Toy Age-Labeling: An Overview for Pediatricians of How Toys Receive Their Age Safety and Developmental Designations

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abstract

Injuries related to toys continue to cause significant childhood morbidity and mortality, despite considerable government regulation of the toy industry. Recent controversy related to toys that contain strong magnets demonstrate the dangers they pose to children. The pediatric community is often unaware of how toys receive their developmental and safety labeling and the degree to which age-labeling on toys can be discretionary. Toy labeling has 2 basic manifestations. The first, safety labeling for hazards like small parts, balloons, or small balls that may present a choking risk, is mandatory. The second, "developmental" age-labeling, describes the age of the children for which the toy is intended, and sometimes has discretionary components. This article provides a review of the regulations governing toy age-safety standards and how they are reflected on toy packaging to help pediatric practitioners apply safety advice across settings and patient characteristics. We review the existing age-labeling regulations and processes and discuss the major areas where children remain vulnerable despite labeling. Finally, we list some recommendations for counseling parents about toy safety.

Purchasing toys for children is often a confusing experience for parents who want to choose a toy that the child will not only like, but will also be able to play with appropriately and safely. Success depends on understanding the child's specific developmental needs and capabilities.[1] Age-labeling of toys is a way to guide purchasing decisions for the typically developing child, but it is important for pediatricians to understand the nature of and basis for these labels to advise parents about toy safety practices. This is necessary because, despite tight governmental regulations, >200 000 visits are made annually to US emergency departments (EDs) for toy-related injuries,[2,3] including 18 deaths in the last year for which there are complete data.[2]

Therefore, toy safety remains a significant cause of concern for the pediatrician.[4] Although the toy related mortality is down from 2 decades ago,[5] US toy-related deaths remain greater than annual mortality from meningococcemia or appendicitis.[6] Moreover, rates of injuries increase periodically, especially around the introduction of new toys to the market, such as was seen after the introduction of scooters.[3] Recently, Buckyballs, a rare earth magnet set made up of hundreds of small, powerful magnets made headlines for causing significant morbidity[7] (especially bowel necrosis[8]) in children, highlighting the fact that

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serious toy-related injuries occur despite government regulations.

Most toys are safe when measured by the frequency of use and exposure, and the majority of toy-related injuries treated in EDs are minor.[9] One-third of all toy-related injuries occur in children <5 years with a significant spike occurring at age 2 years.[2,3] Injuries increase during the summer and boys have twice as many as girls. Most nonfatal, toy-related, ED-treated injuries occur because of riding toys (especially scooters[2] and tricycles[10]). Falls are the most common mechanism, and lacerations, contusions or abrasions are the most common injuries. The head and face are the most commonly injured body parts. However most fatal toy injuries are caused by airway obstruction.[2] As highlighted in the American Academy of Pediatrics' Policy Statement on Prevention of Choking, choking is a significant cause of morbidity in children <3 years of age and one-third of all choking episodes involve nonfood items.[4] The majority of choking fatalities result from nonfood items,[11] often toys.

The purpose of this article is to familiarize pediatric practitioners with the regulations governing toy age-related safety standards and how they are reflected in toy labels to advise parents across settings and patient characteristics. Below, we review the existing age-labeling regulations and discuss the major areas where age-labeling falls short of providing adequate safeguards. Finally we list some recommendations that we hope will be useful in counseling parents about toy safety.

UNDERSTANDING TOY LABELING

The governmental agency in the United States responsible for oversight and regulation of the toy industry is the Consumer Product Safety Commission (CPSC). It has the responsibility to develop toy safety standards and to recall and ban unsafe toys.[12] An important aspect of the CPSC's job is ensuring that toys have appropriate labeling so that consumers are easily able to decipher which toys are appropriate and safe for which children.

Currently, age-labeling of toys has 2 basic components. First, age-related warning labeling is required for certain toys that may present a hazard to young children.[13] Toys with small parts, balloons, or small balls make up the bulk of age-related warning labeling requirements. Regulation of this aspect is strict and is strictly enforced. It reflects the fact that most toy-related deaths occur in small children and result from choking. Second, "developmental" age-labeling describes the age of the children for whom the toy is intended when it does not have a small parts warning. This developmental determination is done by manufacturers via a third party that assesses appropriate safety testing requirements, but does not uniformly need to appear on all the toys' packaging. Most consumers and pediatricians are unaware that this developmental age-labeling seen on toy packaging is not uniformly a legal requirement. Rather, on many toys, it is a self-imposed industry practice that is subject to other interests of the manufacturer.

Small Parts

Because of the high rates of choking fatalities, it is not surprising that small parts, balloons, and balls have the oldest, clearest, and most stringent safety regulations. Pediatricians will immediately recognize why young children are so vulnerable to airway obstruction.[14] Anatomically, they have small tracheas and easily become victims of upper airway obstruction. From a behavioral perspective, young children commonly put objects in their mouths as they explore their environment.[15] Additionally, young children lack the tussive force necessary to expel a foreign body.[16] Therefore, both the decreased ability of a young child to overcome a partially aspirated object and the small radius of the trachea make young children vulnerable to airway obstruction.

These developmental characteristics apply to typically developing children. Many children do not follow this pattern: those who maintain mouthing behavior longer, or who have chronic conditions, such as neuromuscular diseases accompanied by weak cough, gag, and swallow reflexes, and those with poor growth remain at risk, despite older chronological age.

The Federal Hazardous Substance Act of 1960 was established with typical anatomic and developmental patterns in mind to ensure cautionary labeling on items with potential hazardous components. The Federal Hazardous Substance Act mandates warning labels on the packaging of small balls, balloons, marbles, and certain toys that contain "small parts." Any toy that is determined to be for children ≤3 years cannot go to market if the toy is found to have any "small parts."[13] In 2008, the Consumer Product Safety Improvement Act adopted additional existing industry standards, created by a third party international standards organization, that required any "toy"(ie, any object designed, manufactured, or marketed as a plaything for children ≤14 years of age) be third party–tested for compliance with all applicable children's product safety rules (eg, small parts, sharp edges, magnet strength, lead paint, and phthalates, among many more). Items thought to be appropriate only for those ≥15 years are not considered toys at all under the guidelines.[17,18]

Two rounds of testing are used to determine if a toy has a "small part." First, toy components are placed into

a hollow cylinder called the "small parts test cylinder," with an interior diameter of 1.25 inches and a depth of 1–2.25 inches.[17] If any component of a toy fits through this fixture, it is considered a "small part." These dimensions were developed by the CPSC to distinguish between toys that were involved in choking incidents and those that were not. Although not intended to replicate the dimensions or physiology of a child's airway, this method has been accepted worldwide as the gold standard for small parts testing.

If the toy does not fit into the testing cylinder (ie, passes the first round of testing), it is subject to a second round of testing that mimics "normal use and abuse." This testing includes differing quantities of impact, torque, tension, flexure, and compression. Toys intended for children 18 months to 6 years of age receive more rigorous durability testing to mimic this age group's greater ability to damage toys.[17] If any parts break off, those parts must be evaluated for general safety, such as sharp edges,[17] and run through the "small parts test cylinder" again.

If a toy is deemed to contain "small parts" in either round of testing, there are 3 potential outcomes. Those determined to be developmentally appropriate for children >6 years need no further testing or labeling. If the toy is determined to be developmentally appropriate for children between the ages of 3 and 6 years, then the toy must bear the safety warning: "WARNING: CHOKING HAZARD–Small Parts. Not for children under 3 years." Finally, if the toy is determined to be for children ≤3 years, the toy cannot go to market in its current form.[13]

Special Category Toys

Toys have different mechanisms of airway obstruction. Two particularly harmful offenders are balloons and balls/marbles. These items therefore have separate safety labeling and testing requirements. Because round toys can slide deep into a child's airway and create a tight-fitting obstruction that is particularly difficult to extricate, they carry higher risks of choking deaths.[19]

Balls have a special testing mechanism: the ball is placed on a plank with a 1.75 inch (larger than the dimensions of the test cylinder) circular cutout. If it is able to fit through this diameter and is intended for children >3 years old, then it must be labeled: "WARNING: CHOKING HAZARD–This toy is a small ball. Not for children under 3 years."[13] If the ball is considered to be for a child <3 years old, it cannot be brought to market.

Balloons are the leading cause of choking death in children <6 years because they are played with near the mouth and can mold into the shape of a child's airway.[20] Therefore, all balloon packaging must bear the following warning label: "WARNING: CHOKING HAZARD–Children under 8 years can choke or suffocate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons from children. Discard broken balloons at once."[13]

Toys with magnets also have special rules pertaining to safety. If a magnet-containing product is deemed to be a toy for children ≤14 years old, then the magnet cannot be loose or hazardous. As will be described later, this vague magnet regulation has been further clarified as a result of the high morbidity that was associated with Buckyballs.

Developmental Determinations

Ultimately, 3 factors are used to determine the final age for which a toy is intended: (1) the manufacturer's proposed age for the toy's packaging; (2) the target audience for advertising, promotion, and marketing; and (3) whether the toy is commonly recognized as being for a certain age.[21]

Although developmental age-labeling on toys' packaging is not uniformly required by law, toy-makers do not have the authority to decide unilaterally what the target age is for a specific toy. Toy makers must use a third party laboratory certified by the CPSC to conduct developmental age assessments guided by a CPSC protocol outlined in *Age Determination Guidelines: Relating Children's Ages to Toy Characteristics and Play Behavior*.[22] This 2002 document was based on recommendations from the company Play Today. Many of the protocol's recommendations were based on the seminal work of Piaget and on a literature review of articles published on children's play. The company also conducted an original, survey-based study on the toy purchasing decisions of adults and a prospective observational study assessing how children interact with toys. The subsequent developmental determination guidelines broadly identify 7 "play categories" and 21 general subcategories as indicated in Table 1. Once it is decided what type of toy the product falls into, the age determination is made, guided by looking at 14 basic characteristics of the toy, such as the size of parts, number of parts, motor skills required, and level of realism/detail. Based on the specific characteristics, the appropriate age determination is made. There are some unilateral age determinations. For example, sharply pointed toys cannot be sold for children <4 years, and electrically operated toys, regardless of features, are always deemed inappropriate for children <8 years and require a warning label: "CAUTION–ELECTRIC TOY: Not recommended for children under __ years of age. As with all electric products, precautions should be observed during handling and use to prevent electric shock."[23] Although the age label cannot be <8 years, it

TABLE 1 Play Categories

Play Categories	Play Subcategories
Early exploratory/practice play	Mirrors, mobile, manipulatives
	Push and pull toys
Construction play	Blocks
	Interlocking building materials
Pretend and role play	Dolls and stuffed toys
	Play scenes and puppets
	Dress-up materials
	Small vehicle toys
	Tools and props
Game and activity play	Puzzles
	Card, board, and table games
	Computer and video games
Sports and recreational play	Ride-on toys
	Recreational equipment (eg, hoops and tents)
	Sports equipment
Media play	Arts and crafts
	Audiovisual equipment (eg, CDs and DVDs)
	Musical instruments
Educational and academic play	Books
	Learning toys (eg, "press and guess" toys)
	Smart toys and educational software

Further defined by 14 toy characteristics: size of parts, shape of parts, number of parts, interlocking/loose parts, materials, motor skills required, color/contrast, cause and effect, sensory elements, level of realism/detail, licensing, classic, robotic/smart features, and educational level.

may be an older age, depending on the features and marketing of the toy. On the other hand, battery operated ride-on toys, such as a Power Wheel car, are for ages ≥3 years and must be labeled as such in addition to all the other required warning labels not related to age.

For some toys, there are strict labeling rules, but for others, it is left to private industry, and market considerations come into play. For example, 2 companies with similar toys can label them for different age ranges while still being compliant with CPSC regulations, provided they both passed the standard that defines the lower age group. The discrepancy can reflect differing company sales goals. Company A may look to market its toy to an older age group, whereas company B may want to direct its marketing efforts of the same type of toy to the lower part of the approved age range, and there is no regulation against their developmental labeling reflecting that business decision. For further discussion see the paragraph below, Buckyballs: CPSC in Action.

OTHER CPSC REGULATIONS RELATED TO TOYS

The CPSC has many other safety regulations pertaining to flammability, sound level, sharp edges, lead paint, phthalate levels, and other hazardous chemicals.[13,18] These potential safety concerns prevent some toys from ever going to market and mandate specific safety warnings on others. Despite government regulators' best efforts to keep unsafe toys off the market, new technologies and applications of old technologies to new toys pose unrecognized threats to safe play. Inevitably, the discovery of these dangers lags behind their popularity among children. Often, laws made to protect children from potential dangers occur only after a series of unfortunate events bring new risks to light. For example, lead paint has been known since the turn of the 20th century to cause significant health problems in children,[24] but its presence in toys was not formally banned until 1960. Even today, many products still reach the market with lead paint and must be recalled after children's exposure to them has already occurred.[25]

RECALL PROCESS

The CPSC is also entrusted with continued monitoring of toys already on the market and must recall unsafe consumer products. About 100 children's products per year are recalled.[26] To survey the market effectively for potentially hazardous products, the CPSC pools information from hospital databases and coroners' offices and monitors news media for potential tipoffs.[27] Consumers have a right to report safety and compliance problems directly to the CPSC, but most recalls originate from consumer complaints made directly to the manufacturer. If the manufacturer obtains enough information supporting a product's failure to comply with CPSC rules or voluntary standards, the breach must be reported to the CPSC.[28]

The CPSC then decides if the claim necessitates a partial recall (eg, a repair), total recall, or if a warning needs to be released.[28] The full course of a recall can take weeks to months and depends on many factors, including the severity of danger to the consumer, legal disputes, and financial concerns. The recall process is usually done in tandem with the manufacturer, but it can be done in opposition to the manufacturer's claims.

Once a product is recalled, there are many avenues that the CPSC and companies employ to make the public aware of recalled toys. These include the use of social media, press releases, and posters on display at toy stores and pediatricians' offices.[28] Parents need to be aware of these advertising systems because manufacturers rarely advertise recalls in mass media. Additionally, despite being recalled, toys that are already on the market are often re-sold on e-commerce websites

and other international markets that are not under the legal control of the CPSC.[29] Although there are international toy safety standards, every country has different enforceable laws regulating toy safety and recalls. In Europe, there has been cooperative oversight of toy safety since the 1980s, whereas in China, the toy industry was not officially regulated until 2007. The combination of poor information distribution and lack of full CPSC control means that many dangerous and recalled products can still make it to US consumers.

BUCKYBALLS: CPSC IN ACTION

To better understand the labeling and recall process, one can look to the case of the Buckyball magnet sets. The CPSC defines a "magnet set" as a product with multiple, manipulable, separable magnets used for entertainment, such as puzzle working, sculpture building, or mental stimulation.[30] When multiple magnets are swallowed they can trap bowel and cause necrosis leading to perforation and fistula formation.[31] From 2002 to 2011, an estimated 16 386 people presented to EDs nationally with possible magnet ingestions.[32] Of the reported US cases, 1 child died, 20 children needed surgery, and 9 other children required endoscopies.[30]

Originally, in 2009, Buckyballs were determined by the CPSC to be appropriate toys for children >9 years.[30] Magnet sets were considered to be developmentally appropriate for children by age 9 because children of that age can begin constructing complex structures, have the advanced reading and attentional skills required to follow the instructions for building complex puzzles, and have likely learned about magnetism in school.[30] Buckyballs contain many "small parts" and therefore pose risks of ingestion and choking and are not appropriate for children ≤3 years. However, because the toy was determined to be developmentally appropriate for children >6 years, it did not, by law, require any warning label. Magnet-based toys can be appropriate for young children, but magnet sets containing multiple small pieces requiring more advanced fine motor and attentional skill are not developmentally appropriate for children <9 years. Despite this age determination, the company marketed them for children >13 years. This is an example of a toy receiving developmental determinations for 1 age (≥9 years) and labeled for another, older age (≥13 years).

In 2010, responding to the growing numbers of injuries, Buckyballs were recalled from the market. This occurred because they were labeled for "Ages 13+" and therefore still considered "toys" subject to toy safety regulations that ban "hazardous" magnets in toys.[17] Thereafter, as injuries continued, Buckyballs were put back on the market with a new packaging warnings: "Keep away from all children!"; "Do not put in nose or mouth. Swallowed magnets can stick to intestines causing serious injury or death. Seek immediate medical attention if magnets are swallowed or inhaled."[33]; and "For age14+." Because the product was now labeled as being for children ≥14 years, it was no longer subject to the hazardous magnet standards of toys. In 2012, after growing morbidity as a result of Buckyballs, the CPSC decided that Buckyballs' warnings labels were not enough to prevent injuries and demanded a full recall. In 2014, CPSC issued new regulations regarding magnet sets. Any magnet set, even those intended for adults, with magnets that could fit within the small parts cylinder must subsequently be of low magnetic attractive force.[30]

SPECIAL CONSIDERATION FOR PEDIATRICIANS

Two populations under pediatricians' care are at special risk. The first group is the large number of younger children in large or multigenerational households in which there are older children. These households often contain toys that a parent would never purchase for the younger child, but the younger child is often within reach of potentially hazardous toys and toy parts designed for the older child. Increasing parental knowledge about choking hazards and other risks is associated with parents appropriately avoiding these risks.[34] If parents can appropriately identify and anticipate the potential hazards, they can help to assure the safety of the younger child without restricting the learning and play opportunities of the older one.

The second group includes children with developmental disabilities, cognitive impairment, behavioral disorders, and a wide range of chronic health conditions. The 2010 US census showed that 5.2% of the ~54 million school-aged children (ages 5–17 years) have some type of disability.[35] Many of these children are at special risk for potential injuries from toys well beyond the ages described on safety labels. The number of children with disabilities is increasing,[36] and therefore children with atypical development are of growing relevance to pediatricians. Children with other impairments, such as gait instability, poor motor control, and neuromuscular deficits, are at increased risk of injuries. Analysis of injury data shows that this population has a higher rate of nonfatal injuries with toys than typically developing children.[37] This population presents a unique challenge to parents who are trying

to ensure safety as well as an optimal and therapeutic play environment.

Children with behavioral issues, such as attention deficit hyperactivity disorder or autism spectrum disorder, pose unique safety challenges. Studies document an increased incidence of injuries in children with attention deficit hyperactivity disorder.[38,39] Other children with developmental issues may mouth and bang toys in a manner that is uncharacteristic for their age. Therefore, the typical developmentally appropriate designation might not apply to them. As a result, in addition to considering chronological age, it is important for parents to consider the developmental age of their child when selecting toys.

Some families have precocious children or believe that their children should be able to play with toys that are recommended only for older children. In these cases, it is important for pediatricians to both counsel parents about the reasons for the developmental age recommendations and encourage them to teach their child to use the toys appropriately, safely, and under supervision.

RECOMMENDATIONS AND CONCLUSIONS

Although consumer protection is better than in the past, regulations alone do not ensure a specific child is playing with developmentally appropriate or safe toys. Therefore, it is important for pediatricians to be aware of the potential hazards and to give basic developmental guidelines regarding toy safety to their patients. Data suggest that many parents purchase toys regardless of labeling indicating the toy is hazardous for their child's age group.[40] Furthermore, for a child with special needs, some parents may not realize that their child may be at increased risk. In addition to helping parents understand their child's individual developmental abilities, the following are our condensed recommendations for pediatricians to educate parents during health care maintenance visits either verbally or as a handout given to parents. These recommendations below are based, in part, on the Centers for Disease Control and Prevention toy safety recommendations, originally proposed by the CPSC.[9]

1. Parents should adhere to age and safety-related warnings on toys.
2. A parent who knows that a child is inclined to mouth objects (regardless of age) should avoid buying toys that have small parts and keep toys for older children that contain small parts out of reach of the child.
3. Parents of children aged <8 years should avoid or supervise the use of toys with sharp edges, points, or heating elements, and those whose children's judgment is impaired should consider an even older age for use of these materials.
4. Purchases should take into consideration all children in the home. Toys intended for older children should be stored and used out of reach of younger siblings or children with impairments, or under adult supervision.
5. Adults should be involved in play when toys are given to young children to demonstrate proper play and, from time to time, monitor continued appropriate use.
6. Parents should ensure that ride-on toys are used in safe areas and children are always appropriately supervised near dangerous areas, such as stairs, traffic, or around swimming pools.
7. Parents should check toys periodically for breakage, and broken toys should be repaired or discarded.
8. There is no limit to the types of objects that children will use as "toys," and parents should be aware of developmental risks of play with non-toy objects, including household objects, as those that are not designated as toys are not subject to the same regulatory oversight.

Although there are no systemic data to quantify the true exposure children have with toys compared with the number of injuries sustained, toys are most often safe and an essential part of positive childhood development. The case of Buckyballs demonstrates that, despite government regulations, toys can still be harmful to children, and as new products come on the market, the regulations often lag behind potential dangers. The CPSC's actions highlight the fact that warning labels fall short of addressing all relevant safety concerns and cannot replace parental supervision and education. Additionally, there is no single recipe for developmental progression of children's abilities, especially for children with special needs. Therefore, parental education and supervision is the best protection.

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ABBREVIATIONS

CPSC: Consumer Product Safety Commission
ED: emergency department

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