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Table of Contents

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WHY PLAYGROUND INJURIES OCCUR

Playgrounds can be exciting areas where children explore their environment while developing motor and social skills. Yet each year, almost 200,000 children are treated at hospital emergency rooms for injuries occurring on playgrounds (Frost, 1990). About 60% of all playground equipment-related injuries result from falls (CPSC, 1990). Other injuries result from collisions with moving equipment or other children. Sharp edges, protruding hardware, and pinch points also present hazards. Fortunately, most injuries are preventable. Preventable injuries occur primarily due to four conditions: (1) equipment that is too tall; (2) insufficiently resilient surface underneath equipment; (3) specific hazards such as broken equipment; and, (4) lack of proper supervision. Proper supervision is essential to safe play. When children are not challenged, they find creative ways to use play equipment, such as going up the slide backwards or climbing on the roof of the playhouse.

ARE THERE SAFETY STANDARDS FOR PLAYGROUNDS?

Playgrounds may be located on property managed by schools, daycare programs, churches, city parks, state parks, or private individuals. At this time, there are no required standards regarding the manufacture or installation of equipment. Resilient surfacing under equipment is not typically required. The U.S. Consumer Product Safety Commission has established voluntary guidelines for equipment (CPSC, 1991) and surfacing (CPSC, 1990), but it is the responsibility of parents and teachers to educate themselves about playground safety and demand compliance with guidelines in playground development or renovation.

CHECKING FOR HAZARDS IN PLAYGROUND EQUIPMENT

The following playground hazards have been associated with injuries or fatalities (Frost, 1990; Jambor & Palmer, 1990):

1. Excessive equipment height: Falls from tall equipment, such as climbers, account for the greatest percentage of serious injury on playgrounds (Sacks, et al., 1989). Most approved surfacing materials cannot safely absorb children's falls from heights greater than 10 feet. The maximum height for climbing equipment is 4 feet for young children and 5 feet for older children.

2. Inadequate fall zone coverage: There should be an effective resilient surface both underneath and surrounding all equipment so that if a child falls the surface will yield. This resilient "fall zone," in combination with appropriate equipment height, can reduce the incidence and severity of injury. The fall zone should be free of hard objects. Equipment support posts in this area should be firmly anchored in concrete below ground level. The resilient surface material should be placed over the ground surface.

3. Lack of guard rails: Any platform, deck, or walkway (including the top of slides) more than 30 inches high should have a protective barrier.

4. Protrusions and sharp edges: Objects which stick out from the equipment, such as nails, screws and bolts, pipe ends, and edges of broken equipment, can cause cuts and bruises or entangle clothing and cause injury.

5. Head entrapment areas: Openings in which a child can put his head and get stuck include spaces between posts, ladder rungs, or deck levels, or swinging exercise rings.

6. Hard swing seats: Swings with heavy wooden or metal seats can cause serious injuries if a child passes too close or jumps from a moving swing. Heavy animal-type swings are particularly dangerous as they create a "battering ram" effect. Bumpers attached to such swings do not effectively reduce the risk of injury.

7. Pinch and crush points: Many moving structures contain moving parts in which a child can put a finger or hand. Look for pinch and crush points at the center of merry-go-rounds, swinging gates, and see-saws.

8. Open "S" hooks: The "S" shaped hook used to attach the swing seat to the chain should be completely closed. Otherwise, when the child swings high, the seat can slip off the hook causing the child to fall.

WHAT IS A SAFE SURFACE UNDER PLAYGROUND EQUIPMENT?

When a child falls onto a hard surface such as asphalt or concrete, the surface is unyielding. A fall from an 8 foot high structure (the height of many slides) onto concrete or asphalt is the equivalent of hitting a brick wall at 30 mph in a car (Ward, 1987). Even grass is not an acceptable surface for equipment over 3 feet tall. If a child falls onto a resilient surface, such as sand or wood mulch, the surface deforms upon impact. Concrete-surfaced inner city playgrounds present a unique challenge. Some commercially prepared surfaces will adhere directly to the hard surface. If this is too expensive, sand or other materials can be installed after removing asphalt or concrete from the fall zone. The following materials can provide a resilient surface for fall zones: [Refer to the Handbook for Public Playground Safety (CPSC, 1991) to determine size of the fall zone and to the Playground Surfacing Technical Information Guide (CPSC, 1990) to determine depth of material for specific pieces of equipment.]
1. Organic Mulch (pine bark nuggets, pine bark mulch, shredded hardwood bark): This material depends on the air trapped within and between individual particles for cushioning.

Advantages: Low cost; stays in place even on slopes; doesn't get inside shoes; not easily thrown or put in ears or noses; debris can be easily spotted and removed; may

provide wheelchair accessibility.

Disadvantages: Decomposes rapidly and loses cushioning protection; grass will grow over mulch and promote decomposition; absorbs moisture and may pack down or freeze; subject to bacteria and insect infestation.

2. Wood chips from hardwood trees: This material depends on the air trapped within and between individual particles for cushioning.

Advantages: Low-cost; not prone to insect infestation; doesn't get inside shoes; may provide wheelchair accessibility.

Disadvantages: Will eventually decompose and lose cushioning protection; chips may float out of place in heavy rain; chips may be thrown.

3. Coarse sand: Coarse sand or masonry sand is required. Fine sand will pack when moist, and may freeze.

Advantages: Low-cost; will not pack; excellent play value.

Disadvantages: Requires frequent leveling to replace material pushed or blown away; requires sifting to remove debris; gets in shoes and is tracked into buildings; may require some weeding to prevent grass from growing (help prevent this by sterilizing soil before adding sand); no wheelchair access.

4. Pea gravel: This is also called river-washed or tumbled stone. The required type is rounded, smooth, and must be less than 3/8 inch in diameter.

Advantages: Moderate cost; will not pack; will not decompose; drains well; provides additional play value for children over age five years.

Disadvantages: Requires frequent leveling to replace material pushed or blown away; requires sifting to remove debris; inappropriate for children under age five years since they may throw stones or put stones in their mouth, nose, or ears; no wheelchair access.

5. Shredded Rubber Tires: Available commercially and is made from new tires which have been scrubbed clean.

Advantages: Doesn't get inside shoes; will not decompose.

Disadvantages: Expensive; requires frequent leveling to replace material pushed or blown away; may be thrown; particles may lodge in shoe tread and leave black marks on interior floors; must check regularly for debris; no wheelchair access.

6. Commercially prepared surfaces: These are resilient materials designed specifically for outdoor play areas. Gym mats and rubber mats do not provide adequate protection against falls.

Advantages: Provides permanent effective cushioning against falls; can be installed over permanent surfaces (concrete, packed earth) to resist vandalism and provide smooth transition on uneven surfaces; debris can be easily spotted and removed; provides wheelchair accessibility.

Disadvantages: Expensive; requires some cleaning to remove substances such as spilled soft drinks or oils.

RENOVATING AN EXISTING PLAYGROUND

CPSC guidelines can be used to inspect existing playground equipment and determine if modifications can be made to reduce injury risk, such as installing fall zones under slides and swings, exchanging rigid swing seats for softer ones, and closing "S" hooks. Some equipment cannot be effectively repaired or modified. Other equipment is simply inappropriate for children, such as tall slides, and should be disposed of.
A fall zone under a single slide can be installed for $350-$1,000, depending on the material selected. Modifications to older equipment often cost more than the purchase of new equipment. It is important to compare equipment for safety, play value, and durability and to interview contractors to assure compliance with safety standards and an understanding of the value of play.

SUMMARY

The primary elements of playground safety are (1) removing equipment that is too tall; (2) installing resilient surfacing under all equipment; (3) removing hazards such as debris or broken equipment; and, (4) supervising children's play. It is up to parents, teachers, and individuals in the community to demand safer play areas and to provide proper supervision for children's play.

REFERENCES

References identified with an EJ or ED number have been abstracted and are in the ERIC data base. Journal articles (EJ) should be available at most research libraries; documents (ED) are available in ERIC microfiche collections at more than 700 locations. Documents can also be ordered through the ERIC Document Reproduction Service: (800) 443-ERIC. For more information contact the ERIC Clearinghouse on Teacher Education, One Dupont Circle, NW, Suite 610, Washington, DC 20036-1186; (202) 293-2450.
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