitors

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One problem with the use of personal exposure monitors is possible non-compliance by wearers. This study evaluated the utility of small light weight data logging devices in assessing wearer behavior and compliance. The data loggers used were small electronic instruments that recorded measurements of temperature and relative humidity (RH); light intensity; and motion (on/off state changes) (Hobo® models HLI, H08-003-02, H06-003-02, Onset Computer Corporation). The study population consisted of 17 asthmatic children, ages 9-18, participating in the Alpine Asthma Study (NIH, NIEHS # ES-06214-06A2, PI Ralph Delfino). Each subject wore a personal particulate monitor (pDR-1000, MIE Inc.) during waking hours for 14 consecutive days. The data loggers were fastened to the monitor. From daily questionnaires, 11 episodes were identified where the subject admitted not having worn the sampler. In order to evaluate the utility of each logger in identifying these admitted episodes, metrics of the data from each data-logging device were computed and compared to equivalent time periods before and after each episode. The motion detection data loggers provided the most discriminating and useful information in verifying subject-reported non-compliance. The average count of motion events per 15-minute time block during each episode was always <1, while counts before and after episodes were always > 10 (median 57 and 39, respectively). For light intensity (indoor episodes only) 10 lumens proved to be the most discriminating cut-point (100% of episodes had no reading greater than 10 lumens, whereas 12% of the periods before and after the episodes also had no readings > 10 lumens). Temperature and RH were not useful for verification, although there were clear correlations with reported locations. In conclusion, as personal exposure devices become more portable and widely used, the use of these inexpensive data-logging devices will aid in compliance verification.