Swimming Pool Safety—Risk Management Best Practices

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Introduction

Drowning and pool-related injuries in public pools (hotels, resorts, etc.) are preventable through a comprehensive program that includes proper design, staff certification and training, frequent management inspection and feedback from guests and patrons.

Many accidental drowning and pool-related injuries are caused by unsafe acts or conditions. Some examples of this include inadequate emergency planning, poor staff training, poor lifeguard positioning, entrapment hazards, running, negligent supervision, broken equipment, insufficient water depth markings, cloudy or obstructed water views, inadequate fencing, improper surface coatings, and unfastened or missing drain covers.

Pool safety is often overlooked or not given the full attention it deserves. This is likely due to the ubiquitous nature of swimming facilities throughout the country. In addition to the common safety elements, it’s also important that operators allow for full access to their pools by adhering to important design features as required by the American with Disabilities Act (ADA).

Through many years of partnering closely with hotel operators, owners, management companies, and other operators of public pools and spas, I have been fortunate to compile multiple industry best practices. In the following pages, I will:

- Review the main causes of accidental drowning and pool-related injuries
- Identify common hazards and solutions when operating a pool or spa
- Review common key facility design feature considerations
- Discuss the importance of a written pool safety plan

Causes of Drowning and Pool-related Injuries

According to the Centers for Disease Control and Prevention (CDC), drowning is a leading cause of accidental death that disproportionately affects children. Drowning ranks sixth among the leading causes of unintentional injury death in the United States. It is the leading cause of unintentional injury death in the United States for children age 1-4. Further, for every child who dies from drowning, another five receive emergency department care for nonfatal submersion injuries (CDC 2014).
Children are most at risk, and have the highest drowning rates. For very young children, ages 1-4, most drownings occur at home (Laosee et al. 2012). However, the same statistics show us that as we age, drownings tend to occur more often away from home.

According to the CDC, some factors that influence drowning risk include, but are not limited to:

- Lack of swimming ability
- Inadequate barriers
- Poor supervision
- Location
- Alcohol use
- Seizures

There is no doubt that one of the best ways to prevent accidental drowning is to teach someone to swim. Many experts recommend introducing babies and children to water at very young ages, as early as 4 months, and continuing to teach them swimming techniques. In most cases, children can learn swimming fundamentals with stroke development beginning around age 3. Professional swimming lessons are the best method, but any introduction or training is better than nothing. Unfortunately, swimming ability is beyond the control of an operator.

However, a review of the list above shows that many of the factors that influence drowning are within the pool operator’s control. Among others, this includes barriers, supervision levels, and alcohol consumption.

While many people immediately consider drowning when discussing pool injuries and fatalities, there are other related injuries that may be very serious. The most obvious are slips and falls. Falls can be very serious injuries, with a wide range of injuries, from minor contusions to broken bones to head trauma.

The very nature of a pool operation results in wet pool decks. Depending on the type of decking or flooring used, this can create serious slip/fall potential. Many outdoor pools use a concrete deck with a surface finish that offers improved traction. This issue can be more challenging for operators with indoor pools. These areas are often surfaced with tile or other floor surfaces that allow for easy cleaning, disinfection, and maintenance. Unfortunately, those same characteristics may create a slippery environment when wet.

Changes in weather can cause tripping hazards, such as raised or sinking portions of decks. Other design problems or settling may result in low points that allow water pooling. Further, certain types of algae can bloom on wet surfaces, creating a highly slippery surface.

There are a variety of other causes of injury. According to analysis by Liberty Mutual Insurance (Liberty Mutual 2012), the following hazards are proximate causes of loss related to swimming pools and operations:

<table>
<thead>
<tr>
<th>Unsafe Acts</th>
<th>Unsafe Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate emergency plan</td>
<td>Broken or missing rescue equipment</td>
</tr>
<tr>
<td>Poor staff training</td>
<td>Inadequate lifeguard staffing</td>
</tr>
<tr>
<td>Shallow water diving</td>
<td>Insufficient water depth or markings</td>
</tr>
<tr>
<td>Pool lifeguard positioning</td>
<td>Planned lifeguard coverage too large</td>
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<tr>
<td>Improper pool design</td>
<td>Cloudy water, obstructed view</td>
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<tr>
<td>Failure to post rules</td>
<td>Electrocutions</td>
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<td>-----------------------</td>
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<tr>
<td>Failure to warn of dangerous conditions</td>
<td>Lack of depth markings</td>
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<tr>
<td>Entrapment in drains</td>
<td>Inadequate fencing</td>
</tr>
<tr>
<td>Running in pool area</td>
<td>Improper pool coatings and materials</td>
</tr>
<tr>
<td>Negligent supervision of users</td>
<td>Unfastened/missing drain covers</td>
</tr>
</tbody>
</table>

Exhibit 1. Hazards that cause injury in swimming pools and operations.

**Operating Swimming Pools and Spas**

Lifeguards play an important role in protecting swimmers and pool operators. A lifeguard typically has multiple roles, of which the most important is supervision of patrons. It should be noted that in most cases of drowning, the individual in distress couldn’t call out or wave for help. The distressed individual usually slowly sinks under the surface of the water (Branche and Stewart 2001).

Studies have shown a typical adult struggling in water over his head is able to stay above the surface for approximately 60 seconds. Infants and small children can stay for about 20 seconds (Branche and Stewart 2001).

As an owner or operator of a pool, it is important that you do not give extra assignments or responsibilities to lifeguards. Due to the time element mentioned above, a lifeguard must not be distracted, and supervising patrons should be their top priority.

Frequent management inspections of swimming pools can help to minimize risk also. The inspections should be conducted by management, and not create a distraction to the lifeguard(s) on duty.

Locations that do not use lifeguards can use a variety of design features and risk management best practices. We will cover those under the design best practices sections.

**Common Design Feature Considerations**

The American National Standard for Public Swimming Pools, ANSI/NSPI-1 provides guidance on design specifics for pools. Below are a few common design feature considerations to consider. Improper design can contribute to injuries at pools (ANSI/NSPI 2003).

**Design and Equipment Considerations**

Pool and spa area should be appropriately protected. Protection may be in the form of fencing, enclosures, or, in the case of indoor pool, a building structure.

For fencing, a height of 60 inches is recommended, with a minimum height of 48 inches. Regardless of style, the fencing should be designed in a manner that it is not easily climbed. Chain link fencing is not recommended.

All doors and gates should open outward and be self-closing and self-latching. Where the self-latching device is less than 54 inches from the bottom of the gate, the release device should be at least 3 inches from the top of the gate. This will help to prevent children from reaching over
the gate and disengaging the catch. A double-sized gate or door area should exist that allows for
emergency access.

For indoor pools, the area should be completely enclosed by a building structure. If there
are portions of the pool outdoors, those areas should meet the gate/door and fencing requirements
mentioned above. As with gates, doors should open out from the area.

Signage should be placed in pool areas in accordance with state regulations. Many states
have specific requirements for “No Diving” signs and water depth markings. The signs should be
mounted in a manner that they may be viewed from the pool. Incorporating internationally
recognized symbols in addition to English wording is advised. For example, signs stating “No
Diving” should also include the international warning symbol for no diving. Other recommended
signs include “Children Should Not Use Pool without Adult Supervision.” Depending on the pool
operation, it may be necessary to have signage indicating no lifeguard on duty, swimming at own
risk, and so on.

Electrical writing and equipment installation should be in accordance with local safety
codes as well as the National Electrical Code (NEC). There are specific requirements for
swimming pools located in Article 680, “Swimming Pools, Fountains and Similar Installations”
(NFPA 2014). Related to electrical installation, lighting should be provided for all pools/spas that
will be used during periods of darkness. Again, lighting should comply with NEC requirements.

Entrapment and Evisceration Protection and Control
The Virginia Graeme Baker Pool and Spa Safety Act is intended to help prevent evisceration and
entrapment of pool patrons. Evisceration is the removal of some or all of the organs of the
gastrointestinal tract. Entrapment in swimming pools traps the body against the main drain due to
suction. This holds the body underwater, often resulting in drowning (CPSC 2012).

Under the law, all pools must have ANSI/APSP-16 (2011) compliant drain covers
installed, and a second anti-entrainment system installed when there is a single main drain other
than an unblockable drain (P&SS Act 2012).

While the act permits the use of single main drains in commercial pools and spas, a best
practice is to properly size and install multiple main drains. Multiple main drains should be at
least 3 feet apart, and isolation valves are not permitted. It is illegal under the act for commercial
pools to operate with a single main drain without a secondary anti-entrainment device, unless it is
considered unblockable (P&SS Act 2012).

Accessibility (ADA Guidelines)—Pool Lifts
Revisions to the American with Disabilities Act (ADA) in 2012 addressed accessibility to public
pools and spas. In short, Title III of the ADA requires that places of public accommodation
remove physical barriers in existing pools to the extent possible. The compliance date was
effective January 31, 2013.
Pools with more than 300 linear feet of pool wall are required to have a minimum of two handicapped accessible means of entry. Pools with less than 300 linear feet of pool wall must maintain at least one accessible means of entry. Spas must be provided at least one accessible means of entry (ADA 2012).

There are multiple types of accessible means of entry into the water. In practicality, this requirement has resulted in the installation of fixed pool lifts. Lifts must be located where the water level is not deeper than 48 inches, with surrounding deck space kept clear to allow wheelchair or mobility device access. Other solutions include transfer systems, accessible stairs, and zero entry.

Pool lift use should be supervised either in person, for example by a lifeguard, or by cameras. Keeping the lift in an area that is visible to employees will help to keep children from playing with or on the lift.

In addition, a pool lift inspection and maintenance program should be in place. The program should include processes for repair, replacement and, if necessary, winterizing of the lift. Part of the inspection should ensure that all warning and safety labels are on the lift and legible.

**Pool and Spa Safety Program Best Practices**

**Management Commitment and Employee Participation**
As with all safety programs, management commitment and employee participation is key for success. A pool and spa safety program is no different. To assist with the participation, a policy statement should be created. The policy statement helps to clearly outline how an organization intends to conduct itself and act in relation to pool safety.

**Contractual Risk Transfer**
Properly structured contractual risk transfer will place financial responsibility for an injury to the person closest to the risk. Pools that require membership or charge fees should use contractual risk transfer to limit liability exposures. Depending on the state and local laws, examples of this could include liability waivers.

If you use a third party to manage or operate your pools, contractual risk transfer can place responsibility on the third party. The legal premise is to place the liability to those (third parties) closest to the risk with the ability to control. An example could include assumption of risk principles. In this scenario, it’s important that your vendor has appropriate liability insurance coverage and limits.

All risk transfer devices, such as contracts or waivers, should be drafted and reviewed by an attorney specializing in contractual liability law. Misrepresentation or omissions can invalidate otherwise valid contracts or releases.

**Hiring Procedures**
If hiring lifeguards, it’s imperative that a check on lifeguard certification and training be conducted. In addition, other certifications, such as CPR or first aid, should be verified by contacting the certification entity. All employees should be subject to a criminal background check prior to hiring.
Some states have specific regulations in place for pool technicians, often requiring certification such as certified pool technician (CPT). If you operate a pool in state(s) requiring certification, verify that the technician is certified by an accredited institution. If you plan on providing the training, state and local government can often provide guidance on pool operator training providers.

**Training**
In-service training should be provided to your employees on at least a monthly basis. This is training in addition to certification training that was previously provided. The in-service training should be specific to your facility and challenge employees with particular scenarios. Depending on the size and type(s) of pool(s) and the number of patrons, you may require in-service training to be conducted more frequently. A best practice is to create a scenario, and conduct the training exercise unannounced.

In-service training should continually test employees’ response and skills. A sample listing of in-service training follows. Your needs may vary depending upon your particular facility and risk:
- Submerged victim search and rescue
- Rescue breathing (deep and shallow)
- Deep-water back boarding
- CPR
- Bag-valve mask procedures
- Removing unruly patrons
- Multiple-victim retrieval
- Lightning strikes
- Inclement weather/approaching storm procedures
- Allergic reactions
- First aid
- Scanning and zone coverage
- Assisting disabled individuals
- Bloodborne pathogens

**Inspection**
Documenting and completing inspection and maintenance are critical factors in making pools and spas safe. As a best practice, a written inspection program must be in place. Your inspection program should include documents that track non-conforming items and document their correction. Some items that should be present in an inspection program include:
- Daily inspection of water treatment systems, lifts, slides, stairs, emergency shut-off, restrooms, locker rooms, diving boards, pool furniture, and other areas of concern.
- Twice-yearly, in-depth hazard inspections. These inspections may also correspond with the opening of a seasonal pool.
- Drain covers in place, operational, not damaged and replaced, as recommended by manufacturer.
- Disinfection equipment properly maintained and installed.
- Water clarity.
- Plumbing in accordance with appropriate laws, including necessary backflow prevention devices.
- Pump areas containing shutdown and backwash instructions.
Illness Prevention
Pool technicians should maintain appropriate water conditions to protect swimmers from recreational water illnesses (RWI). Chlorine and pH levels help to protect all swimmers from RWI. Proper levels of chlorine and pH also help to address issues such as dermatitis, eye irritation, and pool corrosion. All local and state guidelines must be followed. The CDC recommends the following:6
- Free chlorine levels continuously maintained between 1-3 parts per million
- pH level maintained between 7.2-7.8
- pH and disinfectant level tested at least twice daily or hourly during heavy use
- Maintenance of accurate records of pH/disinfectant measurements and maintenance activities
  (CDC n.d.)

ANSI/NSPI-1 (2003), Appendix A, also provides guidance for testing and standards for swimming pools.

Other best practices to help prevent illnesses include:
- Using biocide shock treatment on daily to weekly basis depending on water quality and frequency of water replacement.
- Cleaning pool surface to remove any slime layer.
- Providing disinfection guidelines for fecal accidents and body fluid spills.
- Establishing a policy for staff who are ill.
- Providing signage for education to patrons about RWI and appropriate pool use.
- Enforcing pool load limits.

Summary
Swimming pools and spas are a sought-after amenity by many individuals, and provide plenty of recreation, fun and great memories. While some drowning prevention methods are beyond the control of a pool operator, many factors affecting drowning are within an operator’s control.

Many states have specific laws and regulations in place to ensure pools and spas are constructed and operated safely. As an operator of a swimming pool and spa, you have a responsibility to provide a safe environment for your patrons.

A written safety plan implementing many of the best practices in this article can help to provide a safe enjoyable environment and limit your overall liability. The plan should be continually reviewed and updated. Ultimately, through management commitment and employee involvement, you can provide a safe environment for your guests.

Bibliography
“Nondiscrimination on the Basis of Disability in Public Accommodations and Commercial Facilities.”


