



# Keeping Kids Safe Around Medicine: Insights and Implications

March 2020





# 5 Things to Know about Kids and Medicine



## Medicine Safety Tips to Remember

- 1 Keep all medicine out of children's reach and sight, even medicine you take every day.** Kids are naturally curious and can easily get into things, like medicine and vitamins, if they are kept in places within their reach.
- 2 Remember child-resistant packaging is *not* child-proof.** While a child-resistant medicine container can slow down a child trying to open it, it is not child-proof. So put medicine away after every use, even if you need to give another dose in a few hours.
- 3 Keep medicine safety on your child-proofing checklist.** 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.
- 4 Save the Poison Help number in your phone: 1-800-222-1222.** Specialists at poison control centers provide free, confidential, expert medical advice 24 hours a day. They help with poison emergencies and can also answer questions about medicine.
- 5 Share medicine safety information with family and friends.** When kids are with other caregivers or visiting another home, it is important that adults know how to keep kids safe around medicine.

## Executive Summary

Safe Kids Worldwide is committed to helping families and communities keep kids safe from serious injuries. As part of that mission, in 2012, Safe Kids started to investigate increasing incidents in accidental unsupervised ingestions of medicine (AUIs) and medicine errors in children under age 6, and released a report that outlined a call-to-action for how a multisector approach could work to reverse the trend and keep kids safe.

Several interventions had already been implemented by 2012, but many continued. The various multisectoral interventions include increases in education and awareness efforts through initiatives like the Centers for Disease Control and Prevention (CDC) PROTECT<sup>†</sup> Initiative and its Up and Away Campaign. Safe Kids Worldwide also introduced a medicine safety program to help with education efforts through our coalitions and industry, and manufacturers intervened with improvements in product packaging and labeling.

As a result of a multitude of efforts addressing this age group, the estimated number of emergency department (ED) visits for suspected AUIs decreased by 33 percent<sup>1,2</sup> and the number of single substance medicine exposure cases reported by poison control centers decreased by 18 percent.<sup>3,4</sup>

This report is the ninth in a series produced by Safe Kids Worldwide with support from Johnson & Johnson Consumer Inc. It presents trends for medicine-related ED visits and single substance medicine exposures cases reported by poison control centers among children under age 6; provides a synthesis of the key insights gained through Safe Kids research since 2012; discusses how those insights have informed educational, public advocacy and awareness efforts by Safe Kids; and outlines further multisectoral action needed to continue reductions in AUIs and medicine errors in children.

The key research findings include the following:

- Several trends over the last few decades have increased the number of medicines in the home which in turn may be increasing the risk of exposure among children.
- AUIs continue to be predominantly driven by unsafe storage practices, with risk factors including not storing both out of reach and out of sight, not storing medicine in containers that are child-resistant, not including safe medicine storage as a key component of home childproofing and not safely storing medicine immediately after use.
- Safe storage practices at other homes and of visitors also impact a child's risk of exposure, yet parents may find it difficult to have necessary conversations with others about their medicine storage practices.
- Some parents believe that supervision is enough to prevent children from getting into medicine, potentially due to their tendency to underestimate their child's motor skill development (e.g., ability to reach or climb) and overestimate their child's ability to make safe choices (e.g., differentiate between candy and medicine).
- While most pediatric medicine poisonings are the result of children getting into medicine, a smaller proportion of poisonings result from medicine errors, with risk factors including parent and caregiver distraction while dosing, miscommunication about dosing amounts and schedules when multiple caregivers are responsible for dosing, not using the correct dosing device and trouble understanding dosing instructions.

These insights have informed a multifaceted strategy implemented by Safe Kids in conjunction with national and local partners. This includes national and local outreach efforts comprising community based educational programming, activities to raise public awareness and participation in advocacy efforts with industry and policy makers.

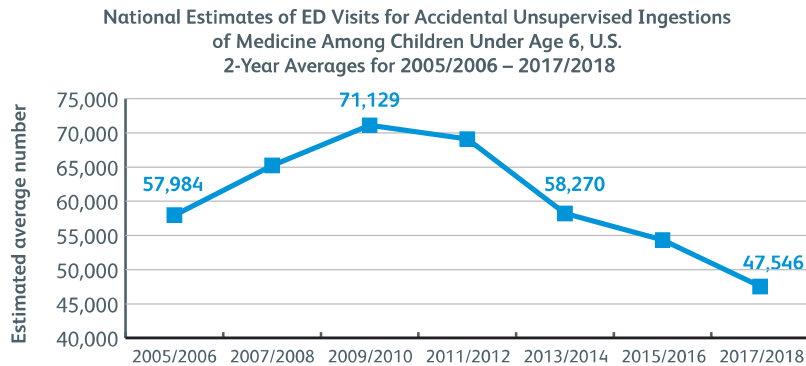
While the declines in recent years in medicine-related ED visits and poison control center-reported exposure cases among children under age 6 in the U.S. is encouraging, further work is required. The most recent two years of data available indicate that medicine exposures in this age group continue to result in approximately 1,100 poison control center-reported exposure cases and 130 ED visits per day.<sup>2,3</sup> These numbers are still too high and signal the need for continued multisectoral actions to address the issue, particularly by industry, researchers, educators and government.

<sup>†</sup> PROTECT: Prevention of Overdoses and Treatment Errors in Children Task Force

## Trends Analysis

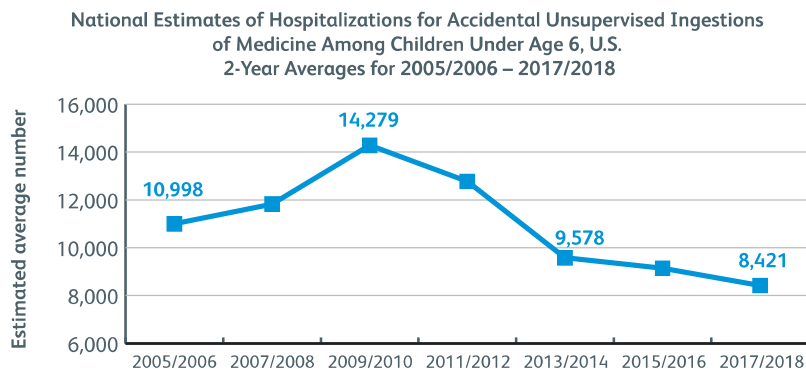
The annual average number of emergency department (ED) visits for accidental unsupervised ingestions of medicine (AUIs)<sup>a</sup> in children under age 6 decreased by 33 percent between 2009/2010 and 2017/2018 (Figure 1).<sup>1,2</sup> While this decrease is encouraging, there were still an average of 47,546 ED visits for AUIs per year for the two years spanning 2017/2018, which equates to roughly 130 visits per day and more than 5 per hour.<sup>1,2</sup>

**Figure 1. Despite a 33 percent decrease since 2009/2010, for 2017/2018 there were still the equivalent of 130 children under age 6 seen every day at the ED for an AUI<sup>2</sup>**



An annual average of 8,421 AUIs were serious enough to require hospitalization for the two-years spanning 2017/2018.<sup>2</sup> The estimated number of AUIs resulting in hospitalizations has also decreased in recent years, with the annual average decreasing by 41 percent between 2009/2010 and 2017/2018.<sup>2</sup>

**Figure 2. The equivalent of 23 children under age 6 were hospitalized every day in 2017/2018 because of an AUI<sup>2</sup>**

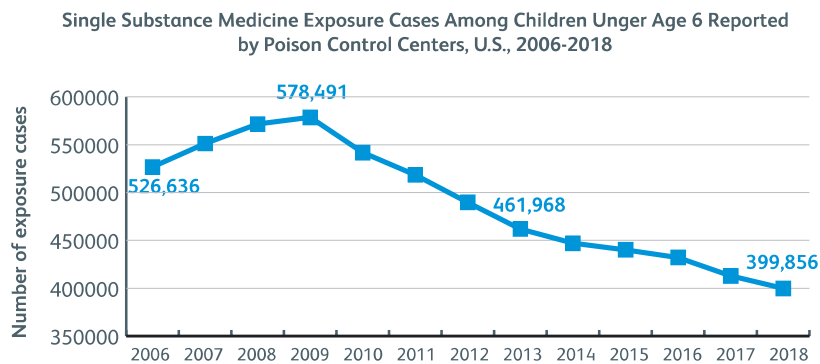


<sup>a</sup> CDC defines accidental unsupervised ingestions (AUIs) as unintended ingestions that result when a child gets into medicine while unattended.



Analyzing data reported by poison control centers also reveals a continual downward trend in recent years, with the number of single substance medicine exposure cases<sup>b</sup> among children under age 6 decreasing by 24 percent from 2006 to 2018. (Figure 3).<sup>3-16</sup> This decrease is consistent with the decrease observed in ED visits for AUIs in this age group. However, it is unknown how much of the decrease in poison control reported-exposure cases is due to a real reduction in exposures versus other factors, including a decreasing birth rate, a decreasing awareness of poison control centers or changing patterns of consumer information seeking behavior.<sup>17,18</sup>

**Figure 3. The equivalent of nearly 1,100 single substance medicine exposure cases in children under age 6 were reported by poison control centers every day in 2018**<sup>3-16, 19</sup>



<sup>b</sup> The single substance medicine exposures reported by the American Association of Poison Control Centers consist of all exposure cases involving a single type of medicine, regardless of intent, including AUI and medicine errors.

## Key Insights

Since 2012, with the support of Johnson & Johnson Consumer Inc., Safe Kids has undertaken various research projects to explore AUIs and medicine errors among children under age 6 to support the development and implementation of practical and proven strategies for prevention. This has included analyzing existing medicine exposure data from hospitals and poison control centers, conducting primary research with parents and caregivers to better understand what drives these incidents, and identifying gaps in our current educational efforts. The results of the research have informed public awareness campaigns, parent- and caregiver-focused education and advocacy activities to increase safe storage and safe dosing. The following is a synthesis of the main findings of that research.

### Trends Impacting Children's Exposure to Medicine

Safe Kids has explored some recent societal trends that have likely influenced the risk of accidental pediatric medicine exposures.

#### More Medicine in the Home

The amount of medicine in the home today is unprecedented. There were 5.8 billion prescriptions filled in 2016 alone — a staggering 184 prescriptions filled every second.<sup>20</sup> This is a 142 percent increase over the past two decades, while the overall population has increased by only 22 percent.<sup>20-23</sup> And the amount of over-the-counter (OTC) medicines in the home has also increased. American consumers spent \$35 billion on OTC medicine in 2018 alone, a nearly five-fold increase since the early 1980s.<sup>24</sup>



## Aging Population

Our population is also aging and living longer. The number of Americans ages 65 or older grew by 37 percent from 2003 to 2018, and people in this age group now make up nearly 15 percent of the U.S. population.<sup>25,26</sup>

Additionally, more than half of U.S. adults ages 50 to 80 are grandparents and most have at least one grandchild under age 18. About 2 in 3 grandparents in this age group report providing care for their grandchildren at least once per month.<sup>27</sup> The number of multigenerational households are also increasing, with the number of grandparents living with their grandchildren increasing by 24 percent between 2005 and 2018.<sup>28,29</sup> There are several potential factors contributing to this trend including an increase in two-working parent or single-parent households,<sup>30,31</sup> the economic crisis of 2007-2009 and the ongoing opioid crisis.<sup>32-34</sup>

These trends are important because they can impact a child's exposure to medicine. Adults ages 65 or older take significantly more prescription medicine than their younger counterparts.<sup>35,36</sup> But it's not just more medicines in the home of grandparents — it's also how they are stored. Grandparents often keep medicine in easy-open containers, such as daily pill organizers, and leave medicine within sight as a reminder to take their medicine.<sup>27,37</sup> While these storage choices are important for medicine adherence and make it easier for grandparents to take their medicine, not using child-resistant containers and not storing medicine out of reach and out of sight can increase a grandchild's risk of exposure.

## Industry Advances to Improve Medicine Safety

The number of single substance medicine exposure cases reported by poison control centers among children under 6 declined by 15 percent between 2009 and 2012.<sup>37</sup> This decline was in part a result of voluntary changes made by industry. For example, the implementation of flow restrictors<sup>c</sup> to all pediatric liquid single-ingredient acetaminophen bottles is associated with a decrease in pediatric AUIs.<sup>38-40</sup> Additionally, pediatric exposures involving products with flow restrictors tended to have lower ingestion per exposure and were associated with lower rates of hospital admissions.<sup>38</sup> Industry also moved to single concentration of single-ingredient pediatric liquid acetaminophen, which is associated with a decrease in medicine errors in children.<sup>41</sup> Finally, switching to unit-dose (or "blister") packaging to distribute buprenorphine — one of the most commonly involved opioids in pediatric drug exposures — is associated with a decrease in unintentional pediatric exposures reported to poison control centers.<sup>42</sup>

## How Children are Getting into Medicine

More than 90 percent of ED visits for accidental medicine exposures among children under age 5 involve situations where a child got into medicine on their own when not being supervised.<sup>43</sup> The two main factors leading to accidental access are failing to store medicine out of reach and sight and not putting medicine away immediately after use.<sup>44,45</sup> Below are insights from Safe Kids research that may help to explain why these incidents occur.

<sup>c</sup> Flow restrictors are adapters added to tops of liquid medicine bottles to limit the amount of liquid that can come out of the bottle and can be used to help prevent young children from getting into the liquid medicine.

## Unsafe Storage Locations

A 2017 national survey by Safe Kids found that while most parents know to keep medicine out of reach and sight, in practice, 7 in 10 said that they often keep medicine where their child can still see it, such as on a shelf or counter.<sup>46</sup> Part of the reason for this disconnect may be that parents perceive “out of reach” and “out of sight” as an either-or proposition.<sup>46,47</sup> In the same survey, 3 in 4 parents believed that medicine stored within sight but out of reach was safe, and about half believed that medicine stored within reach but out of sight was safe.<sup>46</sup> On the contrary, research indicates that about half of all accidental OTC medicine exposures involve a child climbing to reach the medicine,<sup>48,49</sup> clearly indicating the need to keep medicine both out of reach and out of sight. But, it is also important to note that parents appear to have different perspectives on how high is “high enough” and what “out of sight” really means.<sup>46</sup> Further education efforts could help to better clarify this for parents and caregivers.

## Convenience Over Caution

Safe Kids research has found that the knowledge to keep medicine both out of reach and sight is often overridden for convenience. For instance, parents in 2018 focus groups normally stored OTC cold and flu medicines out of reach and sight when they weren't being used, but also kept these medicines in easily accessible places when someone was sick.<sup>18</sup> They also reported leaving routine prescription medicines and vitamins out in visible locations both for easy access and to serve as a convenient reminder.<sup>18</sup> Instead of leaving medicine out for convenience, Safe Kids recommends that parents and caregivers use safe reminder tools such as cell phone reminders or post-it notes to reduce the risk of a child accessing medicine from an unsafe location.

Parents also reported keeping OTC pain relievers (e.g., acetaminophen, ibuprofen) in multiple locations, including in backpacks, at work and in the car, for convenience, because although they aren't taken daily, you “never know when you might need one.”<sup>18</sup> This may be in part because some parents believe that OTC medicines aren't as dangerous as prescription medicines. In fact, 1 in 4 parents polled nationally in 2018 believed that OTC medicine was not strong enough to require precise dosing.<sup>50</sup> However, while OTC medicines are safe and effective when used as directed, like prescription medicine, OTC medicine can be harmful if not taken as directed.

Safe Kids recommends storing all medicines up and away, both out of reach and sight of young children, putting medicines away immediately after use and using safe reminder tools such as cell phone reminders or notes as an alternative to keeping medicine out.



While it is important to keep all medicines safely stored, below are tables to show the top 10 categories of single substance medicines involved in AUI-related ED visits and poison control center-reported exposure cases in recent years. These are common products most people probably have in their homes.

**Table 1. The top 10 medicine categories involved in ED visits for single substance AUIs among children under age 6 in 2017/2018<sup>2</sup>**

Medicine category	Single substance AUIs	%*
Analgesics	10,861	25.7
Cardiovascular drugs	4,434	10.5
Antihistamines	3,650	8.6
Sedative/hypnotics/antipsychotics	2,434	5.8
Dietary supplements/herbals/homeopathic	2,060	4.9
Stimulants	1,969	4.7
Vitamins	1,845	4.4
Topical preparations	1,775	4.2
Antidepressants	1,773	4.2
Cold and cough preparations	1,487	3.5

\* Percent of total children under age 6 reporting to the ED for single substance AUIs in 2017/2018 (N = 42,261). Single substance AUIs made up 89 percent of all AUI-related ED visits.

**Table 2. The top 10 medicine categories involved in cases reported by poison control centers for single substance medicine exposures among children under age 6 in 2018<sup>3</sup>**

Medicine category	Single substance medicine exposures	%*
Analgesics	79,617	25.7
Topical preparations	44,522	10.5
Antihistamines	40,516	8.6
Dietary supplements/herbals/homeopathic	37,456	5.8
Vitamins	37,215	4.9
Gastrointestinal preparations	22,846	4.7
Antimicrobials	20,145	4.4
Cold and cough preparations	17,516	4.2
Electrolytes and minerals	16,082	4.2
Cardiovascular drugs	13,045	3.5

\* Percent of total cases reported by poison control centers for single substance medicine exposures among children under age 6 in 2018 (N=399,856).

*“A 5-year-old boy got into his grandmother’s weekly pill container and swallowed some of her medicine. He had an altered mental state, was vomiting, and started seizing in the emergency department. He required hospitalization.”*

Hospital record reported in CPSC NEISS database<sup>59</sup>

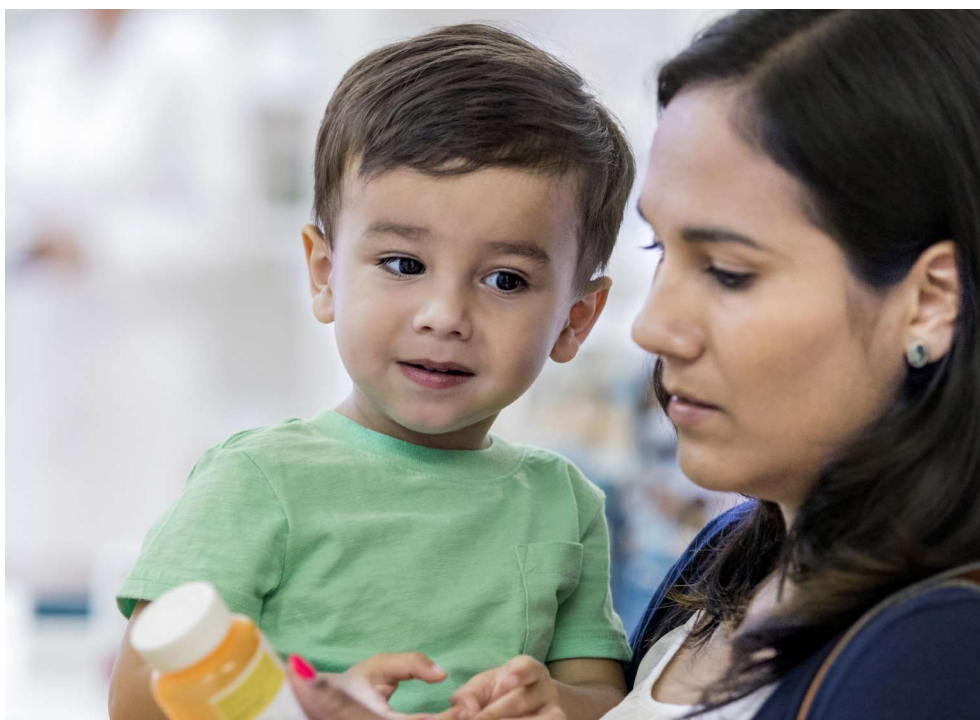
## Packaging and Container Issues

In addition to being stored out of reach and sight every time, medicine should be kept in its original child-resistant container whenever possible. This serves as an extra layer of protection if a child gains access to medicine. While 9 in 10 parents surveyed by Safe Kids agreed that it’s important to keep medicine in its original container, 1 in 3 indicated that they or someone in their household uses a pill organizer or baggie that a child can easily get into if not stored correctly.<sup>46</sup> Likewise, grandparents who otherwise know to keep medicine out of reach and sight when children are around are likely to use easy-to-open containers or pill organizers if they have difficulty opening or remembering to take their medicine.<sup>27,37</sup>

Pill organizers can be beneficial for adults who have trouble opening child-resistant containers or remembering to take their medicine. However, if they are used in households with children or where children visit, the safer option is to store pill organizers out of reach and out of sight every time because children can easily get into most of these containers.<sup>46</sup>

Safe Kids strongly supports the use of child-resistant packaging for both prescription and OTC medicines. However, trouble can arise when parents misunderstand child resistant to mean childproof. Nearly half of the parents in a Safe Kids survey believed that child-resistant packaging meant a child would not be able to access the contained medicine, and 1 in 3 agreed that it was fine to leave medicines kept in child-resistant packages within sight of a child.<sup>51</sup>

This misperception can have serious consequences. In fact, research suggests that children can and often do get into child-resistant packaging (although interventions such as flow restrictors and updated packaging in recent years has improved packaging safety).<sup>45,52</sup> Existing regulations for testing the viability of child-resistant packaging requires that 80 percent of children under the age of 5 are unable to open the package within 10 minutes.<sup>53</sup> Child-resistant packaging does offer protection — however, these containers should not be viewed as an alternative for keeping medicine out of children’s reach and sight.



## Surprise, Surprise

When childproofing their home, parents are likely to include important safety measures such as protecting electrical outlets, installing safety gates, locking up cleaning supplies and addressing sharp corners, but they are less likely to think of medicine safety.<sup>18,37,46</sup> Parents in focus groups conducted by Safe Kids didn't consider medicine safety when childproofing because it hadn't been mentioned to them by other parents, grandparents or healthcare professionals.<sup>18</sup>

Instead, parents may not think to include medicine safety in home childproofing until something happens or they discover their child's ability to reach or climb.<sup>18,46,51</sup> As a result, many parents whose children have gotten into medicine are surprised that their child possessed the ability to do so.<sup>46,54</sup>

Parents in our focus groups said pediatricians are one of their most trusted sources for information on child health, which suggests that pediatricians are well-positioned to provide anticipatory guidance to parents on the importance of medicine safety when childproofing their home.



*“My daughter is like a little vacuum cleaner; she sucks up everything on the floor. She usually gives stuff to me, but who’s to say that if she found a pill, she’d give it to me?”*

Mother, 2012-2013  
focus group<sup>59</sup>

## ***Supervision Is Not Enough***

One in 3 parents Safe Kids surveyed in 2017 agreed that safe storage is less important when a child is being supervised.<sup>46</sup> Yet, parents of children visiting the ED for suspected medicine poisonings have frequently indicated that they turned their back for only a minute while their child got into the medicine.<sup>55</sup>

Supervision is often based on a parent's perception of their child's abilities, and parents tend to underestimate their child's motor skill development (e.g., ability to climb) and may overestimate their child's ability to make safe choices.<sup>56,57</sup> For instance, most parents surveyed believed their child could tell the difference between candy and medicine,<sup>46</sup> even though research has suggested that children and adults alike may have difficulty distinguishing between the two.<sup>58</sup>

## **Risks at Other Homes and From Visitors**

Research has found that children are also at risk of AUIs due to the medicine storage behaviors of those visiting the home and of those in homes visited by the child.<sup>27,59</sup> Yet, only half of parents surveyed by Safe Kids agreed that they were worried about their child's risk of medicine exposure when visiting other homes.<sup>46</sup> Focus groups with parents revealed that many had never thought about their child's risk of accidental exposure to medicine outside of the home or the potential risk of medicine brought into the home by visitors.<sup>47</sup>

Safe Kids research has also found that parents find the idea of having conversations about medicine safety with visitors and others in homes where their children visit to be awkward, and that some parents feel they should instead supervise their own children to keep them safe in these instances.<sup>47,59</sup> To make conversations easier, Safe Kids recommends that parents and caregivers show visitors places where they can safely store their medicine and other belongings, and to gently remind them that with a curious child in the home, it's best to store belongings up high and out of sight.

## **Unused or Expired Medicines in the Home**

The prevalence of unused or expired medicine in the homes has dramatically increased in recent decades.<sup>60</sup> To reduce the risk of exposure among children, parents and caregivers should include safe medicine disposal as a key component of ongoing home childproofing. However, choosing an unsafe disposal method, such as throwing pills loosely into the trash, does not always ensure that curious children cannot get to them.<sup>61</sup>

For safe disposal, Safe Kids recommends that parents take advantage of medicine disposal initiatives and programs, such as year-round designated drop-off locations listed on the U.S. Drug Enforcement Administration's (DEA) website, attend local events taking place during National Prescription Drug Take Back Days or check with their local pharmacy about the availability of safe drug disposal kits.

The U.S. Food and Drug Administration (FDA) maintains a "flush list" of drugs that should be flushed down the toilet if they are no longer needed and cannot be immediately taken to a drug take back program.<sup>62</sup> These include medicines such as fentanyl, buprenorphine and oxycodone — powerful drugs that can be dangerous or even fatal if ingested, touched or misused. The FDA advises that most medicines not on the flush list can be safely disposed of in the trash at home by mixing the medicine with an unappealing substance (e.g., coffee grounds, dirt or cat litter), sealing the mixture in a container or plastic bag and disposing of it in the trash can at home.<sup>63</sup>



## Medicine Errors

While accidental exposure due to unsafe storage is the leading cause of single substance medicine exposure cases among children under age 6 reported by poison control centers, a smaller proportion of cases are related to medicine errors.<sup>3</sup> These errors most often relate to measurement (e.g., giving too much of a medicine) and timing (e.g., giving doses too close together), and result from a combination of human factors, packaging and lack of communication between caregivers or giving the wrong medicine.<sup>3,64</sup>

Research undertaken by Safe Kids since 2012 has sought to better understand what drives medicine errors and what can be done to prevent them. Below are key insights Safe Kids has gained throughout that research.

### Caregiver Distraction

Even slight distractions can cause a lapse of judgment that leads to a medicine error, such as giving the wrong medicine, the wrong amount of medicine or giving medicine at the wrong times. Such errors have been documented in the literature, even among medical professionals who have extensive training and experience administering medicine.<sup>65,66</sup> The good news is that most parents recognize that caregiver distraction and multitasking are common risk factors for medicine errors,<sup>46</sup> but, at the same time, about half of parents indicate that they themselves have been distracted while taking or giving medicine.<sup>46</sup> Mothers in Safe Kids focus groups have described being distracted when giving medicine to a child if they hear a phone ring or if another child in the home needs assistance.<sup>59</sup>

### Miscommunication Among Multiple Caregivers

Another common cause of medicine errors is miscommunication between multiple caregivers who are responsible for giving medicine to a child, including when to give a child medicine and how much. Parents in 2013 Safe Kids focus groups described their methods for avoiding such mishaps, including sharing a medicine schedule with those watching over their child and sending a text message reminder when the next dose is needed.<sup>54,67</sup> Grandparents say they write notes, set alarms and follow instructions from parents when giving medicine to their grandchildren.<sup>37</sup> When creating a schedule for other caregivers, Safe Kids recommends writing clear instructions that include which medicine to give, when to give it, how to give it and how much to give, along with a reminder to immediately store after use.

### Errors Related to Dosing Devices and Instructions

Significant errors can occur when measuring liquid medicine to give to children, especially when using a dosing device other than what came with the medicine.<sup>68</sup> Research has found that parents and grandparents do at times use devices other than what is packaged with liquid medicine, such as teaspoons and tablespoons.<sup>37,67</sup> This is a dangerous practice as kitchen spoons do not indicate exact measurements and have been shown to increase the risk of both underdosing and overdosing.<sup>69,70</sup> Safe Kids urges parents to use the dosing device that comes with the liquid medicine and to ask a pharmacist to recommend a dosing device if a device is not included or if the device is broken.

The misunderstanding of medicine label instructions by caregivers has also been found to contribute to medicine errors. Medicine labels are often written at an advanced reading level, despite the fact that 1 in 5 adults in the U.S. possess low literacy skills.<sup>71,72</sup> Recent research has found that including

pictograms (pictorial-enhanced written materials) on liquid medicine prescription labels can enhance parental understanding of dosing instructions, hence reducing the risk of accidental medicine errors.<sup>68</sup> Further, medicine errors can be reduced by packaging medicines with dosing tools that more closely match the prescribed dosing volumes listed on the accompanying medicine label, so that there is little room to overdose.<sup>68</sup>



## How the Key Insights Have Impacted Safe Kids' Work

To further impact preventable child injuries resulting from accidental medicine exposures, Safe Kids continues to work alongside national and local partners to implement a multifaceted strategy based on key research insights. This includes national and local outreach efforts such as launching sustainable educational interventions and community-based programming, promoting core safety messages through public awareness-raising activities and engaging with policymakers and industry leaders in advocacy efforts involving child safety.

### Community-Based Programming

#### Educating Families

Research demonstrates that providing education in settings that serve community members can have a positive impact on knowledge and intention to change behavior.<sup>73,74</sup> Additionally, delivering education supplemented by the provision of safety devices, such as cabinet locks and latches, has shown an increase in safe behaviors related to home safety. These methods of delivering education are considered to be promising practices for impacting parent and caregiver knowledge, attitudes and beliefs that can be applied to community programming that addresses medicine safety.

Since children's health outcomes related to preventing accidental medicine poisoning are highly reliant on the behaviors of their primary caregivers and access to medicine in their home environments, our initial programming was largely designed to reach parents of children younger than age 6 years and to increase their knowledge about medicine safety. However, with the progression of our research over the years, Safe Kids has identified a broader range of community-based educational opportunities and target audiences to reach families with medicine safety information.

Educational outreach to families and healthcare professionals is primarily delivered through U.S. members (coalitions) of the Safe Kids network and in collaboration with local partners. Coalitions utilize core medicine safety messages and adapt education delivery mechanisms to meet the individual needs of their communities that align with a framework for engaging parents, caregivers and partner organizations to maximize reach through educational sessions. These sessions take place in settings such as new parent or grandparent classes, schools and universities, professional trainings and even home visits.

Although activities mainly target parents and caregivers of young children, coalitions also deliver medicine safety education to groups who are involved in daily supervision or administering medicine to children — such as grandparents, childcare providers and older siblings or babysitters — in order to influence changes in responsible medicine use among adults and older children.

As our medicine safety strategies for community-based programming have developed over time, our core safety messages and educational resources have also evolved. Safe Kids has a portfolio of program assets to support education to families and engagement of community partners that allows educators to distribute relevant, consistent safety messaging based on the needs of their community. These caregiver resources address safe behaviors to prevent accidental medicine poisonings: limiting children’s access to medicine, preventing medicine errors, disposing of unused or expired medicine safely and knowing when to call the Poison Help number.

### Raising Awareness

Safe Kids coalitions organize and participate in interactive community events such as health and safety fairs, prescription drug take back events, expos, event booths or informational tables at conferences and retailers. While coalitions may have limited time to engage with families during these types of events compared to educational sessions, they provide an opportunity to interact with a large number of individuals to raise awareness about medicine safety.

In addition to connecting directly with families at educational sessions and events, many coalitions use social media platforms and traditional media to extend their reach. These locally-sourced messages combine with Safe Kids’ national social and traditional media to broaden the opportunities to connect with families. In its role as the go-to resource for families on injury prevention, Safe Kids focuses on both proven and practical information so families can relate to it and offers messages in a wide-variety of styles so families will be compelled to engage.

### COMMUNITY ENGAGEMENT IN COLUMBIA, MISSOURI

**Interactive activities can be effective teaching tools to convey the importance of safe medicine storage to families. While playing a medicine vs. candy look-a-like game with a family, a coalition educator in Missouri asked the children what they would do if they found something sitting out on a counter that looked like it might be candy. They responded that they would eat it, even if they weren’t sure what it was. The educator reported that the parents were shocked when their kids responded in this way; however, it was a great opportunity for the coalition to reinforce for the caregiver why it is important to store all medicine up and away, out of children’s reach and sight.**

Safe Kids Columbia (MO)

**“I DIDN’T THINK IT COULD HAPPEN TO ME.”**

*In Connecticut, one grandmother described an incident that happened while she was watching her 3-year-old granddaughter. While looking for candy in her purse, the granddaughter grabbed heart medicine that was kept in a pill box and it was very easy for her grandchild to open.*

*Luckily, she realized what her granddaughter had done before she swallowed the pill, but the grandmother explained how quickly something awful could have happened. After attending a medicine safety class previously, the grandmother did not think an incident like this could happen to her. She now keeps her medicine in a child-resistant container and keeps her purse up and away, out of her grandchildren’s reach and sight.*

Safe Kids Greater Naugatuck Valley (CT)

## Partnering with Local Organizations

Community partners are critical to the success of the Safe Kids medicine safety program. Coalitions are innovative in building relationships with organizations and local businesses to address gaps in education and to expand their outreach efforts. Partners supplement programs by providing educators for classes and trainings, volunteering to staff larger community events or offering venues for activities. Other partners, such as local nonprofit organizations serving families, support Safe Kids programming by connecting coalitions with families that they may not have previously engaged through the medicine safety program. Even further, coalitions offer training opportunities for community partners in order to expand the capacity and number of individuals in the community trained to provide medicine safety education to families.

## Engaging Healthcare Professionals

Healthcare professionals (HCPs), including pediatricians, nurses and pharmacists, are among the most trusted professionals whose advice is sought by parents and caregivers,<sup>75</sup> and injury prevention programs are often designed around HCP engagement.<sup>73,74</sup>



Photo: Safe Kids Kansas

In recent years, Safe Kids has focused on exploring strategies to involve HCPs in education delivery to strengthen our medicine safety program. Through interviews with coalition educators and various groups of HCPs such as nurses and pharmacists, Safe Kids has started to assess the capacity of our network and partners to leverage relationships with HCPs to incorporate medicine safety education and resources into their existing interactions with families.

Research has demonstrated that involving HCPs at the individual and community level may be an effective strategy for implementing aspects of home safety and medicine safety programs.<sup>76</sup> Current local partnerships align with the recommendations from the literature, indicating that coalitions are primed to cultivate new relationships with HCPs and leverage existing ones to expand their medicine safety outreach.

Within healthcare settings, coalitions incorporate medicine safety educational materials into the library of resources available for patients, whether it be tip cards or posters displayed in waiting rooms or printed resources provided at patient discharge. Coalitions have also collaborated with home visiting nurses to deliver education and appropriate safety devices during visits with new parents and vulnerable families.

The train-the-trainer model is a common component of programming among Safe Kids coalitions. Training HCPs to deliver medicine safety education has also shown to have a positive impact in the likelihood of HCPs using the information to advise patients and even their own family members and friends.<sup>77</sup> Not only are coalitions engaging HCPs in their outreach, they are also involving nursing and pharmacy students. The students are equipped with knowledge they will be able to incorporate into their own healthcare practices and given the opportunity to participate in coalition-led medicine safety educational activities.



Given the current capacity of our network to leverage relationships with HCPs as part of their grassroots activities, Safe Kids is working toward strengthening its framework to engage this group of partners to enhance the medicine safety program.

## SCHOLASTIC OTC MEDICINE SAFETY PROGRAM

Reaching older children with medicine safety education is a crucial intervention given recent trends in medicine poisoning rates for teenagers, and especially as it relates to current events such as the ongoing opioid crisis.<sup>88</sup> Teaching pre-teens and older children how to practice safe and responsible medicine behaviors arms them with the knowledge they need to avoid medicine misuse in their later teenage years.

Studies indicate children begin to self-medicate as young as 11 years of age and 90 percent of teens report self-administering OTC medicine by age 16.<sup>89</sup> The Scholastic Over-The-Counter (OTC) Medicine Safety Program was developed in partnership with Scholastic, the American Association of Poison Control Centers (AAPCC) and Johnson & Johnson Consumer Inc. to introduce the topic of medicine safety to 5th and 6th grade students and teach them about responsible medicine use. The program contains lesson plans for teachers and community educators, which align with Common Core curriculum standards, and resources for families and healthcare professionals. In 2019, the program expanded to include lesson plans for 7th and 8th grade students.



Photo: Safe Kids Alameda County (CA)

Several Safe Kids coalitions have incorporated the OTC Medicine Safety Program in their grassroots programs either by teaching children in schools directly or partnering with school nurses and other community organizations that serve children in this age group. In Arizona, Safe Kids Pima County presents the curriculum in local elementary and middle schools. At the end of the lesson, students take turns sharing how they will apply the lessons they learned while they are at home. One 5<sup>th</sup> grade student stated that learning how to read the Drug Facts Label and understanding how medicine ingredients can interact with each other was important for her to learn. She added that when she is taking medicine, with a parent's permission and guidance, she will make sure she reads the medicine label first so that she can stay safe.

To learn more about the program, visit [scholastic.com/otc-med-safety](https://www.scholastic.com/otc-med-safety)

## Advocacy

Safe Kids has supported multiple efforts to strengthen public policy on medicine safety over the last several years, including:

- **Urging a public education campaign addressing “child-resistant” packaging.** In response to the Safe Kids finding that nearly half of parents surveyed were under the mistaken impression that child resistant meant childproof,<sup>46,51</sup> Safe Kids and 80 of its coalitions sent a letter to the U.S. Consumer Product Safety Commission (CPSC) urging them to undertake a public education campaign to increase consumer understanding of child-resistant packaging. Safe Kids also recommended such a campaign in testimony before Congress.
- **Supporting poison control centers.** Safe Kids has continued to support Poison Control Centers as an indispensable and effective part of our health care system, calling on government to make a meaningful investment consistent with the level authorized by law.
- **Supporting safe medicine storage legislation.** In 2018, Safe Kids supported a California bill requiring pharmacies that sell Schedule II, III or IV controlled substances to also sell and prominently display safe storage products near the pharmacy. To qualify, these products must include a locking mechanism which limits access to only the patient.
- **Supporting improvements to labeling standards.** Safe Kids has consistently supported calls for the FDA to allow manufacturers of acetaminophen to provide weight-based dosing instructions for children between 6 months and 2 years of age.

## Summing Up and Moving Forward

The multisectoral response to address accidental pediatric medicine exposures over the past decade and the resulting reductions in ED visits and poison control center-reported exposure cases are encouraging, and Safe Kids is proud to be part of the solution. However, despite the progress, the equivalent of 130 children under the age of 6 per day were still seen at the ED for an AUI,<sup>1,2</sup> signaling that there is still much work that industry, researchers, educators and government can do.

## Industry

**Continue to improve labeling and packaging.** Medicine labels can be a source of confusion among caregivers who give medicine to children.<sup>71,78</sup> Industry should continue to look for opportunities to minimize medicine errors. Consideration could be given to enhancing dosing information on medicine labels and packaging and revising directions to be better understood by low-literacy populations, which could include a combination of text and pictographic guidance. Further, considerations could be given to educating that child-resistant medicine packages are not childproof and thus should especially be stored out of reach and sight to prevent exposure to children.

As noted earlier, flow restrictors have shown success in decreasing accidental unsupervised ingestions in children. Given that success, industry should also explore the use of flow restrictors for other liquid medicines, such as both adult and pediatric antihistamines and cough and cold medicines. Further, because individual dose packaging has been found to be effective in reducing exposure in medicines like buprenorphine, pharmaceutical companies should consider expanding its use to other medicines in which a single pill can be particularly dangerous if ingested by a child.

**Make child-resistant pill organizers more accessible.** While child-resistant containers are safer containers for medicines, non-child-resistant pill organizers are preferred by many adults and recommended by some physicians, especially for adults who have trouble opening the original container or keeping track of their dosing schedule. While a limited number of child-resistant pill organizers do exist, their cost may be prohibitive to many who would benefit from them. To reduce the risk of medicine exposure to children associated with these container types, industry should develop more affordable child-resistant pill organizers that meet CPSC standards for child-resistant packaging and make them more accessible for caregivers.<sup>53</sup>

## Researchers

**Continue with surveillance and epidemiologic studies.** Ongoing surveillance and research are needed to monitor rates of accidental pediatric medicine poisonings. This includes the need for larger epidemiological studies to better understand the risk and protective factors and circumstances surrounding accidental medicine poisonings among young children.

**Evaluate prevention strategies.** Several strategies introduced in recent years to reduce accidental pediatric medicine poisonings need to be evaluated to assess their effectiveness. These include legislative and educational strategies described earlier in this report as well as promotion of safety messages in the media, that, if evaluated and found to be effective, have the potential to be scaled-up and influence broader medicine safety intervention strategies.

## Educators

**Continue building medicine safety knowledge and awareness through education.** Educators have played a vital role in increasing knowledge and awareness of medicine safety practices among parents and caregivers in communities across the country. The reductions in the number of emergency department visits and cases reported by poison control centers for medicine exposures to children under age 6 that have coincided with the educational efforts of organizations like Safe Kids, the CDC PROTECT Initiative and others suggest such efforts should continue.

**Make education more accessible.** To address the existing disparities in the risk of accidental medicine poisoning and access to prevention strategies, organizations and agencies delivering medicine safety education need to ensure education and awareness efforts are tailored to variety of audiences, which include addressing cultural considerations and low literacy, integrating medicine safety education into health and wellness activities, and exploring additional mechanisms for delivery that overcome these barriers. An example of the latter are easily accessible phone apps that support safe behaviors by illustrating safe and effective medicine storage, dosing and disposal behaviors.

**Leverage relationships with HCPs.** HCPs are well-positioned to help deliver medicine safety education and resources, and have been identified by caregivers as a preferred and trusted source of information around medicine safety.<sup>79</sup> Lack of time and competing demands on their time with patients are potential barriers,<sup>80,81</sup> so exploring how medicine safety education might be integrated into existing systems used by HCPs and what types of resources would work best in those settings is warranted.

**Leverage relationships with news media.** Because of its ubiquitous nature, the news media is a powerful tool for drawing attention to issues relevant to public health and safety and can act as a catalyst for action at the national, state and local level.<sup>82</sup> The magnitude of their audience provides opportunity for news media outlets to raise

awareness of accidental pediatric medicine poisonings and to offer to families practical steps for prevention. Further, they are well-positioned to promote national campaigns that help to prevent accidental medicine poisonings, such as Poison Prevention Week and the bi-annual National Prescription Drug Take Back Day.

## Government

**Integrate safe storage messaging into state-level opioid strategies.** The opioid crisis has been one of the most pervasive public health challenges in recent decades. It has prompted the development of multifaceted prevention strategies by states, organizations and agencies throughout the country. Existing strategies have focused on messaging to patients and HCPs around the proper use and prescribing of opioid pain killers.<sup>83</sup> Education on safe storage of prescription opioids in the home is a natural fit to accompany this education — both in terms of preventing accidental ingestion of prescription pain killers among young children and preventing misuse among older children. The government effort is consistent with the American Medical Association’s advice to its members as well as what the CDC has recommended: “remind patients that medications should be stored out of reach of children, and in a safe place.”<sup>84</sup>

**Increase public awareness of national take back days.** Public participation in the DEA’s bi-annual National Prescription Drug Take Back Days continues to climb. Nearly 900 thousand pounds of unused or expired prescription medicine were collected by local, state, tribal and federal partners during the October 2019 event — a 272 percent increase since the first event in took place in 2011.<sup>85,86</sup> Campaigns to increase public awareness of these events may serve to further bolster efforts to collect unused and expired medicines. In addition, we urge allowing public/private partnerships to establish more safe collection sites year-round and increase of awareness them. For example, the DEA has a drop-off site locator on [www.dea.gov](http://www.dea.gov).<sup>87</sup>

## Safe Kids’ Commitment Moving Forward

In 2012 Safe Kids committed to work in partnership with all sectors of society and relevant disciplines to tackle accidental pediatric medicine exposures, and we reaffirm that commitment now. To that end, Safe Kids will:

- Continue efforts to change caregiver behavior through education and awareness raising and primary research to support those efforts;
- Continue to strengthen educational outreach by incorporating research insights and feedback from educators to further evolve program strategies and educational resources available to meet families where they are;
- Explore strategies and initiatives for expanding the reach of our current medicine safety messaging by building and leveraging partnerships such as with HCPs, news media, and retailers;
- Support advocacy efforts to expand the use of flow restrictors to all liquid medicines; and
- Support uptake of, and continuing innovation in, technological advancements that prevent or limit harm to a child if they try to get into medicine.

Safe Kids commends all the work done to date by all relevant sectors and looks forward to continuing to collaborate to address this important issue.



## References

1. Lovegrove MC, Weidle NJ, Budnitz DS. Trends in Emergency Department Visits for Unsupervised Pediatric Medication Exposures, 2004-2013. *Pediatrics*. 2015;136(4):e821-9. doi:10.1542/peds.2015-2092
2. Centers for Disease Control and Prevention, Division of Healthcare Quality Promotion. Data from the National Electronic Injury Surveillance System-Cooperative Adverse Drug Event Surveillance (NEISS-CADES) project. Personal communication, January 13, 2020.
3. Gummin DD, Mowry JB, Spyker DA, et al. 2018 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 36th Annual Report. *Clin Toxicol (Phila)*. 2019;57(12):1220-1413. doi:10.1080/15563650.2019.1677022
4. Mowry JB, Spyker DA, Cantilena Jr LR, Bailey JE, Ford M. 2012 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 30th Annual Report. *Clin Toxicol (Phila)*. 2013;51(10):949-1229. doi:10.3109/15563650.2013.863906
5. 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. *Clin Toxicol (Phila)*. 2015;53(10):962-1147. doi:10.3109/15563650.2015.1102927
6. 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. *Clin Toxicol (Phila)*. 2016;54(10):924-1109. doi:10.1080/15563650.2016.1245421
7. 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): 34th Annual Report. *Clin Toxicol*. 2017;55(10):1072-1252. doi:10.1080/15563650.2017.1388087
8. 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): 35th Annual Report. *Clin Toxicol*. 2018;56(12):1213-1415. doi:10.1080/15563650.2018.1533727
9. Lai MW, Klein-Schwartz W, Rodgers GC, et al. 2005 Annual report of the American Association of Poison Control Centers' National Poisoning and Exposure Database. *Clin Toxicol*. 2006;44(6-7):803-932. doi:10.1080/15563650600907165
10. Bronstein AC, Spyker DA, Cantilena LR, Green J, Rumack BH, Heard SE. 2006 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS). *Clin Toxicol*. 2007;45(8):815-917. doi:10.1080/15563650701754763
11. Bronstein AC, Spyker DA, Cantilena LR Jr, et al. 2007 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 25th Annual Report. *Clin Toxicol (Phila)*. 2008;46(10):927-1057. doi:10.1080/15563650802559632
12. Bronstein AC, Spyker DA, Cantilena Jr LR, Green JL, Rumack BH, Giffin SL. 2008 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 26th Annual Report. *Clin Toxicol (Phila)*. 2009;47(10):911-1084. doi:10.3109/15563650903438566
13. Bronstein AC, Spyker DA, Cantilena Jr LR, Green JL, Rumack BH, Giffin SL. 2009 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 27th Annual Report. *Clin Toxicol (Phila)*. 2010;48(10):979-1178. doi:10.3109/15563650.2010.543906
14. 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. *Clin Toxicol*. 2011;49(10):910-941. doi:10.3109/15563650.2011.635149
15. Bronstein AC, Spyker DA, Cantilena LR Jr, Rumack BH, Dart RC. 2011 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 29th Annual Report [published correction appears in *Clin Toxicol (Phila)*. 2014 Dec;52(10):1286-7]. *Clin Toxicol (Phila)*. 2012;50(10):911-1164. doi:10.3109/15563650.2012.746424
16. Mowry JB, Spyker DA, Cantilena LR Jr, McMillan N, Ford M. 2013 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 31st Annual Report. *Clin Toxicol (Phila)*. 2014;52(10):1032-1283. doi:10.3109/15563650.2014.987397
17. American Association of Poison Control Centers. National Poison Data System. Personal communication. January 25, 2019.
18. MacKay J, Samuel E, Safe Kids Worldwide. *Medicine Safety: A Key Part of Child-Proofing Your Home*. Washington, D.C.; 2019. <https://www.safekids.org/research-report/medicine-safety-key-part-child-proofing-your-home>.
19. Graph created using total number of single substance pharmaceutical exposure cases among children under age 6 extracted from Annual Reports of the AAPCC's National Poison Data System (NPDS) (Years 2006-2018). <https://aapcc.org/annual-reports>. Accessed January 16, 2020.
20. IQVIA Institute. *Medicine Use and Spending in the U.S.* <https://www.iqvia.com/insights/the-iqvia-institute/reports/medicine-use-and-spending-in-the-us-a-review-of-2018-and-outlook-to-2023>. Published 2019. Accessed December 11, 2019.
21. Quintiles IMS. *America's Love Affair With Prescription Medication*. <https://www.consumerreports.org/prescription-drugs/too-many-meds-americas-love-affair-with-prescription-medication/#nation>. Published 2017. Accessed November 19, 2019.
22. U.S. Census Bureau. *Historical National Population Estimates: July 1, 1900 to July 1, 1999*. <https://www.census.gov/population/estimates/nation/popclockest.txt>. Published 2000. Accessed December 11, 2019.
23. U.S. Census Bureau. *Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018*. <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>. Published 2018. Accessed February 10, 2020.
24. Consumer Healthcare Products Association. *OTC Retail Sales 1964-2018*. <https://www.chpa.org/OTCRetailSales.aspx>. Published 2018. Accessed January 17, 2020.
25. He W, Sengupta M, Velkoff VA, Debarros KA, U.S. Census Bureau. *65+ in the United States: 2005 Current Population Reports Special Studies*. Washington, D.C.; 2005.
26. U.S. Census Bureau. 2018: American Community Survey 5-Year Estimates Data Profiles. <https://data.census.gov/cedsci/table?q=&d=ACS 5-Year Estimates Data Profiles&tid=ACSDPSY2018.DP05&q=&lastDisplayedRow=93>. Published 2020. Accessed January 29, 2020.
27. University of Michigan Institute for Healthcare Policy & Innovation. *Safely Storing Medication Around Grandchildren*. Ann Arbor, Michigan; 2019. [https://deepblue.lib.umich.edu/bitstream/id/538029/NPHA\\_Grandparents-Report\\_FINAL-070119.pdf](https://deepblue.lib.umich.edu/bitstream/id/538029/NPHA_Grandparents-Report_FINAL-070119.pdf). Accessed December 4, 2019.
28. U.S. Census Bureau. *Grandparents living with own grandchildren under 18 years by responsibility for own grandchildren by presence of parent of grandchildren and age of grandparent, year 2018*. <https://data.census.gov/cedsci/table?q=B10051&g=&lastDisplayedRow=10&table=B10051&tid=ACS DT1Y2018.B10051>. Published 2019. Accessed November 21, 2019.
29. U.S. Census Bureau. *Grandparents living with own grandchildren under 18 years by responsibility for own grandchildren by length of time responsible for own grandchildren for the population 30 years and over by age of grandparent, year 2005*. [https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_05\\_EST\\_B10050&prodType=table](https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_05_EST_B10050&prodType=table). Published 2005. Accessed February 10, 2020.

30. Pew Research Center. *Raising Kids and Running a Household: How Working Parents Share the Load*. Washington, DC; 2015. <https://www.pewsocialtrends.org/2015/11/04/raising-kids-and-running-a-household-how-working-parents-share-the-load/>. Accessed March 5, 2020.
31. U.S. Census Bureau. The Majority of Children Live With Two Parents, Census Bureau Reports. <https://www.census.gov/newsroom/press-releases/2016/cb16-192.html>. Published 2016. Accessed March 5, 2020.
32. Pew Research Center. Fighting Poverty in a Bad Economy, Americans Move in with Relatives. <https://www.pewsocialtrends.org/2011/10/03/fighting-poverty-in-a-bad-economy-americans-move-in-with-relatives/>. Published 2011. Accessed January 22, 2020.
33. Generations United. State of Grandfamilies 2016: *Raising the Children of the Opioid Epidemic: Solutions and Support for Grandfamilies*. Washington, D.C.; 2016. <https://www.fatherhood.gov/library-resource/state-grandfamilies-2016-raising-children-opioid-epidemic-solutions-and-support>. Accessed November 21, 2019.
34. Anderson L, U.S. Census Bureau. The Opioid Prescribing Rate and Grandparents Raising Grandchildren: State and County Level Analysis (working paper). Washington, D.C.; 2019. <https://www.census.gov/content/dam/Census/library/working-papers/2019/demo/sehsd-wp2019-04.pdf>. Accessed November 21, 2019.
35. The Henry J. Kaiser Family Foundation. Data Note: Prescription Drugs and Older Adults. <https://www.kff.org/health-reform/issue-brief/data-note-prescription-drugs-and-older-adults/>. Published 2019. Accessed November 21, 2019.
36. Centers for Disease Control and Prevention (CDC). Prescription drug use in the past 30 days, by sex, race and Hispanic origin, and age: United States, selected years 1988–1994 through 2013–2016. <https://www.cdc.gov/nchs/data/hus/2018/038.pdf>. Published 2018. Accessed December 2, 2019.
37. Ferguson RW, Samuel E, Safe Kids Worldwide. *Keeping Families Safe Around Medicine*. Washington, D.C.; 2014. [https://www.safekids.org/med\\_report\\_2014](https://www.safekids.org/med_report_2014).
38. Brass EP, Reynolds KM, Burnham RI, Green JL. Frequency of Poison Center Exposures for Pediatric Accidental Unsupervised Ingestions of Acetaminophen after the Introduction of Flow Restrictors. *J Pediatr*. 2018;198:254-259.e1. doi:10.1016/j.jpeds.2018.02.033
39. Lovegrove MC, Hon S, Geller RJ, et al. Efficacy of Flow Restrictors in Limiting Access of Liquid Medications by Young Children. *J Pediatr*. 2013;163(4):1134-1139.e1. doi:10.1016/j.jpeds.2013.05.045
40. Paul IM, Reynolds KM, Delva-Clark H, Burnham RI, Green JL. Flow Restrictors and Reduction of Accidental Ingestions of Over-the-Counter Medications. *Am J Prev Med*. 2019. doi:10.1016/j.amepre.2018.12.015
41. Brass EP, Reynolds KM, Burnham RI, Green JL. Medication Errors With Pediatric Liquid Acetaminophen After Standardization of Concentration and Packaging Improvements. *Acad Pediatr*. 2018. doi:10.1016/j.acap.2018.03.001
42. Wang GS, Severtson SG, Bau GE, Dart RC, Green JL. Unit-Dose Packaging and Unintentional Buprenorphine-Naloxone Exposures. *Pediatrics*. 2018;141(6):e20174232. doi:10.1542/peds.2017-4232
43. Centers for Disease Control and Prevention (CDC). PROTECT Initiative: Advancing Children's Medication Safety. [https://www.cdc.gov/medicationsafety/protect/protect\\_initiative.html](https://www.cdc.gov/medicationsafety/protect/protect_initiative.html). Published 2017. Accessed December 19, 2019.
44. Kendrick D, Majsak-Newman G, Benford P, et al. Poison prevention practices and medically attended poisoning in young children: multicentre case-control study. *Inj Prev*. 2017;23(2):93-101. doi:10.1136/injuryprev-2015-041828
45. McFee RB, Caraccio TR. "Hang Up Your Pocketbook" -- an easy intervention for the granny syndrome: grandparents as a risk factor in unintentional pediatric exposures to pharmaceuticals. *J Am Osteopath Assoc*. 2006;106(7):405-411. <http://www.ncbi.nlm.nih.gov/pubmed/16912339>.
46. MacKay J, K M, Steel A, Safe Kids Worldwide. *Safe Medicine Storage: A Look at the Disconnect Between Parent Knowledge and Behavior*. Washington, D.C.; 2017. <https://www.safekids.org/research-report/safe-medicine-storage-look-disconnect-between-parent-knowledge-and-behavior>.
47. Prepared for Safe Kids Worldwide by Salter Mitchell. *Medication Messages: Evaluating Message Concepts and Language (Internal Document)*. Tallahassee, FL; 2013.
48. 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. <http://wonder.cdc.gov>. Accessed February 29, 2012.
49. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. [www.cdc.gov/injury/wisqars](http://www.cdc.gov/injury/wisqars). Accessed January 19, 2019.
50. Consumer Healthcare Products Association. *Safe Dosing Attitude & Behavior Study*; 2018. <https://chpa.org/ParentsSafeLiquidOTCMedicine.aspx>.
51. MacKay J, Samuel E, Safe Kids Worldwide. *Safe Medicine Storage: Recent Trends and Insights for Families and Health Educators*. Washington, D.C.; 2018. <https://www.safekids.org/research-report/safe-medicine-storage>.
52. Franklin RL, Rodgers GB. Unintentional Child Poisonings Treated in United States Hospital Emergency Departments: National Estimates of Incident Cases, Population-Based Poisoning Rates, and Product Involvement. *Pediatrics*. 2008;122(6):1244-1251. doi:10.1542/peds.2007-3551
53. U.S. Consumer Product Safety Commission. Poison Prevention Packaging Act Business Guidance. <https://www.cpsc.gov/Business--Manufacturing/Business-Education/Business-Guidance/PPPA>. Published 2013. Accessed November 23, 2019.
54. Mackay J, Steel A, Samuel E, Creppy T, Green A, Safe Kids Worldwide. *The Rise of Medicine in the Home: Implications for Today's Children*. Washington, D.C.; 2016. <https://www.safekids.org/research-report/rise-medicine-home-implications-todays-children-march-2016>.
55. United States Consumer Product Safety Commission. National Electronic Injury Surveillance System. [Online]. Codes used: ages 0 to 5 years, all races, both sexes, year 2015, diagnosis 68; body part 85. <http://www.cpsc.gov/en/Research--Statistics/NEISS-Injury-Data/>. Accessed January 12, 2017.
56. Schmetzmann M, Williamson A, Black D. Unintentional poisoning in young children: Does developmental stage predict the type of substance accessed and ingested? *Child Care Health Dev*. 2014;40(1):50-59. doi:10.1111/j.1365-2214.2012.01424.x
57. Hagan J, Duncan P. *Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents*, 4th Edition. Elk Grove Village, IL; 2017.
58. Gittelman C, Bishop E, Gittelman M, Byczkowski T. *Candy or Medicine: Can Children Tell the Difference?* (conference paper). 2011 American Academy of Pediatrics National Conference and Exhibition, Boston, MA. [https://www.researchgate.net/publication/267912071\\_Candy\\_or\\_Medicine\\_Can\\_Children\\_Tell\\_the\\_Difference](https://www.researchgate.net/publication/267912071_Candy_or_Medicine_Can_Children_Tell_the_Difference)
59. Ferguson RW, Mickalide A, Safe Kids Worldwide. *An In-Depth Look at Keeping Young Children Safe Around Medicine*. Washington, D.C.; 2013. <https://www.safekids.org/medsreport>.
60. Makki M, Hassali MA, Awaisu A, Hashmi F. The Prevalence of Unused Medications in Homes. *Pharmacy (Basel)*. 2019;7(2):61. Published 2019 Jun 13. doi:10.3390/pharmacy7020061
61. Washington Poison Center. *Medicine Disposal Myths and Facts*. <http://www.takebackyourmeds.org/what-you-can-do/medicine-disposal-myths-and-facts/>. Accessed January 17, 2020.

62. U.S. Food and Drug Administration. Drug Disposal: Flush Potentially Dangerous Medicine. <https://www.fda.gov/drugs/disposal-unused-medicines-what-you-should-know/drug-disposal-flush-potentially-dangerous-medicine>. Published 2019. Accessed December 4, 2019.
63. U.S. Food and Drug Administration. Drug Disposal: Dispose "Non-Flush List" Medicine in Trash. <https://www.fda.gov/drugs/disposal-unused-medicines-what-you-should-know/drug-disposal-dispose-non-flush-list-medicine-trash>. Published 2019. Accessed December 5, 2019.
64. McD Taylor D, Robinson J, MacLeod D, MacBean CE, Braitberg G. Therapeutic errors among children in the community setting: nature, causes and outcomes. *J Paediatr Child Health*. 2009;45(5):304-309. doi:10.1111/j.1440-1754.2008.01462.x
65. Feil M. Distractions and Their Impact on Patient Safety. *Pennsylvania Patient Saf Advis*. 2013;10(1):1-10.
66. Grissinger M. Sidetracks on the safety express: interruptions lead to errors and ... wait, what was I doing? *P T*. 2015;40(3):145-190. <https://www.ncbi.nlm.nih.gov/pubmed/25798035>.
67. Prepared for Safe Kids Worldwide by Salter Mitchell. *Medication Safety: Perspectives on Dosage and Access from Mothers and Grandparents (Internal Document)*. Tallahassee, FL; 2012.
68. Shonna Yin H, Parker RM, Sanders LM, et al. Pictograms, Units and Dosing Tools, and Parent Medication Errors: A Randomized Study. *Pediatrics*. 2017;140(1). doi:10.1542/peds.2016-3237
69. U.S. Food and Drug Administration. Questions and Answers on Guidance for Industry: Dosage Delivery Devices for Orally Ingested OTC Liquid Drug Products. <https://www.fda.gov/drugs/medication-errors-related-cder-regulated-drug-products/questions-and-answers-guidance-industry-dosage-delivery-devices-orally-ingested-otc-liquid-drug>. Published 2018. Accessed December 4, 2019.
70. van Ittersum K, Wansink B. Stop spoon dosing: Milliliter instructions reduce inclination to spoon dosing. *BMC Res Notes*. 2016;9(1):33. doi:10.1186/s13104-015-1809-1
71. Trivedi H, Trivedi A, Hannan MF. Readability and comprehensibility of over-the-counter medication labels. *Ren Fail*. 2014;36(3):473-477. doi:10.3109/0886022X.2013.872571
72. National Center for Education Statistics. Adult Literacy in the United States. <https://nces.ed.gov/datapoints/2019179.asp>. Published 2019. Accessed January 8, 2020.
73. Kelly NR, Harding JT, Fulton JE, Kozinetz CA. A randomized controlled trial of a video module to increase U.S. poison center use by low-income parents. *Clin Toxicol*. 2014;52(1):54-62. doi:10.3109/15563650.2013.863328
74. Kelly NR, Huffman LC, Mendoza FS, Robinson TN. Effects of a videotape to increase use of poison control centers by low-income and Spanish-speaking families: A randomized, controlled trial. *Pediatrics*. 2003;111(1):21-26. doi:10.1542/peds.111.1.21
75. Gallup. Nurses Again Outpace Other Professions for Honesty, Ethics. <https://news.gallup.com/poll/245597/nurses-again-outpace-professions-honesty-ethics.aspx>. Published 2018. Accessed December 11, 2019.
76. Yuma P, MacKay M, Hunt A. *Prevention of Unintentional Medication Overdose by Children in the Home: An Analysis of Evidence-Based Strategies for Safe Kids Coalitions (Internal Document)*. Washington, D.C.; 2019.
77. Broderick M, Dodd-Butera T, Wahl P. A Program to Prevent Iron Poisoning Using Public Health Nurses in a County Health Department. *Public Health Nurs*. 2002;19(3):179-183. doi:10.1046/j.0737-1209.2002.19305.x
78. Larmené-Beld KHM, Alting EK, Taxis K. A systematic literature review on strategies to avoid look-alike errors of labels. *Eur J Clin Pharmacol*. 2018;74(8):985-993. doi:10.1007/s00228-018-2471-z
79. Prepared for Safe Kids Worldwide by Marketing for Change. *Medicine Safety Focus Group Research Report (internal document)*. Alexandria, VA; 2018.
80. Fetters M. Virtual Mentor (Review). *Ethics J Am Med Assoc*. 2005;7(6):438-441.
81. Jaen CR, Stange KC, Nutting PA. Competing Demands of Primary Care: A Model for the Delivery of Clinical Preventive Services. 1994;38(2):166-171.
82. National Academies Press. *The Future of the Public's Health in the 21st Century*. Washington, D.C.: National Academies Press;2003. doi:10.17226/10548
83. National Safety Council. What You Can Do to Stop Opioid Misuse. <https://www.nsc.org/home-safety/safety-topics/opioids/what-you-can-do>. Published 2019. Accessed December 9, 2019.
84. American Medical Association Task Force to Reduce Opioid Abuse. Promote Safe Storage and Disposal of Opioids and All Medications. <https://www.end-opioid-epidemic.org/wp-content/uploads/2017/05/opioid-safe-storage-and-disposal.pdf>. Accessed December 13, 2019.
85. U.S. Drug Enforcement Administration. Take Back Day. <https://takebackday.dea.gov/>. Published 2019. Accessed December 10, 2019.
86. U.S. Drug Enforcement Administration. Another Huge Turnout at DEA's National Prescription Drug Take-Back Event. <https://www.dea.gov/press-releases/2011/05/06/another-huge-turnout-deas-national-prescription-drug-take-back-event>. Published 2011. Accessed December 10, 2019.
87. U.S. Drug Enforcement Administration. Drug Disposal: Drug Take Back Locations. <https://apps2.deadiversion.usdoj.gov/pubdispsearch/spring/main?execution=e2s1>. Accessed December 13, 2019.
88. Ferguson RW, Osterthaler K, Kaminski S, Green A, Safe Kids Worldwide. *Medicine Safety for Children: An In-Depth Look at Calls to Poison Centers*. Washington, D.C.; 2015. <https://www.safekids.org/research-report/medicine-safety-children-depth-look-calls-poison-centers-march-2015>.
89. Scholastic. *Over the Counter Medicine Safety*. New York, NY <http://www.scholastic.com/otc-med-safety/OTC-Medicine-Safety-Community-All.pdf>.

#### Suggested citation:

Chandler MD, MacKay JM, Samuel E, Hunt A, Simenstad S. Keeping Kids Safe Around Medicine: Insights and Implications. Washington, D.C.: Safe Kids Worldwide, 2020.



Support Provided By



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

[www.safekids.org](http://www.safekids.org)

© 2020 Safe Kids Worldwide