SAFE KIDS WORLDWIDE®

Medicine Safety: A Key Part of Child-proofing Your Home

March 2019

WHERE DO YOU KEEP YOUR MEDICINE

Our research suggests parents know they need to store medicine safely, but many also keep medicine within reach in places like purses and on nightstands and counters.

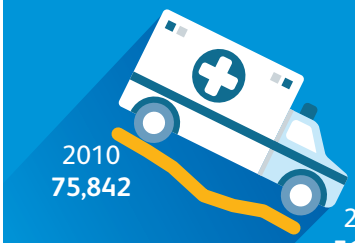
Remember to keep all medicine up and away, out of children's reach and sight.

SAFE KIDS WORLDWIDE

The Facts about Medicine Safety and Children

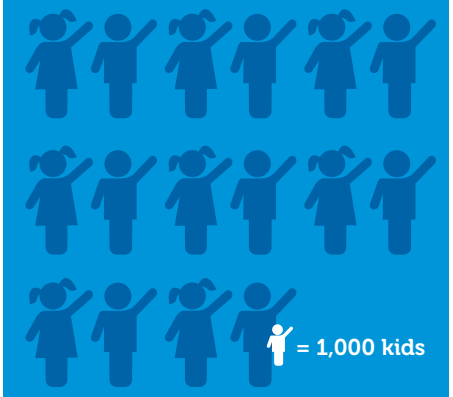
Sales of prescription and over-the-counter medicine in the U.S. increased by 22% between 2010 – 2016.

At the same time, ER visits for medicine poisoning for children under age 6 decreased by 32%.



And calls to poison control centers for medicine poisonings decreased by 20%.

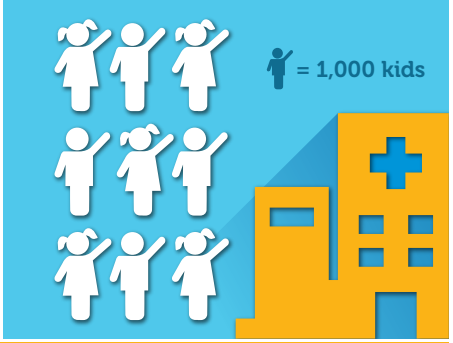
Still, nearly **52,000** children under age 6 were treated in ERs for medicine poisonings in 2017.



That's 1 child every 10 minutes.

84% of those kids were between 1 and 3 years old.

And nearly 9,000 were hospitalized.



How to Keep Kids Safe Around Medicine

- Keep medicine and vitamins out of children's reach and sight, even medicine you take every day.
- Kids can surprise you at any age, so make sure to keep medicine safety on your child-proofing checklist.
- Save the Poison Help number in your phone and post it visibly at home: 1-800-222-1222.
- Share medicine safety information with family and friends.

SAFE KIDS WORLDWIDE

Support provided by Johnson & Johnson Consumer Inc.

Executive Summary

Between 2010 and 2016, U.S. pharmacy and drug store sales of prescription and over-the-counter (OTC) medicines increased by 22 percent.[1] During that same time period, the estimated number of emergency room (ER) visits for children under age 6 who had gotten into medicine decreased by 32 percent and the number of calls to poison control centers decreased by 20 percent.[2-12] Thus, with even more medicines being sold, efforts to reduce child medicine poisoning appear to be making a difference.

While that is a trend worth celebrating, we cannot ignore the fact that there were still nearly 52,000 children under age 6 treated at an ER for medicine poisoning across the U.S. in 2017, with 84 percent of them occurring in children between 1 and 3 years of age.[3] And while not every situation is life-threatening, a significant number of them are serious, resulting in hospitalization and in some cases, death.

This report is the eighth in a series of reports produced in support of medicine safety efforts by Safe Kids Worldwide. In this report, we provide an update on trends in accidental unsupervised medicine exposures among children under age 6 and share findings from recent focus groups with parents of children in that age group, which provide insights into why, when most parents know they need to store medicine safely, so many children are still getting into medicine.

- First, parents in our focus groups feel they know their child's abilities and how and when their child might be at risk for an injury. Therefore, they often base home safety precautions around their perception of their child's level of ability. At the same time, parents shared being frequently surprised by what their child was able to do. Surprises can lead to risky situations in which children have access to medicine, including medicine that was thought to be in a safe location. In addition, medicine safety was not seen as part of an initial child-proofing plan; parents felt there were other more important safety issues to address.
- Second, in talking about safe storage, there appeared to be a distinction between where parents store medicine and where they keep it. Many parents who reported storing medicine up and away, out of reach and sight also reported keeping medicine in many locations that would be easily accessible to their children.
- Finally, parents reported storing different types of medicine differently. They did not appear to perceive that any medicine can pose a danger to young children if taken without a parent or caregiver's supervision.

These insights suggest the need for increased efforts to include medicine safety as part of child-proofing activities, including anticipatory guidance for parents as children approach the highest-risk age group of 15 to 30 months of age.[16] Education of parents around medicine safety should also include discussions around all the places a child could get into medicine because of where it is kept, even unconventional locations like purses and cars and understanding the difference between "store" and "keep." Finally, we need to find more effective ways of communicating the risk and offering practical solutions so that parents perceive how susceptible children are to medicine poisoning and feel empowered to engage in safer patterns of behavior.

Medicine Poisonings Happen Every Day

Safe Kids has monitored trends in medicine poisoning* in young children over the past eight years. In that time, the number of emergency room (ER) visits has decreased significantly from the peak in 2010, when it was estimated that nearly 76,000 children under age 6 were seen after they got into medicine (Figure 1).[2, 3] In 2017, there were just under 52,000 visits, which is a 32 percent decrease since awareness and educational efforts were stepped up through initiatives like the CDC Protect Initiative, the Up and Away Campaign and Safe Kids Worldwide's medicine safety program. In fact, in 2016, the number of ER visits was down to the lowest level in the past 12 years.[2, 3]

The number of calls to poison control centers has also decreased by 29 percent since its peak in 2009 (Figure 2).[4-12] And while this decrease is consistent with the decrease in ER visits, the American Association of Poison Control Centers (AAPCC) has indicated they are not sure how much of the decrease in recent years represents a real reduction in exposures or could be attributed to other factors.[17]

Figure 1. Despite progress, about 1,000 kids under age 6 are seen at ER for medicine poisoning each week

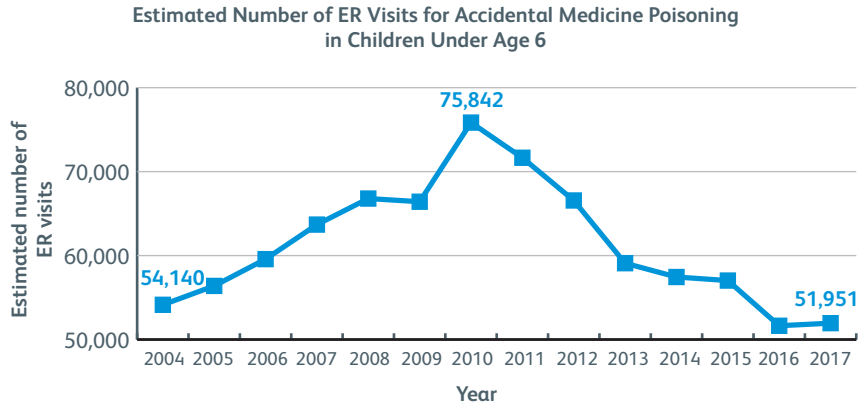
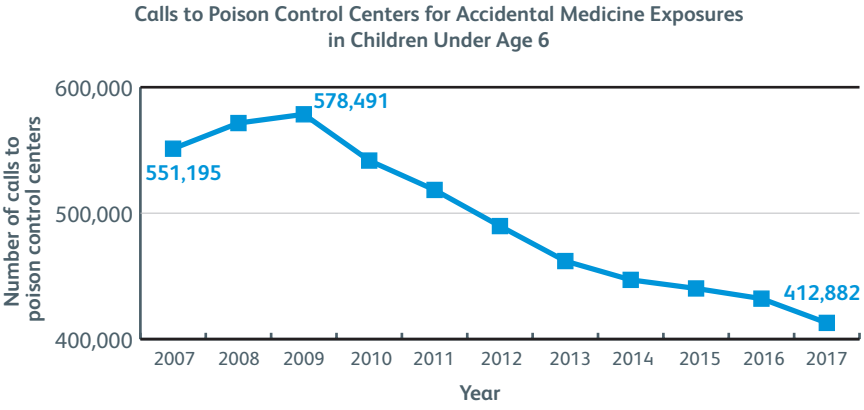


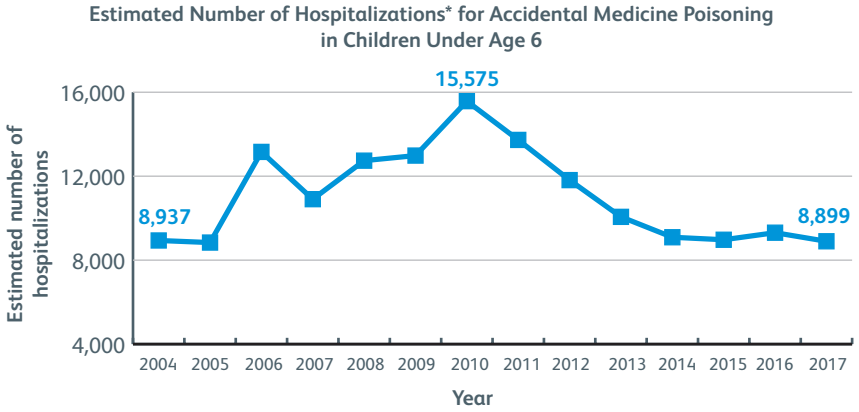
Figure 2. Calls to poison control centers for accidental medicine exposures in children under age 6 have decreased by 29 percent since 2009



* Medicine poisoning: an unintended exposure to a pharmaceutical resulting from an unforeseen or unplanned event such as a child getting into a grandparent's prescription medicine.

While these decreases are good news, the 52,000 children under age 6 still being seen at ERs after getting into medicine are the equivalent of 142 children a day or about one child every 10 minutes. And in nearly 9,000 of the ER visits, the poisoning is serious enough to require a hospital stay (Figure 3).[2, 3] Eight-four percent of the ER visits were for children between the ages of 1 and 3 years and slightly more occurred in boys than girls (55.1 percent versus 45.9 percent).[3]

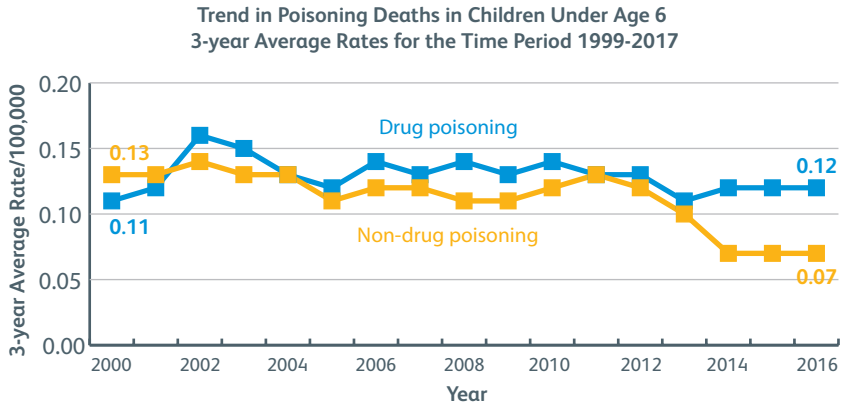
Figure 3. A child under age 6 is hospitalized almost every hour because of an accidental medicine poisoning



* Hospitalizations include inpatient admissions, transfers to other facilities and observation admissions.

Although the number of deaths is small with fewer than 20 per year, fatal poisonings involving medicine are not on the decline. While the rate of fatal non-drug poisonings† decreased by 46 percent between 2000 and 2016, the rate of fatal drug poisonings has increased by 10 percent during the same period.[18] When the 3-year average fatality rate for poisonings for the years 2015 to 2017 are compared, children under age 6 are 1.7 times more likely to die from a drug poisoning than a non-drug poisoning and this difference is statistically significant (Figure 4).[18]

Figure 4. Child under age 6 are nearly two times more likely to die of accidental drug poisoning compared to accidental non-drug poisoning



† Non-drug poisonings are those that do not involve medicine or other drugs (ICD-10 codes X45-X49) and drug poisonings are those that involve medications and illicit drugs (ICD-10 codes X40-X44).

The Thinking Behind the Behavior

Over the last eight years of its medicine safety program, Safe Kids Worldwide has conducted several studies to better understand why these medicine poisoning events happen. In 2017 we conducted a survey among parents of children under age 6 and found a disconnect between their knowledge and behavior around medicine.[19] To take a deeper dive into this disconnect and understand the thinking behind the behavior, in fall 2018 we conducted a series of focus groups with parents of children under age 6. We asked them about medicine safety and storage, particularly situations when the convenience of having medicine handy is selected over caution of keeping it in a safe location and got their feedback on current medicine safety messaging. Several valuable insights came to light that will guide future prevention messaging and education.

Surprise, Surprise

The first insight relates to how we prepare parents to think about medicine safety. Parents shared that as their babies grow and develop, they get to know them, their different preferences and personalities and their levels of ability. Parents see their child as unique and because they believe they know how and when their child might be at risk for an injury, they often base safety precautions in their home around the uniqueness of their child.

> ***"My child isn't interested in outlets, but [he is] interested in cords."***
>
> ***— Suburban mom***

> ***"I know [my children] well enough to know what I need to do to keep them safe – if they're likely to climb up and try and get into things."***
>
> ***— Urban mom***

This sense of *knowing* leads parents to think they can predict their child's skill level, and they do so successfully, until their child does the unexpected. At times, these surprises are received with a sense of amusement and pride, but other times, parents are shocked when they realize that their child can access something that has the potential to cause harm.

> ***"They're going to find something somewhere that you didn't even think about. I used to keep hand sanitizer on the changing table for when I was done. I went to grab a diaper one time and he was laid back just eating it. I had to call poison control..."***
>
> ***— Urban mom***

This sense of surprise over a child getting into something is well-documented. When a child goes to the ER after getting into medicine, parents often say that they only turned their back for a minute and they were surprised to learn their child could access off-limit items such as medicine.[19, 20]

As a young child's independence emerges and mobility rapidly increases, new injury hazards arise that require additional environmental modifications. Yet many parents are not even aware of the true risk that injuries pose or how they can prevent them.[21] Further, parents of young children often underestimate the level of their child's motor skill development (e.g., age of ability to climb) and overestimate their cognitive and sensory skills (e.g., being able to learn from past mistakes).[22, 23]

Our 2017 study looking at where medicines are kept among parents of children under 6 showed that most parents do know the importance of storing medicine up and away and out of reach and sight, but our recent focus groups suggest that there are subtleties in this message. For example, parents have different perspectives on how high is high enough and what 'out of sight' really means.[19] And parents often wait to make additional environmental changes related to safety until their child's ability to reach or get into something is revealed. Once children are mobile and able to climb on furniture, what was previously out of reach and sight can change very quickly.

To avoid the alarming surprises, experts recommend that parents start thinking about storing medicine safely from day one. However, when we asked parents about initial child-proofing in advance of bringing their child home for the first time, medicine safety was rarely included. Instead, they mentioned other precautions, such as installing safety gates, using covers for electrical outlets, locking up cleaning supplies and addressing furniture with sharp corners. When asked why medicine safety was not included, they indicated that it was never mentioned by other parents, grandparents or their doctor, and that because medicine is beneficial, unlike cleaning products, they did not think of medicine as a "poison" that needed to be kept out of reach.

Anticipatory guidance or guidance given by a healthcare provider to assist parents and caregivers in understanding the expected growth and development of their children, has been shown to improve knowledge and safety behaviors. It is also the rationale behind much of the injury prevention education delivered to parents and caregivers.[24] However, other research suggests parents can only retain a limited number of topics and only some safety practices are increased after such counseling.[25, 26] The parents in our focus groups also indicated that there are so many other things to be concerned about and they don't want to worry about something before they need to. However, when it comes to medicine safety, waiting until a child surprises you may be waiting too long.

> ***"There's so much to worry about when they're little that you don't want to worry about it until it's necessary."***
>
> ***— Suburban dad***

> ***"Because my son is so young, I take care of things as they come. As he reaches, I move things up. As soon as I notice he can reach things, I'll child-proof."***
>
> ***— Suburban mom***

Developmental Milestones and Injury Prevention

	COGNITIVE DEVELOPMENT (Learning, thinking, problem-solving)	PHYSICAL DEVELOPMENT (Movement)
0-6 MONTHS	• Begins to follow things with eyes • Uses hands and eyes together (seeing something and reaching for it) • Curious; tries to get things that are out of reach • May seem bored if activity doesn't change	• Can hold things • Brings hands to mouth • Rolls over in both directions • Begins to sit without support • Begins crawling • Begins to stand with support and pull up
6-12 MONTHS	• Watches the path of something as it falls • Puts things in mouth • Looks for things that you hide • Begins to find hidden things easily • Picks up objects with thumb and index finger • Explores environment in different ways (shaking, banging, throwing) • Follows simple directions (pick up the toy) • Begins to use things correctly (drinks from cup, put things in and takes things out of containers)	• Sits without support • Pulls to stand and walks by holding on to furniture (cruising) • Begins to stand without support • Begins to take a few steps without support • Crawls
1-3 YEARS	• Identifies common things such as apple, phone, brush, ball • Follows simple verbal directions without gestures (sit down) • Points to get the attention of others • Begins to sort things by shape and color	• Moves in and out of sitting • Walks without support • Begins to walk up steps and run • Begins climbing and jumping

Source: CDC, https://www.cdc.gov/ncbddd/actearly/pdf/checklists/Checklists-with-Tips_Reader_508.pdf

Children grow and develop very quickly in the first few years of life. *While all children under age 6 are at increased risk of medicine poisoning, research suggests that children between 15-30 months are particularly at risk because their mobility increases so rapidly.*[16]

However, it is important to note that children achieve developmental milestones at different times, with some reaching them sooner than expected. *As a result parents should anticipate the need to change where they keep medicine in advance of their child's development to avoid alarming surprises.*

This wait-and-see approach may help explain some of the disconnect previous research has found between knowledge and behavior. Parents and caregivers know that they need to make adjustments in their homes to create a safer environment for their children, but they tailor their behaviors according to how they perceive their child's abilities. Given these findings, we recommend that medicine safety messaging be included in child-proofing resources and as part of prenatal education classes. Parents should be encouraged to stop and explore all the places where they keep medicine and get into the habit of ensuring they keep medicine in places that are out of reach and sight. This precaution should be just as important as hiding loose wires, covering outlets and putting up safety gates. Guidance should also be given to parents in advance of their child reaching 15 to 30 months, a period when children are at higher risk for medicine poisoning because they are more mobile and are actively exploring their home environments.[16] Parents should be encouraged to revisit all the places they keep medicine and make changes to avoid potentially dangerous discoveries.

Where is Your Medicine: The Difference Between Store and Keep

Another key insight from our focus groups is that where parents store and where they keep medicine may be two different things. Participating parents talked about storing medicine up high, out of reach and sight and described locations that meet that definition. However, they also talked about places like backpacks, purses, diaper bags and cars where they keep medicine, that initially they did not think of when they described where they store medicine.

> ***"I think about my wife's purse. A lot of times it's on the floor and it probably has some Tylenol® in there. I wouldn't have thought of that."***
>
> ***— Suburban dad***

The places where medicine was kept were often more accessible to young children and, increasing the risk further, medicines in these locations were sometimes kept in unsafe, non-child resistant containers such as pillboxes and baggies. Data on the circumstances surrounding medicine poisoning in young children indicate that these other locations and containers are common in cases seen at the ER.[20, 27]

The distinctions appear to relate to differences in long- versus short-term storage, accessibility and convenience. Parents store medicines out of children's reach and sight when they do not need to use the medicines often, suggesting that parents are thinking of this as long-term storage. When parents are using a medicine on a more regular or daily basis or need to take more than one dose in a day, they will keep medicine in a temporary location that is convenient for them. Therefore, it is possible that some of the disconnect we see between knowledge and behavior is because parents are not thinking about purses, cars, diaper bags and backpacks as places of storage and are therefore not thinking about securing them.

While a fine line, the distinction between *storing* and *keeping* medicine, that parents made as part of our focus groups, may have implications for messaging and may help explain some of the disconnect health educators perceive between parent and caregiver knowledge and behavior. Parents and caregivers know that they should *store* medicine up high, out of reach and sight of children and behave accordingly; however, the same rules do not apply to where they *keep* medicine. Educating parents of young children, and particularly those with children ages 15 to 30 months, may be more effective in addressing this disconnect if educators include discussions around all the places a child *could* get into medicine, even unconventional locations, and avoids only using the word *storage*.

Our focus groups also suggest that parents are more receptive when specific messaging is modeled as safe behavior and is perceived as a practical solution. In other words, if a parent sees images of purses, diaper bags or backpacks being hung on hooks by the door, as opposed to being placed on the floor, they have a proposed solution ("Oh, that's what you mean by out of reach!") as part of the safety recommendation.

Different Medicine, Different Rules

Parents in our focus groups also talked about how they treated various types of medicine differently. Parents said OTC cold and flu medicine was stored out of reach and sight in the medicine cabinet or closets when not in use. However, many of the parents in our focus groups indicated that when someone was sick, they keep the medicine out on dressers, nightstands, counters, diaper bags and changing tables, so it is easy to access when needed. They also reported keeping OTC pain relievers in multiple locations because, "you never know when you'll need one" – so they might be stored in the medicine cabinet at home, but they are also in backpacks, purses, cars and diaper bags in case they are needed on the go. The in-use locations for OTC medicines aligns with research which suggests that in 3 of 5 accidental OTC medicine poisonings involving young children, the medicine involved was not in its usual or 'normal' storage location.[28]

Parents indicated that because prescription medicine often needs to be taken at specific times, it is more likely to be kept out on the counter, table, nightstand or dresser where it is in sight, so they don't forget. Frattaroli et al also found in their study of medicine storage behavior in urban homes that prescription medicine was frequently kept within reach of children and unsecured.[29] Pharmacies and pharmacists as the point of purchase for prescription medicines may offer a partial solution to this challenge. While they often focus on safe use of prescription medicines, they are also well positioned to educate parents and grandparents about the importance of keeping them out of the reach of young children.

Finally, vitamins and supplements that need to be taken every day are often built into daily routines. As a result, parents keep them on the kitchen counter, on the nightstand, on the bathroom counter – places where they know they'll be as they get ready for the day and can serve as a reminder. Yet in 2018, vitamins are among the top 25 substances with the greatest rate of increase of serious exposures and the fourth most common substance involved in exposures among children under age 6 as reported to poison control centers.[13]

It is interesting that parents seem to have different rules for different medicine because almost all medicine has the potential to cause harm if taken in large enough amounts or taken by the wrong person. For some medicines, one pill is enough to kill.[30-32] Anecdotal evidence from parents whose children have gotten into medicine suggests that they did not realize how dangerous medicine could be, and the parents in our focus groups talked about medicine as a good thing and did not associate it as clearly with, or label it as, a poison like they did with other household products, such as bleach. Because research suggests that parents are more likely to safely store products and to put them away immediately after use if they perceive them to be highly toxic,[33] it may be that drawing comparisons between medicine and other products they do see as dangerous, or relating real-life stories as part of initial child-proofing discussions may increase the likelihood that parents will understand the potential harm. This aligns with a recent review of existing evidence which suggests that strategies that change parents perceived susceptibility and vulnerability, as well as increase their perceived ability to make effective changes, offer the most promise for parent-focused prevention programs.[16]

WHAT IS CONSIDERED MEDICINE?

Parents are often surprised to hear that things like vitamins, eye drops, nasal sprays and diaper cream are poisonous and pose a risk to children.

Yet multivitamins with iron can damage the stomach and intestinal lining[13] and eye drops and nasal sprays can cause vomiting, lethargy and coma.[14] Depending on the formulation, products used to treat diaper rash creams can cause nausea, vomiting and diarrhea and talcum powder can cause lung damage if inhaled.[15] When we talk about medicine safety, it comprises all medicines including prescription medicine; OTC medicines such as pain medicines like acetaminophen and ibuprofen, allergy medicine, laxatives, eye drops and diaper cream; and all vitamins and supplements.

Keeping Kids Safe Around Medicine

Parents and caregivers are the first line of defense in keeping kids safe around medicine. Yet our research suggests that parents are not thinking about medicine safety when they first child-proof their homes. It also suggests that parents often do not anticipate how quickly their child's abilities can change and put them at risk for medicine poisoning. Finally, even if parents and caregivers know to store medicines out of reach and sight, they may treat some medicines differently and keep them in other locations that are accessible to children because they see them as less dangerous or for convenience sake. These findings provide further insight into the apparent disconnect between parent knowledge and behavior surrounding medicine safety and suggest ways to enhance the existing strategies parents can use to protect young children around prescription and OTC medicines, vitamins and supplements.

> ***We recommend that medicine safety be part of the initial child-proofing parents do before they bring their baby home, and they continue to assess and make adjustments to where medicine is kept as their child starts to crawl, walk and climb.***

Add medicine safety to your initial child-proofing checklist. As you create a safer home environment for your child to grow and explore, it's important to add medicine safety to your list along with installing safety gates and cabinet locks, anchoring furniture and mounting TVs and keeping small objects and poisonous products out of children's reach. As your child learns new skills and becomes more mobile, anticipate that you may need to continue to assess and change where you keep medicine to avoid alarming surprises.

Keep medicine and vitamins out of children's reach and sight, even medicine you take every day. Think about places you store medicine you don't use regularly as well as places you keep medicine that you use more frequently. Children often find medicine kept in purses or on counters and nightstands, so it is important to put medicine in cabinets at or above counter height, even if you need to take another dose in a few hours. Keep all bags or briefcases on high shelves or hang them on hooks where your child can't reach them.

Save the Poison Help number in your phone and post it visibly at home: 1-800-222-1222. Specialists at poison control centers provide free, confidential, expert medical advice 24 hours a day. They can answer questions about how to give or take medicine and help with poison emergencies.

Share medicine safety information with family and friends. Teach other caregivers such as family members, babysitters and friends medicine safety and make sure they know the Poison Help number.

Methodology

Six 90-minute focus groups were held in November 2018 with moms and dads of at least one child under the age of 6 who reported keeping and storing medicine in the home. Parents were grouped by age (20-29 or 30-39 years) and locations were selected to provide perspective of parents from urban (Baltimore, MD), suburban (Bethesda, MD) and rural (Salisbury, MD) settings. Each group had a mix of race and ethnicity, education and income level.

Non-fatal poisoning data used in the trend analyses come from the NEISS CADES database which is managed by the Division of Healthcare Quality Promotion at the Centers for Disease Control and Prevention set and the National Poison Data System managed by the American Association of Poison Control Centers (AAPCC).

Analyses of fatal poisonings for this report involved publicly-available data housed on the CDC WISQARS Injury Mortality database. Rolling 3-year average rates were calculated for the years 1999-2017. The comparison of rates was done in MedCalc, which uses the Test-based Method to test the difference between two rates.

References

1. U.S. Census Bureau. Annual Retail Trade Survey 2016 – Pharmacy and drug store sales in the United States from 1992 to 2016. Available at: https://www.statista.com/statistics/197635/annual-pharmacies-and-drug-store-sales-in-the-us-since-1992/ Accessed January 13, 2019.
2. Lovegrove MC, Weidle WN, Budnitz, DS. Trends in Emergency Department Visits for Unsupervised Pediatric Medication Exposures, 2004-2013. Pediatrics, 2015;136(4):e821-9.
3. Centers for Disease Control and Prevention, Division of Healthcare Quality Promotion. Personal communication, January 24, 2019.
4. Bronstein AC, Spyker DA, Cantilena LR, Green JL, Rumack BH, Giffan SL. 2009 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 27th Annual Report. Clinical Toxicology 2010;48(10):979-1178.
5. Bronstein AC, Spyker DA, Cantilena LR, Green JL, Rumack BH, Dart RC. 2010 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 28th Annual Report. Clinical Toxicology 2011;49(10):910-941.
6. Bronstein AC, Spyker DA, Cantilena LR, Rumack BH, Dart RC. 2011 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 29th Annual Report. Clinical Toxicology 2012;50(10):911-1164.
7. Mowry JB, Spyker DA, Cantilena LR, Bailey JE, Ford M. 2012 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 30th Annual Report. Clinical Toxicology 2013;51:949-1229.
8. Mowry JB, Spyker DA, Cantilena LR, McMillan N, Ford M. 2013 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 31st Annual Report. Clinical Toxicology 2014;52(10):1032-1283.
9. Mowry JB, Spyker DA, Brooks DE, McMillan N, Schauben JL. 2014 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 32nd Annual Report. Clinical Toxicology 2015; 53(10):962-1147.
10. Mowry JB, Spyker DA, Brooks DE, Zimmerman A, Schauben JL. 2015 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 33rd Annual Report. Clinical Toxicology 2016;54(10):924-1109.
11. Gummin DD, Mowry JB, Spyker DA, Brooks DE, Fraser MO, Banner W. 2016 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 34rd Annual Report. Clinical Toxicology 2017;55(10):1072-1254.
12. Gummin DD, Mowry JB, Spyker DA, Brooks DE, Osterthaler KM, Banner W. 2017 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 35rd Annual Report. Clinical Toxicology 20187;56(12):1213-1415.
13. Anderson BD. Retrospective analysis of ingestions of iron containing products in the United States: are there differences between chewable vitamins and adult preparations? Journal of Emergency Medicine 2000;19(3):255-258.
14. U.S. Federal Drug Agency. FDA Drug Safety Communication: Serious adverse events from accidental ingestion by children of over-the-counter eye drops and nasal sprays. 2012. Available at: https://www.fda.gov/Drugs/DrugSafety/ucm325257.htm Accessed January 29, 2019.
15. Are Diaper Rash Products Dangerous? Available from: https://www.poison.org/articles/2011-mar/are-diaper-rash-products-dangerous. Accessed January 29, 2019.
16. Schwebel DC, Evans WD, Hoeffler SE, Marlenga BL, Nguyen SP, Jovanov E, Meltzer DO, Sheares BJ. Unintentional child poisoning risk: A review of causal factors and prevention studies. Children's Health Care 2017;46(2):109-130.
17. American Association of Poison Control Centers. National Poison Data System. Personal communication. January 25, 2019.
18. Centers for Disease Control and Prevention. National Center for Health Statistics. Compressed Mortality File 1979-1998 Archive and Compressed Mortality File 1999-2006. CDC WONDER Online Database. Available from: http://wonder.cdc.gov Accessed February 29, 2012 and Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. Available at: www.cdc.gov/injury/wisqars Accessed January 19, 2019.
19. MacKay JM, Murphy K, Steel A. Safe Medicine Storage: A Look at the Disconnect Between Parent Knowledge and Behavior. Washington, D.C.: Safe Kids Worldwide, 2017.
20. MacKay JM, Steel A, Samuel E, Creppy T, Green A. The Rise of Medicine in the Home: Implications for Today's Children. Washington, D.C.: Safe Kids Worldwide, 2016.
21. Schwebel DC, Gaines J. Pediatric unintentional injury: behavioral risk factors and implications for prevention. Journal of Developmental and Behavioral Pediatrics 2007;28(3):245-54.
22. Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents, 4th Edition, Hagan JS, Duncan PM (Eds). Elk Grove Village, IL: American Academy of Pediatrics, 2017.
23. Schmertmann M, Williamson A, Black D. Unintentional poisoning in young children: does developmental stage predict the type of substance accessed and ingested? Child: care, health and development 2012;4(1):50-59.
24. Bass JL, Christoffel KK, Widome M, Boyle W, Scheidt P, Stanwick R, Roberts K. Childhood injury prevention counseling in primary care settings: a critical review of the literature. Pediatrics 1993;92(4):544-550.
25. Barkin SL, Scheindlin B, Brown C, Ip E, Finch S, Wasserman RC. Anticipatory guidance topics: are more better? Ambulatory Pediatrics 2005;5(6):372-376.
26. DiGuiseppi C, Roberts IG. Individual-level injury prevention strategies in the clinical setting. Future of Children 2000;10(1):53-82.
27. Ferguson RW, Mickalide AD. An In-Depth Look at Keeping Young Children Safe Around Medicine. Washington, D.C.: Safe Kids Worldwide, 2013.
28. Schoenewald S, Ross S, Bloom L, Shah M, Lynch J, Lin CL, Patel M, Boyle K, Kuffner E. New insights into root causes of pediatric accidental unsupervised ingestions of over-the-counter medications. Clinical Toxicology 2013;51(10):930-936.
29. Frattaroli S, Sheilds W, Omaki E, Molloy M, Gielen AC. How are prescription medications stored in urban homes where children live? Opportunities for poisoning prevention. Clinical Pediatrics 2017;56(7):678-681.
30. Bar-Oz B, Levichek Z, Koren G. Medications that can be fatal for a toddler with one tablet or spoonful. Pediatric Drug, 2004;6(2):123-126.
31. Lavonas E, Banner W, Bradt P, Bucher-Bartelson B, Brown KR, Rajan P, Murrelle L. Dart RC, Green JL. Root causes, clinical effects, and outcomes of unintentional exposures to buprenorphine by young children. Journal of Pediatrics 2013;163(5):1377-1385.
32. Matteucci M. One pill can kill: assessing the potential for fatal poisonings in children. Pediatric Annals 2005;34(12):964-968.
33. Patel B, Groom L, Prasad V, Kendrick D. Parental poison prevention practices and their relationship with perceived toxicity: cross-sectional study. Injury Prevention 2008;14(6):389-395.

Suggested citation: MacKay JM, Samuel E. Medicine Safety: A Key Part of Child-proofing Your Home. Washington, D.C.: Safe Kids Worldwide, 2019.

SAFE KIDS WORLDWIDE®

Support Provided By

Johnson & Johnson CONSUMER INC.

Safe Kids Worldwide
1255 23rd Street, NW
Suite 400
Washington, D.C. 20037
202.662.0600

www.safekids.org