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## **322 Quantitative assessment of US home care aides' respiratory exposures during residential bathroom cleaning and disinfecting using household products**

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**Introduction:** In the USA, home care (HC) aide visits to clients' homes typically involve cleaning and disinfecting (C&D). Some ingredients in household C&D products are associated with respiratory illness: sodium hypochlorite (bleach), quaternary ammonium compounds (QACs), and volatile organic compounds (VOCs). This study assessed quantitatively HC aides' airborne exposures during bathroom cleaning using conventional and "green" C&D products.

**Methodology:** Aides performed C&D tasks in a simulated residential bathroom constructed in an environmental air sampling laboratory. Breathing zone samples were collected according to a balanced experimental design; each aide performed two 20-minute cleaning sessions using one of three C&D spray products (bleach-based, 1-5% sodium hypochlorite by weight; QACs-based, 0.1 – 1%; and "green," 0.5% thymol).

**Results:** We completed 169 air sampling sessions with 22 aides. VOCs were generated by all products: QACs-based mean total VOCs (TVOC) concentration was 1,210 ppb; bleach-based mean TVOC 593 ppb; and green TVOC 498 ppb. Seven VOCs were quantified above the limit of detection in 50% or more of whole air canister samples: acetaldehyde, acetone, chloroform, d-limonene, alpha-pinene, ethanol, isopropanol. Only the QACs-based product generated QACs: Benzalkonium chloride (BAC)12 (6975 ng/m<sup>3</sup>), BAC14 (2971 ng/m<sup>3</sup>), BAC16 (782 ng/m<sup>3</sup>); the 3 QACs combined (10857 ng/m<sup>3</sup>). When using the bleach-based product, 13 aides (65%) experienced peak chlorine exposures above the US OSHA Permissible Exposure Limit ceiling limit (1 ppm).

**Conclusions:** During typical bathroom cleaning with household C&D products, HC aides can generate airborne exposures that present respiratory health risks. Use of a spray bleach product can produce over-exposure to chlorine.