Assessing Toxic Airborne Nicotine Concentrations from the Use of Electronic Vapor Products (EVPs) in Public Middle and High School Bathrooms to Quantify Youth Exposure

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Although e-cigarettes have rapidly proliferated within our youth communities and supplanted cigarettes as the primary means of nicotine consumption across the United States over the past decade, evolving research has yet to definitively assess the extent to which youths may be exposed to potentially toxic e-cigarette secondhand aerosols. A particular site of frequent student e-cigarette use are public school bathrooms, which educators nationwide have indicated can become highly polluted with e-cigarette aerosols throughout the school day, warranting quantification of the potential risk posed to “non-vaping” bystanders. The research described herein attempts to clarify this developing public health crisis by conducting a series of air sampling surveys within local middle and high schools to measure the concentration of airborne nicotine produced by e-cigarettes. Using a novel active sampling system designed to be secure from student tampering, as well as conventional passive nicotine monitors, airborne nicotine concentrations were measured at 18 bathrooms at the middle and high school levels. Subsequent analysis revealed significantly elevated nicotine levels in high school bathrooms compared with middle school bathrooms, but not between girls’ and boys’ bathrooms. Furthermore, a paired t-test comparison between samples taken actively and passively in a model bathroom indicated no significant difference between the effectiveness of the two sampling strategies. However, the very presence of nicotine in the bathrooms tested supports the hypothesis that secondhand nicotine concentrations will exceed background levels, and prefigures the efficacy of such sampling methodologies in an environment such as a public school bathroom in assessing bystander nicotine exposure.

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