

## Playing Safe

### Hidden Hazards Lurking in School Yards & Parks

By Howard W. Spencer



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Playgrounds are an important part of childhood growth. They provide an ostensibly safe place to test muscles, learn personal interaction and build confidence. But playgrounds also can be hazardous if equipment is improperly installed or maintained.

Injuries are not confined to aging playgrounds; a national survey of 760 playgrounds revealed that 87% lacked adequate protective surfaces, 42% had equipment with head-entrapment hazards and 40% had equipment with protruding parts that could cause clothing to become entangled. Overall, 43% of playgrounds surveyed had at least one piece of hazardous equipment.

#### History

The U.S. Consumer Product Safety Commission (CPSC) has long recognized the hazards that can exist with the use of playground equipment, with an estimated 200,000 estimated emergency room-treated injuries and 15 deaths annually. Experts generally agree most of those could be prevented if playground owners and operators follow safety standards, and if manufacturers design equipment carefully and adequately warn users. Safe design, proper warnings and adherence to safe stan-

dards of operation should not be too much to ask to keep children safe.

#### Applicable Standards

CPSC first published its Public Playground Safety Handbook in 1981 and has updated it several times since, most recently in November 2010.

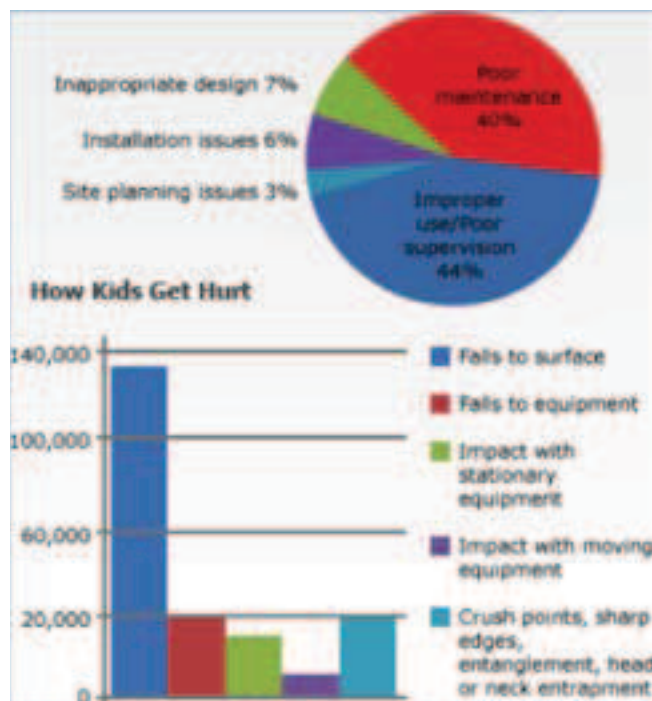
American Society for Testing and Materials (ASTM) International produces two of the most widely recognized standards for playground equipment: ASTM F1487, Standard Consumer Safety Performance Specification for Playground Equipment for Public Use and ASTM F 2373-11, Standard Specification for Playground Equipment for Public Use by Children 6 to 23 months.

ASTM F1487 is updated every 3 years and is the basis for the certified playground safety inspector (CPSI) designation. The original standard, F1487-93, was published in 1993 most recently replaced by the current version, F1487-11.

CPSC document #325 and ASTM F1487 do not always agree and do not cover the same subject matter. CPSC #325 is a user guideline and ASTM F1487 is essentially a specification for manufacturers that has become the

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**FIGURE 1**  
**How Kids Get Hurt**



## Playground Safety Stats

- About 75% of all nonfatal playground-related injuries occur on public playgrounds.
- Playground-related injuries cost an estimated \$1.2 billion in 1995.
- Girls are more prone to playground-related injuries than boys (55% to 45%, respectively).
- Climbing apparatus is the most dangerous equipment on public playgrounds.

standard of care. CPSC covers elements such as supervision and sight lines, while ASTM includes information about structural integrity that can only be evaluated in a factory setting.

## Duty of Care

The law says owners of property with playgrounds and their management staff have a legal duty of care (obligation) to make playgrounds and adjacent areas safe for children. This means property owners and management staff must do everything reasonably possible to ensure the safety and well being of children invited to use the playground. This includes repairing or eliminating dangerous conditions. The duty of care extends to mall and restaurant owners, daycare centers, municipalities, parents, daycare workers and teachers, animal owners and others.

When a playground owner fails to do everything reasonably possible to make the playground safe and a child is hurt, the owner is said to have breached his duty of care. The nature of the breach is negligence. Negligence makes the responsible party liable for the injured child's damages.

California, Connecticut, Michigan, New Jersey, New York and Texas have playground safety laws, but they do not all recognize both CPSC and ASTM. In states that do not have playground laws, both CPSC and ASTM are normally considered to be the standard of care.

## Common Playground Hazards

Many kinds of playground hazards exist relating to equipment, environment and, sadly, lack of child supervision. National Playground Safety Institute (NPSI) has identified the most common playground hazards, which it calls the Dirty Dozen:

- 1) Improper playground surface: Rocks, grass, gravel, cement, brick and stone are all highly inappropriate playground ground surface covers.
- 2) No falling zone in place. A fall zone means a decent amount of space is located under and surrounding play equipment. Equipment lacking a fall zone of at least 6 ft on all sides is a playground hazard. The fall zone must have proper ground covering.
- 3) Choking and entanglement hazards. Equipment that can snag a child's hair or coat creates potential for tangling and or choking.
- 4) Broken or missing rails. On an open platform it is far too easy for a child to fall off and be seriously hurt if proper railing is missing.
- 5) Overcrowding of equipment. playground equipment placed extremely close together creates congestion. A child could fall onto another piece of equipment, which is worse than falling on proper ground covering. All equipment must be a proper distance apart: at least 6 ft, which covers the fall zone. Further apart is better.
- 6) Trip hazards. A small trip can be just as harmful as a high fall. Cracked sidewalks, concrete, wood, ripped groundcovers and broken pieces of equipment can all become trip hazards.
- 7) Too large head spaces. If bars are placed too far apart, on a railing, for example, a child's head can become caught. A child can choke to death if trapped like this.
- 8) Sharp, rough, or pinching edges. Any surface that is not smooth, free of hard sharp edges, splinters and breaks can be a cutting hazard. When a child runs into an unsafe edge s/he can suffer harsh injuries.
- 9) Young children playing on equipment for older children. A 3-year-old child lacks the coordination of a 10-year-old. Equipment needs can vary significantly. Be sure to accommodate different age groups with separate areas to play in.

10) Shoddy maintenance. A lack of quality maintenance is a major playground hazard.

11) Banned equipment. Some playground equipment has been deemed hazardous in recent years, but it has not necessarily been removed from every playground.

12) Lack of adult supervision. Children do not always know what equipment is age appropriate. Adults must always be aware of what children are doing on a playground.

## Accessibility Requirements

The Americans With Disabilities Act (ADA) specifically requires that “each service, program or activity conducted by a public entity, when viewed in its entirety, be readily accessible to and usable by individuals with disabilities.” The Architectural and Transportation Barriers Compliance Board referred to as the Access Board developed accessibility guidelines for newly constructed and altered play areas. The play area guidelines are a supplement to the ADA Accessibility Guidelines (ADAAG).

ADAAG Section 4.3 addresses accessible routes that connect the play area to a school, parking lot or facility that it serves. Operators or owners of play areas are obligated to provide individuals with disabilities equal opportunity to enjoy the play area.

Ground surfaces along accessible routes, clear floor or ground spaces and maneuvering spaces must comply with ASTM F1951-99 Standard Specification for Determination of Accessibility to Surface Systems Under and Around Playground Equipment.

## Important Basic Concepts

### Age Appropriateness

CPSC states: A playground should allow children to develop gradually and test their skills by providing a series of graduated challenges. The challenges presented should be appropriate for age-related abilities and should be ones that children can perceive and choose to undertake. Toddlers, preschool and school-age children differ dramatically, not only in physical size and ability, but also in their intellectual and social skills. Therefore, age-appropriate playground designs should accommodate these differences with regard to the type, scale and the layout of equipment.

Three age groups are defined as:

- *toddlers* refers to children ages 6 months to 2 years;
- *preschool-age* refers to children 2 to 5 years;
- *school-age* refers to children 5 to 12 years.

The overlap between these groups is anticipated in terms of playground equipment use and provides for additional margins of safety.

## Inappropriate Playground Equipment

According to the Amplatz Children’s Hospital at the University of Minnesota, the following types of equipment are never safe on playgrounds and should be removed:

- Animal-figure swings. According to CPSC, one specific model of animal-figure swing has led to one fatality and seven serious head injuries due to its great weight and size.
- Glider swings that hold more than one child at a time.
- Free-swinging ropes, as they may unravel, fray or form a noose. Never let a child tie a leash, a jump rope or other type of rope to playground equipment.
- Exercise rings (the kind used in gymnastics) and trapeze bars.
- Trampolines.

## Understanding Fall Height & Impact Absorbency

Falls inevitably occur on playgrounds, but the severity of injuries is directly related to the surface on which a child falls.

According to CPSC’s handbook, the surface under and around playground equipment can be a major factor in the injury inflicting potential of a fall. Falling onto a shock-absorbing surface is less likely to cause serious

injury than a fall onto a hard surface. Because head-impact injuries from a fall have the potential for being life-threatening, so the more shock-absorbing a surface can be made, the greater the likelihood of reducing severe injuries.

A recent CPSC study of playground-equipment-related incidents indicates that falls are the most common hazard, resulting in approximately 44% of injuries. To better understand the relationship of height to extent of injury, it is critical to understand two terms used in the standards:

- **Fall height:** the vertical distance between the highest designated play surface on a piece of equipment and the protective surfacing beneath it;
- **Critical height:** the fall height below which a life-threatening head

**The surface under and around equipment can be a major factor in the injury-inflicting potential of a fall.**





injury would not be expected to occur.

Fall height represents a measurement of the actual fall distance, while the critical height is a rating of the fall-attenuating material itself. The relation between the two is as follows:

- the rating of the attenuating material should be greater than or equal to the fall height of the highest piece of equipment on the playground;
- manufacturers and installers of playground protective surfacing should provide the critical height rating of their materials to assist in determining the required depth of protective material around each piece of playground equipment.

It is well documented that serious injury can occur from a fall of less than 6 in. on asphalt. A fatal injury can occur from a fall from as little as 1 ft on asphalt and from as little as 3 in. on concrete.

Safer playground surfacing materials are available, and are grouped in two types: unitary, such as rubber mats; and loose-fill, such as sand, gravel or shredded wood products. Falls on these surfaces are not life threatening unless the child has fallen from a significant height (several feet or more). CPSC document #325 offers an excellent chart to guide in the selection of impact-absorbing materials.

### Adult Supervision

Adult supervision is critical to preventing injuries. Making sure children properly use playground equipment and do not engage in unsafe behavior around it is integral to their safety. If an injury occurs, an adult can assist the child and administer first aid immediately.

Children should always have adult supervision while on the playground. Younger children (and sometimes older ones) cannot always gauge distances properly and are not capable of anticipating dangerous situations by themselves. Older children like to test their limits on the playground. Young children should not use equipment designed for older children.

### Proper Maintenance

To begin playground maintenance, look for debris, particularly stones, broken glass or other foreign objects, and remove them. Check that the depth of the impact-absorbing surface is not below the design depth. It is a good idea to mark the legs of the equipment with a bold horizontal mark showing system depth when originally installed. If not already marked, take the time to mark the legs with an indelible marker at the system design depth, measuring from the bottom of the fill surface.

**The weather does not have to be hot for equipment to heat up and cause skin burns.**



Playground maintenance experience has shown that installations typically require top-offs after 3 years of use and sometimes more frequently on certain playgrounds.

## Regular Inspection

Regular, thorough playground inspections are important for two primary reasons:

- 1) they help keep the playground safe by identifying problem areas;
- 2) they help to protect organizations legally by maintaining a standard of care.

Inspection frequency is based on how much the playground is used and the routine wear and tear on the equipment:

- High-frequency inspections are done daily or weekly, and are designed to quickly spot problems, allowing for prompt correction.
- Low-frequency inspections are done less often, sometimes monthly or quarterly, and are designed to identify long-term changes.

Using a detailed checklist to guide inspections is important to identify all problem areas. Inspectors need training in what to look for. Parents and caregivers should obtain and be familiar with NPSI's "Dirty Dozen" pamphlet so that they can perform quick inspections before allowing children to use equipment. Playground-related deaths reported to CPSC involved entanglement of ropes, leashes or clothing, falls and impact from equipment tipping over, or structural failure.

CPSC document #325 contains many requirements for appropriate inspection and maintenance of equipment and surfaces. Section 7.2 states that "all equipment should be inspected frequently for any potential hazards," and "any damage or hazards detected during inspection should be repaired immediately."

## Product Liability

Like other products, playground equipment can be considered defective if it is not as safe as an ordinary consumer would expect or if the benefits of the design are outweighed by the risks. Equipment design is often cited in court cases as causing serious injuries to children.

While the duty to install safe surfacing belongs to the playground operator, a manufacturer must also warn of the need for safe surfacing under its equipment. The manufacturer should provide a label

warning of the danger of installing equipment on hard surfaces, and should warn that the fall height should not exceed the critical height of the surface. The manufacturer should provide information about the critical heights of various types of surfacing. The manufacturer is considered by the courts to have superior knowledge regarding safe installation and surfacing around its product.

Warnings are meant to guide the behavior of the adults in charge of the playground as they may not understand the hazards and what can be done to make equipment and play areas safer.

**CPSC found that 62% of surveyed playgrounds had lead levels that could be hazardous by federal standards.**



## Environmental/Health Hazards

- CPSC testing revealed that some equipment was painted with lead paint and, over time, the paint has deteriorated into chips and dust. In a survey of 26 playgrounds, CPSC found that 62% had lead levels that could be hazardous by federal standards. The amount of lead paint a child would have to ingest to get lead poisoning depends on the amount of lead in the paint and how much of that lead can be absorbed into the child's body. For playground equipment with 1.47% lead in the paint, CPSC staff determined that daily ingestion over 15 to 30 days of as little as 0.1 sq in. of this paint (the size of the head of a pencil eraser) could result in blood lead levels at or above the 10 µg/dl amount the federal government considers a health concern for young children.

- According to American Academy of Dermatology, research indicates that one in five Americans will develop some form of skin cancer during their lifetime, and five or more sunburns double the risk of developing skin cancer. Utilizing existing shade (e.g., trees), designing play structures as a means for providing shading, or creating more shade are potential ways to design a playground to help protect children's skin from the sun.

- The weather does not have to be hot for equipment to heat up and cause skin burns. Even in mild weather, as long as the equipment or surfacing is in direct sunlight for an extended period, there is a risk of sustaining a thermal burn injury. Be aware that even plastic slides can get hot enough to cause skin burns. Young children may lack the awareness of the need to act quickly to get off of hot surfaces.

## What Is a CPSI?

National Recreation and Park Association (NRPA) sponsors the Certified Playground Safety Inspector (CPSI) certification and states on its website that it is "dedicated to promoting children's right to play in a safe

and challenging play environment.” NRPA’s goal is to train and certify as a CPSI at least one person from every U.S. community. According to NRPA “the CPSI program offers the most comprehensive and up-to-date training on playground safety as well as provides certification for playground safety inspectors.”

## Recordkeeping & File Maintenance

ASTM F1487 suggests that owners maintain complete files of original equipment purchase documents. Owners should establish a system to document the history of each playground. Keep a record of everything, including the decision to purchase a piece of equipment, installation records, maintenance and repair records, warranties, correspondence with the playground manufacturer and records of injuries that may occur on the playground. Keep copies of inspections and repair records. Document the use of original equipment manufacturers replacement parts.

These records, along with pictures and videos of equipment, help limit liability and will also help in planning for proper maintenance and replacement of equipment. Obtain detailed installation and maintenance instructions from the manufacturer’s representative.

## Agencies That Provide Guidance

The International Play Equipment Manufacturers Association (IPEMA) is a nonprofit trade association that represents and promotes an open market for manufacturers of playground equipment and surfacing. IPEMA represents and serves its members by providing information on key economic and governmental issues affecting the play equipment industry and promotes relationships among related organizations.

IPEMA provides third-party product certification services for public play equipment and surfacing in the U.S. and Canada, ensuring compliance with ASTM and Canadian Standards Association trade standards.

National Program for Playground Safety (NPPS) works with national, state and local community programs and schools to ensure children’s play areas are safe and high quality. NPPS leads projects that increase

the quality and safety of play environments, offers training to educators and advocates, undertakes collaborative projects that improve research and support best practices and advocates for policies that improve the quality of programs and the lives of children.

National Recreation and Park Association is an advocacy organization dedicated to the advancement of public parks and recreation opportunities. In 1991 the organization launched a major safety training program for public playground owner/operators. The program is now an international certification program for people responsible for the design, installation, inspection, maintenance and repair of public playground areas.

U.S. Play Coalition is a partnership to promote the value of play throughout life. It is made up of individuals and organizations that recognize play as a valuable and necessary part of a healthy and productive life. They are housed within Clemson University’s College of Health, Education and Human Development.

Safe Kids Worldwide is a global network of organizations whose mission is to prevent accidental childhood injury, a leading killer of children 14 and under. More than 450 coalitions in 16 countries bring together safety and health experts, educators, corporations, foundations, governments and volunteers to educate and protect families.

## Conclusion

Playground safety has improved over the years, but much more needs to be done. Most of the 200,000 injuries and 15 deaths each year could be prevented if playground operators followed safety standards and manufacturers designed equipment carefully and warned users adequately. Safe design, proper warnings and adherence to safe standards of operation should not be too much to ask for the safety of children. It is worthwhile that we all get involved as we are able to maintain and improve the playground environment to protect the value of play in the lives of children.

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