

Prototype for safer, child-resistant spray bottle

September 12 2012



Researchers at Nationwide Children's partnered with the Department of Design at the Ohio State University to design the new child resistant spray bottle. Credit: Nationwide Children's Hospital

Researchers at The Research Institute at Nationwide Children's Hospital, in partnership with The Ohio State University have developed a prototype for child-resistant spray bottles for household cleaning products. If produced, the prototype would provide an alternative to current, more harmful child-resistant spray bottles while still meeting U.S. Consumer Product Safety commission standards for child resistance.

A Nationwide Children's study* in 2010 revealed that spray bottles were the most common source of exposure to injury in an estimated 267,269 children 5 years of age or younger treated in U.S. emergency departments for household cleaning product-related injuries between 1990 and 2006. These spray bottles are the largest dispensing system type by volume in North America, commonly used for household cleaning and garden products.

The study, led by Lara McKenzie, PhD, principal investigator in the Center for Injury Research and Policy at Nationwide Children's, was the basis for the spray bottle prototype.

"Existing spray bottles for household cleaning-products cannot be designated as truly child-resistant," explained Dr. McKenzie, also a faculty member at The Ohio State University College of Medicine. "While many spray bottles contain a nozzle that controls the stream configuration or closes the spray bottle, these nozzles are not effective if the user does not turn the [nozzle](#) back to the 'closed' or 'off' position after each use. These nozzles are also relatively easy for young children to manipulate on their own."

In a [pilot study](#) including 25 families of young children, Nationwide Children's investigators found that 75 percent of the nozzles on the cleaning product spray bottles were not in the "closed" or "off" position and therefore posed a potential hazard to young children in the household.

To develop concepts and design a child-resistant spray bottle, Dr. McKenzie's research group partnered with Professors Carolina Gill, MS, BSID, and Scott Shim, MA, BFA, from the Department of Design at The Ohio State University and Professor Blaine Lilly, PhD, from the Department of Mechanical and Aerospace Engineering at The Ohio State University. Together, they developed a distinct method for making

spray bottles essentially unusable by children younger than six years of age.

"The two-stage trigger mechanism design restricts the ability of young children to trigger spray bottles because they lack the development capability to perform the correct operational sequence and because their hand size and strength are not sufficient to activate the mechanism," said Dr. Lilly. "The spray mechanism is designed to be extremely challenging for young children to operate, yet will allow adults comfortable use."



The spray mechanism is designed to be extremely challenging for young children to operate, yet will allow adults comfortable use. Credit: Nationwide Children's Hospital

Most notably, the prototype features a two-stage trigger mechanism that must be sequentially engaged in order for the spray mechanism to function. The spraying mechanism then automatically returns to a locked

state after each use without requiring the user to consciously apply a locking feature, setting it apart from any other existing technology.

"Our long-term goal is to reduce the number of household cleaning product-related injuries in [young children](#) through widespread adoption of our product," said Dr. McKenzie. "This technology may set a new 'gold standard' for child safe spray bottles."

Now that the prototype has been finalized, the team plans to identify commercial partners to bring the technology to the public sector. Both the mechanism and design of the spray bottle are patent-pending and available for licensing.

More information: *McKenzie LB, Ahir N, Stolz U, Nelson NG. Household cleaning product-related injuries treated in US emergency departments in 1990-2006. *Pediatrics*. 2010 Sep; 126(3):509-16.

Provided by Nationwide Children's Hospital

Citation: Prototype for safer, child-resistant spray bottle (2012, September 12) retrieved 26 April 2024 from <https://medicalxpress.com/news/2012-09-prototype-safer-child-resistant-bottle.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--