POLICY STATEMENT

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Prevention of Drowning: Policy Statement

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Drowning is a leading cause of unintentional injury death in children. Multiple layers of prevention are necessary, because no single method is effective in preventing drowning. This policy statement guides clinicians, families, community partners, injury-prevention professionals, and policy makers regarding evidence-based best practices for reducing pediatric drowning.

INTRODUCTION

Drowning is the leading cause of death in US children ages 1 to 4 years.[1] Unintentional pediatric drowning fatality rates declined from 1999 to 2019 but subsequently trended upward.[2] Racial/ethnic disparities in fatal pediatric drowning rates have widened. Persisting disparities in urban-rural pediatric drowning fatality rates exist.[3,4] This policy statement provides evidence-based best practices for reducing pediatric drowning and accompanies a technical report (TR).[5]

Toddlers have the highest drowning fatality rates. They frequently drown in swimming pools, often when unsupervised and gaining unanticipated access to water. Adolescents have the second-highest drowning fatality rates. They commonly drown in natural water. Dangerous situations around water occur when adolescents overestimate their swimming skills, misjudge the seriousness of water hazards, engage in risky and impulsive behaviors, or consume alcohol or drugs.[6]

Some comorbidities increase drowning risk in children and adolescents. Epilepsy is a comorbidity in 4.1% of drowning fatalities among 0- to 14-year-olds, compared with 0.7% to 1.7% among the general population.[7] The risk of drowning depends on additional factors such as age, epilepsy severity, extent of water exposure, and level of supervision.[8,9] Drowning risk in children and adolescents with autism spectrum disorder (ASD) is 3-fold higher than in those without ASD and highest in children ages 0 to 4 years.[10] Fatal drowning often occurs when a child with ASD wanders into a body of water.[11]

abstract

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SOCIODEMOGRAPHIC FACTORS

Racial and ethnic disparities in fatal drowning rates exist.[12,13] From 2018–2022, unintentional fatal drowning rates among 0- to 19-year-olds were higher among persons of Native Hawaiian/other Pacific Islander and Black race compared to persons of white, American Indian/Alaskan Native (AI/AN), and Asian race (Table 1). Compared with white persons, children of Hispanic ethnicity have lower fatal unintentional drowning rates for ages 1 to 9 years and slightly higher fatal unintentional drowning rates for ages ≥10 years.[3] Among 1- to 4-year-olds, white children have the highest drowning rates. However, after age 5 years, fatal drowning rates are higher among Black children, peaking at age 10 to 14 years.[3] Fatal drowning rates are also consistently higher for children living in rural counties compared with urban counties.[4]

The location of unintentional fatal drowning varies by race, which may relate to the degree of exposure to water and swimming skills among persons by race and ethnicity. For swimming pools, unintentional fatal drowning rates in white toddlers are higher than nonwhite toddlers. However, after age 5 years, Black children were >5.5 times likely to drown in swimming pools than similarly-aged white children.[13] For natural water, fatal drowning rates in children ≥5 years old were higher in persons of AI/AN, Black, and Asian/Pacific Islander races compared with their white counterparts. However, watercraft-related death rates were higher for white 15- to 19-year-olds compared with those of Black race and Hispanic ethnicity.[3]

In children, social drivers explain well-described disparities in swim competency among different groups and locations of people[14–18] and relate to historical segregation of public pools and limitation of pool and water access for many Black communities.[19,20] Adverse social drivers of health have led to fewer community resources and aquatic venues for low-income populations. Restrictive policies pertaining to access, cost, or clothing may hinder participation of disadvantaged groups in aquatic activities.[21] Other factors include lower water competency (below) from fewer opportunities for swim instruction[19,22,23] or fear of drowning,[24,25] variations in intergenerational swimming capabilities,[18,23] lack of opportunities to swim in single-sex aquatic settings,[26] previous negative swimming experiences,[27] and lifeguard shortages in unguarded city pools and beaches in underserved urban communities.[28] In addition to increasing drowning risk, lifeguard shortages reduce access to swim lessons for urban youth.

TABLE 1. Unintentional Pediatric Drowning[a] Deaths, United States, 2018–2022

	Total Deaths (Crude Rate No. Deaths per 100 000)		
Age Group, y	**Males**	**Females**	**Total**
<1	95 (1.0)	89 (1.0)	184 (1.0)
1–2	890 (4.6)	518 (2.8)	1408 (3.7)
3–4	539 (2.7)	242 (1.3)	781 (2.0)
5–9	479 (0.9)	180 (0.4)	659 (0.7)
10–14	348 (0.6)	140 (0.3)	488 (0.5)
15–19	987 (1.8)	155 (0.3)	1142 (1.1)
0–19	3338 (1.6)	1324 (0.7)	4662 (1.1)

Source: Centers for Disease Control and Prevention Web-based Injury Statistics Query and Reporting System.
[a] Includes water transport-related deaths.

WATER-COMPETENCY AND SWIM LESSONS

Drowning prevention requires an expanded set of competencies called *water competency*,[29] which includes knowledge, safe attitudes and behaviors, risk assessment, and skills including life jacket use and swim competency. Besides being able to swim, water competency also includes being able to anticipate and avoid common drowning situations, perform survival swimming, and recognize and assist drowned persons.

All children should learn to swim. Proficiency in swimming requires mastery of multiple motor skills: being able to jump in and resurface, tread water, float, turn around, propel oneself some distance in the water, and exit the water.[29] These skills, called *swim competency*, are acquired over multiple lessons in the low-risk and controlled environment of a swimming pool. These skills do not transfer well to natural water, where water conditions differ and additional hazards exist. Parents should choose swimming lessons that teach their children water competency in addition to swim competency and inform parents on their child's progress in attaining these skills.[30] Achieving swim competence and survival skills requires many lessons and is facilitated by the psychomotor maturation usually achieved at age 5 to 6 years. Refresher swim classes may be needed.[31]

The AAP recommends that swim lessons commence after the child's first birthday.[32] Children become independently mobile at this age, thus increasing the risk of unanticipated access to water. There are no data to recommend infant swim lessons. Infants younger than 1 year are neurodevelopmentally unable to coordinate their extremities to achieve propulsion and perform other motor skills required for survival swimming. Following multiple sessions of repeated submersions, infants can be trained to reflexively float on their backs, face up. However, infants' ability to float on their backs has not been demonstrated to decrease infant drowning rates. Furthermore, repeated submersions required to perform this skill can present negative aquatic experiences for the child, which may negatively affect attaining swim competency.[27]

"Adapted aquatics" are swim lessons and recreational aquatics that are adapted for persons with disabilities. These programs reduce drowning risk in children with

ASD by improving swim competency and providing benefits in motor skills, behavior, and mood.[33,34]

SUPERVISION

Close, constant, attentive, and competent adult supervision is a cornerstone of water safety when children are in or around water.[35–37] In 86% of fatal drownings of children <14 years old, the child had unpermitted access to water; 80% were alone and unsupervised for an average 16 minutes.[38] Distractions or concomitant alcohol use by caregivers impairs effective supervision.[38,39] Competent supervision requires the ability to institute the actions in the drowning chain of survival. Lifeguards provide an additional layer of protection but do not replace adult caregiver supervision.

DROWNING CHAIN OF SURVIVAL AND CPR

The drowning chain of survival (see Figure 6 in TR[5]) is a sequence of actions to reduce drowning-associated injury.[40] Early rescue and resuscitation are critical in reducing drowning morbidity and underscore the importance of adult supervision. The drowning timeline[41] (see Figure 7 in TR[5]) illustrates the critical time interval when effective rescue and resuscitation of a drowning person must occur. Prompt cardiopulmonary resuscitation (CPR) with chest compressions and rescue breathing in patients with cardiac arrest following drowning[42] and activation of prehospital advanced cardiac life support have the greatest impact on survival and prognosis.[43,44]

DROWNING-PREVENTION STRATEGIES

Multiple layers of prevention are necessary. Proven methods to prevent drowning include 4-sided (ie, separated from the house) pool fencing with self-closing and self-latching gate; close, constant, attentive, and competent supervision; water competency; life jacket use when boating or during recreational water activities; and early rescue and resuscitation of children who have drowned. The US National Water Safety Action Plan (USNWSAP)[42] recommends using the 6 levels of the spectrum of prevention to reduce drowning, with specific activities under each group. Drowning countermeasures across multiple levels of the spectrum[42] act synergistically[45,46] (Table 2).

The Haddon's matrix (Table 3)[32] identifies interventions that modify the environment, mitigate individual risk factors, and alleviate drowning risk from the injury vector (ie, water).

Culturally affirming policies that encourage participation of people from diverse backgrounds in aquatic activities, expand access to swim classes and aquatic venues, and disseminate affordable and culturally appropriate water safety information and resources in multiple languages per local needs to people of all ages, cultures, and abilities are important when addressing disparities in drowning death rates. Community programs that train lifeguards and staff community pools can reduce disparities in access to safe swimming locations for urban youth.[28,47–49] The most effective drowning countermeasures in populations at highest risk are evidence-based, multilayered interventions within the categories of the Injury Equity Framework (see Figure 5 in TR[5]), including the built and natural environment, local codes and state legislation/policy, availability of swimming/water competency education, access to equipment/technology, and treatment/recovery.[50]

TABLE 2. Drowning Spectrum of Prevention[a]

Prevention	Methods
(1) Influence policy and legislation	Develop strategies to change laws and policies to influence outcomes at all levels (national and state laws, county and municipal ordinances, adoption of formal policies by boards and commissions).
(2) Change organizational practices	Adopt regulations and evidence-informed practices to shape norms to enhance drowning prevention efforts (eg, add water safety education for parents while their child participates in swim lessons; require life jacket use when patrons rent stand-up paddle boards, kayaks, canoes, or boats).
(3) Fostering coalitions and networks	Convene and maintain groups that have a common goal of drowning prevention (eg, community- or state-wide safety alliance/task force that can develop and implement a water safety action plan or address a local issue; coalition of partners across the country that work to develop a national minimum training standard).
(4) Educating providers	Ensure that providers have the necessary understanding and skills to effectively educate or train others. This involves education of those who train or educate others (eg, swim instructors, lifeguard trainers, public safety training officers, physicians, teachers, childcare providers) or transmit information to end users (eg, pool installers, insurance companies, media).
(5) Promoting community education	Educational outreach and dissemination of resources on water safety to specific groups or the population at large through focused interventions or public awareness campaigns.
(6) Strengthening individual knowledge and skills	Enhance a person's capability of preventing drowning through individual or group education (eg, water safety education, swim lessons, demonstrations on appropriate fitting and use of life jackets, lifeguard certification training, and continuing education on pool safety for health inspectors).

[a] Adapted from USNWSAP, 2023.[42]

TABLE 3. Haddon Matrix for Drowning Prevention Strategies With Associated Levels of Evidence

	Personal	Equipment	Physical Environment	Social Environment
Pre-event	Provide close, constant, attentive supervision of children and poor swimmers[a]	Install 4-sided fencing that completely isolates the pool from the house and yard[b]	Swim where there are lifeguards[a]	Mandate 4-sided residential pool fencing[b]
	Evaluate preexisting health condition[c]	Install self-closing and latching gates[b]	Attend to warning signage[c]	Mandate life jacket wear[b]
	Develop water competency, including swim ability[a]	Wear life jackets[b]	Swim at designated swim sites[c]	Adopt the Model Aquatic Health Code[c]
	Know how to choose and fit a life jacket[c]	Install compliant pool drains[a]	Remove toys from pools when not in use to reduce temptation for children to enter the pool[c]	Increase availability of lifeguards[a]
	Avoid substance use[a]	Install door locks[c]	Empty water buckets and wading pools[c]	Increase access to affordable and culturally compatible swim lessons[c]
	Know the water's hazards and conditions[c]	Enclosures for natural bodies of water[c]	Lakefront slope gradient[d]	Close high-risk waters during high-risk times[d]
	Swim at a designated swim site[d]	Promote life jacket loaner programs[c]		Develop designated natural water swim sites[d]
	Learn CPR[b]	Role model life jacket use by adults[a]		Enforce Boating Under the Influence laws[b]
	Take a boater education course[c]	Make rescue devices available at swim sites[c]		
	—	Provide ability to call for help[b]		
	—	Ensure functional watercraft[c]		
Event	Water survival skills[c]	Rescue device available[c]	Lifeguard or bystander response[b]	Emergency Medical System[b]
Postevent	—	AED[c]	Early bystander CPR[b]	Advanced medical care[c]
	—	Rescue equipment[c]	EMS response[b]	

[a] Trials or diagnostic studies with minor limitations; consistent findings from multiple observational studies.
[b] Well-designed and conducted trials, meta-analyses on applicable populations.
[c] Expert opinion, case reports, reasoning from first principles.
[d] Single or few observational studies or multiple studies with inconsistent findings or major limitations.

Effectiveness of Legislation/Regulations in Drowning Prevention

Legislation on swimming pool fencing, preventing entrapment injuries in public pools, safe natural water swim areas, and life jacket use among boaters have reduced drowning deaths.

Adoption of 4-sided pool fencing laws halved pediatric drownings in Queensland, Australia.[51] Implementation of the Virginia Graeme Baker Act in the US targeting suction entrapment at public swimming pools reduced entrapment injuries.[52,53]

In the US, states that implemented regulations pertaining to lifeguards, water quality, rescue equipment, tracking/planning/reporting, and signage for natural water swim sites had lower natural water drowning death rates than states without similar regulations. In states lacking these regulations, fatal drowning rates in natural water were 3-fold higher among youth and 4-fold higher among nonwhite residents.[54] Lifeguarding and surveillance were associated with lower natural water drowning rates among children younger than 18 years.[54]

Laws mandating life jacket use when boating have improved their use among boaters.[55,56] In Victoria, Australia, regulations mandating life jacket use among recreational boaters significantly decreased fatal drownings.[57] Local ordinances that require life jacket use by those near/in the water of specific high-risk waterways have led to observed increases in life jacket use.[58] Lack of enforcement reduced mandated life jacket use.

Legislation with enforcement can be an effective tool in drowning prevention. Inspections of aquatic venues can increase compliance with safety regulations[59] or close facilities for safety infractions.[60,61] Water safety regulations should be uniformly applied and enforced across jurisdictions.

PREVENTION OF DROWNING RECOMMENDATIONS

Parents and Caregivers

- Be aware of drowning hazards.
  - Prevent unanticipated entry of young children to the toilet, swimming pool, or natural water.

- Empty water from buckets. Store upside down after use.
- Provide constant adult presence when bathing an infant or young child. Never leave children alone in the bathroom. Use toilet locks.
- For families with toddlers or children with ASD who are at risk of wandering, identify and prevent access to nearby water hazards.
- When visiting a home or facility with potential aquatic exposure, assess safety features such as barriers.

- Isolate the swimming pool from the house and rest of the yard by installing a 4-ft, 4-sided fence with a self-closing, self-latching gate.
- Supervise children in, on, and around water.[42]
  - Never leave, even momentarily, young children alone or with another child while in or near bathtubs, pools, spas, or standing or flowing water.
  - Never use alcohol or drugs before or when supervising children around water.
- Ensure a supervising adult with swimming skills is within arm's length and provides touch supervision for an infant, toddler, or weak swimmer who is in or around water.
  - An adult should provide close, constant, attentive, and competent supervision of children and swimmers. The water watcher's sole responsibility is supervision, and should not be distracted, or engage in other activities, including phone use. The person should be able to recognize distress, perform rescue without taking undue risks, initiate CPR, and summon help for a drowning child.
  - Require children to obtain an adult's permission and presence to enter the water, regardless of their swimming ability.
- Children can begin to learn water competency after their first birthday. Individualize when to begin children's swim lessons on the basis of the child's emotional maturity, physical and cognitive abilities, and health concerns in discussion with your child's pediatrician.
- Ensure all children wear US Coast Guard–approved life jackets whenever they are in/on any type of motorized/nonmotorized watercraft. Life jacket sizes are based on a child's weight. Confirm the child's life jacket is fitted and secured properly.
  - Adults should wear life jackets when boating to model safe behavior and to perform rescue.
  - Young children and nonswimmers should wear life jackets when they are near water or when swimming.
  - Avoid using inflatable arm bands, neck rings, or "floaties" because they may deflate and not keep children safe.
- Be prepared to provide rescue. Caregivers and adolescents should learn CPR.
  - Keep US Coast Guard-approved rescue equipment (life buoys, life jackets, and reach tool) poolside.
  - Have a mobile telephone available only for emergency use.
- Select designated and lifeguarded areas when swimming in natural water.
  - Pay attention to local weather, tides, waves, currents, and natural water hazards.
  - Check for rip currents. Avoid swimming near piers and areas where rip currents develop.
  - If caught in a rip current, swim parallel to the shore until free of the current; then swim diagonally to land.
  - Before entering the water, check the water's depth and for underwater hazards. Teach entry feet first.
- Recognize winter drowning hazards. Avoid walking, skating, or riding on weak or thawing ice in natural water.

Pediatricians

- Provide drowning-prevention anticipatory guidance to all parents based on the child's age, drowning risk, and exposure to water.
- Emphasize multiple layers of drowning prevention. Inquire about barriers that limit their use.
  - Warn about high-risk settings: unanticipated water access, parties, absence of a supervisor or lifeguard.
  - Emphasize need for 4-sided fence with self-closing, self-latching gate for residential swimming pools.
  - Advise families to swim in designated safe and lifeguarded areas.
  - Define needed supervision as close, constant, attentive, and competent.
  - Encourage use of life jackets.
  - Emphasize water competency for the entire family with caregiver response to a drowning emergency for children of all ages.
  - Promote CPR and safe rescue training for adolescents, parents, and grandparents.
  - Educate adolescents against risky behavior, alcohol/drug use, and need for supervision during activities in and around water.
- Identify children at higher drowning risk because of age, comorbidities (eg, epilepsy, autism), exposure (eg, private pool), or family's lack of aquatic experience and swimming ability. Recommend evidence-based countermeasures to mitigate risk.
- Recommend aquatic experiences for infants with a parent and swimming lessons for children after their first birthday. Set a goal of water competency for the entire family.
- Describe drowning based on the outcome: fatal/nonfatal. Avoid using incorrect terms (eg, "dry/wet drowning," "near drowning," "secondary drowning" "active/passive drowning").

- Encourage and support families of children with disabilities to seek the benefits of swimming or water recreation programs and access to facilities.

Community Engagement and Advocacy

- Advocate for laws that reduce drowning such as 4-sided fencing, life jacket use at aquatic recreational areas, safe constructed and natural aquatic facilities, preventing boating under the influence, and optimizing emergency medical services care.
- Encourage community-based programs that provide low-cost/free swim lessons for high-risk groups, including children with disabilities.
- Promote access to swim lessons beginning after the first birthday.
  - Implement guidelines for aquatic programs involving children <3 years old.[62]
- Educate everyone on proper life jacket use. Make water safety resources, US Coast Guard-approved life jackets, and adaptive aquatics flotation devices available for people with special needs or disabilities or high-risk groups.[42]
- Include assessment of life jacket competency as a critical component of water competency curricula.
- Partner with community stakeholders to increase access to life jackets, lifesaving equipment, and usage instructions at life jacket loaner stations and public access points for aquatic recreation.[42]
- Advocate for policies that ensure certified lifeguards with current CPR certification are present at public pools and natural water swimming locations.[42]
- Develop drowning prevention curricula.
  - Expand CPR training in schools with age-appropriate content for children in all grades.
- Increase public awareness of environmental aquatic hazards.[42]

Pool Operators

- Adopt the International Swimming Pool and Spa Code.[42]
  - Encourage development and implementation of national labeling standards for barriers, pools, and spa products.[42]
- Implement Virginia Graeme Baker Act to prevent suction entrapment in private and public pools.[42]

Culturally Affirming Policies

- Institute policies that encourage participation of all persons in aquatic activities, especially minoritized groups, and those with disabilities or low family income.
- Increase availability of affordable and culturally appropriate water safety resources to people of all ages, cultures, and abilities in multiple languages per local needs.

Policy and Legislation

- Require inspection of residential pools/spas to meet applicable laws, building codes, and standards and enforcement for violations.[42]
- Recommend new and existing residential pools and spas have 4-sided fencing with a self-closing, self-latching gate.[42]
- Require individuals of all ages participating in any activity involving a vessel <26 feet long, including water sports or while on any human-propelled vessel, wear a properly fitted US Coast Guard-approved life jacket.[42]
- Standardize life jacket use among states for consistency in usage.[42]
  - Include adolescents and human-propelled watercraft users under state life jacket regulations.
- Establish safety requirements for natural swimming areas and public and private recreational facilities (eg, certified lifeguards present in designated swimming areas).
- Institute a state/national surveillance system that links data systems across the drowning spectrum.
  - Implement a standardized data collection tool to investigate drowning.
  - Provide timely reports of fatal and nonfatal drowning, especially in vulnerable populations, to inform drowning countermeasures.[42]
  - Expand human and financial resources to implement USNWSAP recommendations to prevent drowning.
- Prioritize equity when developing and implementing policies and legislation that address racial/ethnic disparities in pediatric drowning.

Future Research

Current gaps in drowning-prevention research include an incomplete understanding of drowning epidemiology in disproportionately affected populations,[3,63–67] need for measures to assess swim skills/water competency,[68] and a paucity of rigorously evaluated drowning countermeasures, especially in high-risk groups.[69–74] Future research should:

- Describe the epidemiology of fatal and nonfatal drowning in disproportionately affected persons.[74]
- Determine the most effective methods of teaching swimming and water safety skills to children and adolescents.[74]
- Operationalize and assess environmental and equipment-related drowning-prevention strategies (eg, lifeguard supervision, pool fencing, life jacket use) and policy and legislation that support these strategies.[74]
- Ascertain barriers and facilitators to people's willingness to adopt drowning-prevention strategies (eg, pool

fencing, life jacket use, cautionary signage at beaches), especially among disproportionately affected persons.[74]
- Evaluate policies that make proven interventions (swimming instruction, survival swimming classes) accessible to the public and at-risk populations.[74]

CONCLUSION

Drowning is a leading cause of unintentional death in US children. Despite decreasing trends in overall fatal drowning rates, there are widening racial and ethnic disparities in pediatric drowning death rates. Multiple layers of protection are necessary, because no single method is effective in preventing all drowning. Proven methods to prevent drowning include functional barriers, effective supervision, water competency, life jacket use when boating, and early rescue and resuscitation of drowning victims.

The USNWSAP recommendations[42] provide tools to reduce drowning. Clinicians can provide age- and content-specific drowning-prevention anticipatory guidance to patients. Parents and clinicians can advocate for implementation of evidence-based drowning countermeasures in their community and work with key partners to introduce and update existing laws to support water safety. A multifaceted approach to drowning prevention involving clinicians, families, community partners, and public health and injury-prevention professionals and policy makers is necessary to reduce drowning-related injury and death.

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