Childproof Medicine Containers, Are They Really Childproof?

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December 7, 2012
Abstract

In this experiment I will be using two over the counter pills bottles, a liquid medicine bottle, and a prescription bottle. The liquid bottle and the prescription bottle are new and have never had any medicine in them. The two over the counter bottles will be empty of medication and cleaned so that no residue remains for the children to be exposed to. Each product has a different looking safety cap which also works slightly different from the others. This will allow me to see how different containers measure up.

This experiment will use test subjects in the age range of 5-7 years old. They will be given 1 minute to try to open each childproof safety container. Whether they can open the container will be noted with a yes or no. If they could not open the container within the 1 minute time frame then, without speaking, they will be shown how to open the container and given another minute to try and open it. Whether they can open it, after the demonstration, will be noted with a yes or no. I will use 20 test subjects. I will determine the percent of total test subjects able to open the container by taking the total number of test subjects able to open the container divided by the total number of test subjects and multiplying it by 100. The parents will be given a consent sheet to sign giving permission for their child to participate in this experiment. I will also remind the test subjects about medication safety and warn them to never take medications without a parent’s permission.
Research Plan

1. Why do accidental poisonings happen? They happen because some children can open medicine containers and some adults accidentally live out their medicines and children pick them up and eat them.

2. Why are medicines placed in child-proof containers? They are so children will not be able to get into medicine containers.

3. Why are hazardous materials placed in child-proof containers? Some medicine in medicine containers are hazardous.

4. How do accidental poisonings take place? Medicines or medicine containers are left out and children get into them.

5. How does a child-proof safety cap work? You can open child-proof medicine containers by pushing down on them and then turning them.

6. How do child-proof bottles protect children? They protect children because they have a two-part mechanism and most children can’t do two things at one time.

7. Who needs to use child proof safety caps? People with children in their house.

8. Who invented child proof safety caps? Dr. Jay Arena

9. Who benefits from using child proof safety caps? The children that try to get into medicine containers because they don’t get poisoned.

10. What are child proof safety caps made of? Molded plastic

11. What types of materials are put in child proof containers? Threads and plastic

12. What is the success rate of child proof safety caps? 22%

13. When were child proof safety caps required on hazardous medicines? 1970

14. When were the child proof safety caps invented? 1940

15. When are you old enough to not require a child proof safety caps? There is not an exact answer but usually you are not able to open child proof safety caps until the age of five.

16. Where can you get child proof safety caps? You can get them anywhere on medicine bottles.

17. Where can you find information on child safety caps? On the internet
Research

Today most households have someone taking medications. These medications can be very dangerous if they get into the hands of children. Even with the invention of childproof caps and safety warnings, the number of accidental drug poisonings among young children surged 22% from 2001 to 2008, according to a study in the Journal of Pediatrics. The reason for this increase is the number of medications taken by both children and adults today. In a study of 453,559 children age 5 or under, the study found 55% of the cases involved children getting the medicine on their own. Another 40% was from accidental consumption of over the counter products, and about 5% were due to medication dosing errors. The statistics show how important it is to keep children away from medications. The childproof safety cap is a step in the right direction to help prevent children from getting into medicines.

Childproof safety containers are used for most over the counter products, some household cleaners and prescription medicines you receive from the pharmacy. Over the counter medicines are products like Tylenol, Motrin and other products you can go into the store and buy without a prescription. It is very important that households with children get childproof safety caps on all their medications. In the mid 1940’s, manufacturers began making aspirin taste better so that children would take it and not spit it out. The problem with this was that children would often mistake it and its sweet taste for candy. Dr. Jay Arena, a pediatrician at Duke Hospital in Durham, North Carolina, was already focusing on child poisonings and became upset when he noticed the number of children coming into the hospital after taking too many “candy” aspirin. He contacted the maker of the aspirin and suggested that they make a top, for the bottle, that would be easy for parents to open but hard for children to open. As a result,
Saint Joseph’s aspirin became the first product sold in a container with a safety cap. It became mandatory in the United States in 1970 as part of the Poison Prevention Packaging Act (PPPA). The goal of these containers is to allow adults easy access while making it difficult for children to open.

The childproof safety containers are made of molded plastic. The cap has internal threads for joining a similarly threaded neck of the container. The cap is put on the container in the usual manner until the inwardly extending rim of the container engages the bead below the threads on the container. After the rim has passed over the bead, it snaps down into place making an audible sound or click. The cap is now in full operative position on the container. If a child tries to remove the cap, it may move a little but it will not come off. Only a person with enough strength and knowledge of resistance can remove the cap.

Much research has gone into whether childproof safety caps help prevent poisonings in children. Dr. Shari Platt, head of the pediatric emergency department at New York Presbyterian Hospital, has studied child resistant caps and she says more than a million children are accidentally poisoned every year often by household products and medicines that came in child-resistant containers. “Parents think that the safety cap is going to give them 100% security” Platt says. “They don’t realize how easily children can get into these medicines but they do”.

A study done by Susan Koeppen of CBS news tested the ability of children ages 3-4 to get into 7 different childproof containers. The bottles contained products such as iron pills, mouthwash, drain cleaner, Tylenol, aspirin and cough syrup. The bottles were emptied and sanitized before they were given to the children to try and open. With the parents watching, Koeppen conducted the experiment and the kids were able to open 3 of the 7
bottles, including the bottle that contained iron pills. Iron is one of the most
deadly and poisonous products for children. It took only 1 second for a 4 year
old to open that bottle.

Childproof safety containers are not 100% effective in preventing
children from getting into medications or other dangerous products. They are
only one part of the equation. The Centers for Disease Control has started a
program to help decrease the number of accidental drug poisonings. It is
called the “Up and Away and Out of Sight” program. It asks that you store
medications in a safe, secure place out of the sight of young children and that
you never refer to medicine as “candy”. Ask guests and babysitters to make
sure they put their purses and bags that contain medicine up and away when
visiting. Always close child-resistant caps on bottles every time you use them
and keep them out of sight. Also, parents should avoid taking medications in
front of children because they like to imitate grownups.

Due to the increase in the use of medications, both prescription and over
the counter, every effort should be made to make sure that children are
protected from the dangers these products present. Everyone from the drug
manufacturers to the parents and caregivers are responsible for keeping
medications out of the hands of children.
Question:
Are childproof medicine containers really childproof?

Hypothesis:
If I give twenty children one minute to open each of the following containers: an anti-diarrheal container, an allergy container, a prescription pill bottle, and a liquid bottle with childproof safety caps over one-half of the children will not be able to open the containers after one try because of the two part safety mechanism that is part of the design of the childproof safety cap.

Why I chose this topic:
My mom is a pharmacist and this project seemed very interesting to me. I find opening childproof containers difficult so I wanted to find out if children ages 5-7 would be able to open these containers.

Materials:
Test Subjects, Ages 4-7 (20) Male and Female
Table
Timer on the Ipad
Notebook
Pencil/pen
Laptop computer
Childproof containers, emptied and cleaned (1 of each)
An over the counter anti-diarrheal medicine
An over the counter allergy medicine
A prescription pill bottle
A prescription liquid bottle

Independent Variable:
The type of childproof safety cap

Dependent Variables:
The time it takes to open the container
Whether they can open the container or not

Constants:
The childproof safety containers
The age of subjects
The amount of time given to complete the task

Control:
The over the counter allergy medicine container
Procedure:

1. Set the room up with the four containers sitting in front of the subject.
2. Have the subject sit across from you and explain what you are doing.
3. Explain that you will give them one minute to try to open the bottle.
4. Give the 1st container to the subject and say “Go”.
5. If subject is able to open the bottle record the amount of time it took them.
6. If they cannot open the bottle say “Stop” when one minute it up.
7. If they did not open the container, without speaking, show them how to open it by demonstration and repeat the process.
8. If they have not opened the bottle after one minute say “Stop” and record that they could not open the bottle.
9. Repeat steps 4-7 with each of the 4 bottles.
10. Thank the subject and dismiss them.
11. This is done with each of the 20 test subjects.

Missing.....student will send on Monday

1. Data Tables
2. Graphs
Analysis of Data

This experiment used four different medication containers. Each container used a different safety mechanism for opening. Each containers cap had directions on how to open them printed on the top. The test subjects ranged in age from 5-7 years old. Both males and females were represented. Both non-readers and readers were represented.

The analysis of the data shows that Container 2 was the easiest to open followed by Container 1, 4, and 3, respectively. Three containers were able to be opened after the test subjects were shown how to open them without any verbal directions. Those were Containers 1, 2, and 4. Container 3 proved to be the most difficult for the subjects to open. The safety mechanism for Container 1, 3, and 4 required that the subject push down on the cap and turn at the same time. The safety mechanism for Container 2 required that the subject squeeze two points on the cap and turn at the same time. Most children in this age range do not have the ability to perform both functions at the same time which was demonstrated during the experiment. The over the counter products proved to be easier to get into with Container 1 allowing 55% to open and Container 2 allowing 75% to open. Container 3 is a bottle used behind the pharmacy counter to put prescription medications in.

Conclusion

The results of the experiment show that childproof safety containers are not always childproof. The ability to get into the safety container is dependent on the mechanism used by the manufacturer. Container 1, an over the counter anti-diarrheal medication, was opened by 45% of the subjects during the first try. After being shown how to open the container 55% of subjects were able to get the safety cap open. This container required the subject to push down and turn the top at the same time. Container 2, an over the counter allergy medication, proved to be the easier to get into. According to the directions on the top, it required that the subject squeeze two spots on either side of the top and turn. However, observation proved that the cap was able to be opened without squeezing the spots without much difficulty. Container 3, a
prescription bottle, was the most difficult to open. The mechanism required that the top be pressed down and turned at the same time. The bottle was very difficult to open. Only 10% of subjects were able to open the container and not a single test subject was able to open after being shown how to open it. This container required a lot of strength which most kids at this age do not have. The last container, number 4, was a liquid prescription bottle. This container used the same mechanism as containers 1 and 3. It was slightly more difficult than Container 1 but much easier than Container 3. Out of 20 test subjects 15% were able to open after the first try and 40% were able to open it after being shown how.

Even though each container had the directions printed on the top telling how to open it. Only 3 test subjects noticed them, of the three only one was able to open it based on reading the directions. Females were able to open Container 1 more than males. Container 2 proved to be similar between boys and girls. Only boys were able to open Container 3. Container 4 was similar between boys and girls as well. Therefore, gender didn’t appear to be a factor when testing the ability to access childproof safety caps. Age did prove to be important. Of the test subjects only 3 five year olds were able to open any container and it was Container 2, the easiest for all age groups. The six year olds were next with 11 subjects able to open three of four containers. The seven year old group was able to open all four containers. This demonstrates how age is a factor in childproof safety containers. As children get older, they have more coordination and are stronger which is important when opening these containers. Showing the test subjects how to open the container, without verbal instructions, did not prove to increase their ability to get into the container.

This experiment has shown that childproof safety containers are not childproof past the age of 5. The over the counter products are easier to open than the prescription bottles. This is a disturbing fact considering the number of childhood poisonings in the United States every year.
Applications:

Every year thousands of children are seen in the emergency room due to accidental poisoning from medications. In fact, medicine is the leading cause of child poisonings in the United States. This problem costs millions of healthcare dollars. The government requires safety caps on medications to try and prevent this, but children can often open these containers without much difficulty. Parents and caregivers need to be educated about the dangers of children getting into medications and taking them. This project will help determine if children ages 5-7 are capable of opening four different types of childproof safety containers. Studies such as this can help everyone become more aware of the efficacy of childproof safety containers.
Works Cited


