



SPANISH ASSOCIATION OF PAEDIATRICS

## Recommendations for the prevention of drowning<sup>☆</sup>



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**Abstract** Drowning is the second leading cause of non-intentional death in children under the age of 19 in Europe. Weather conditions in Spain allow an extended period of contact with water, therefore increasing the risk of drowning (due to the increased exposure), and constitutes the second leading cause of accidental death in children less than 14 years of age. In children younger than 5 years, drowning occurs mostly in pools belonging to private homes or communities, while in older children, drowning is often linked to aquatic recreational activities in lakes, sea, rivers and canals, and at times associated with alcohol consumption.

In this article, the Committee on Safety and Non-Intentional Injury Prevention in Childhood of the Spanish Association of Paediatrics provides a series of architectonic, educational and legislative recommendations to prevent such incidents.

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### PALABRAS CLAVE

Ahogamiento;  
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### Recomendaciones sobre la prevención de ahogamientos

**Resumen** El ahogamiento supone la segunda causa de muerte accidental en menores de 19 años en Europa. Las condiciones climáticas en España permiten un amplio periodo de contacto con el agua, aumentando el riesgo por mayor exposición y constituyendo la segunda causa

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de mortalidad accidental en menores de 14 años. Los ahogamientos en menores de 5 años se producen sobre todo en piscinas particulares o de comunidades privadas y, en el caso de niños mayores, suelen estar ligados a actividades acuáticas de tipo lúdico en lagos, mar, ríos y canales, y, en ocasiones, asociadas al consumo de alcohol.

En el presente artículo, el Comité de Seguridad y Prevención de Lesiones No Intencionadas en la Infancia de la Asociación Española de Pediatría proporciona una serie de recomendaciones para prevenir este tipo de lesiones, tanto arquitectónicas como educativas y legislativas.

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## Introduction

Water is an essential element in our lives and for most children it is also a place to practise sports and an important source of pleasure and fun. Whether on a recreational basis or for competitive purposes, contact with water begins at an increasingly early age and in more and more varied settings (in public or private swimming pool facilities, waterparks, spas, in the sea, rivers or lakes).

The WHO defines drowning as the process of experiencing respiratory impairment from submersion/immersion in liquid, with outcomes classified as death, morbidity and no morbidity.<sup>1-4</sup>

## Epidemiology

Over 5000 children die from drowning every year in the group of countries that make up the WHO's European region. Drowning is the second leading cause of accidental death in people aged between 0 and 19 in Europe as a whole.<sup>5</sup>

In Spain, weather conditions allow an extended period of contact with water, thereby increasing the risk due to greater exposure. Drowning accounts for 13% of the main causes of injury death in children (aged 0-14) and occupies the thirteenth place in Europe. It is also the second leading cause of accidental death, after traffic accidents, and claims around 450 lives a year among people of all ages (461 mortalities in 2011, of which 23 were under 15, and 438 in 2012, 28 of them under 15).

The statistics only reflect the number of deaths, which are the tip of the iceberg, since for every person killed there will be many other injuries that will require visits to accident and emergency departments or hospital admissions and will cause suffering and sequelae that may result in severe permanent disabilities.<sup>6</sup> Diving head-first causes over 70% of all spinal cord injuries related to sports and recreational activities.

Death rates from drowning vary according to age and sex, the groups most at risk being small children and adolescent males.<sup>5,7-9</sup>

Socioeconomic status and poverty are also linked to a higher risk of drowning in children.<sup>5</sup>

In the case of small children, it can happen in as little as 2 cm of water in the bottom of a bucket, a bath, a paddling pool or a well.

Drowning incidents in children under 5 occur mostly in swimming pools belonging to private homes or communities, where it has been shown that deaths by drowning can be reduced by up to 95% with simple regulated fencing like the one currently used for community pools.<sup>10</sup>

In the case of older children, drownings usually take place in lakes, the sea, rivers and canals, where recreational aquatic activities are practised. At these ages, the consumption of alcohol and drugs are added risks to adolescent impulsiveness. As many as 25% of deaths by drowning were associated with alcohol consumption.<sup>5,11</sup>

Another type of injury is related to drain entrapment that occurs when a child is held by the forces created by water passing through the underwater drain at the bottom of a swimming pool.<sup>1</sup> These forces produce injuries to various parts of the body: hair entanglement (the most common), suction of the chest, abdomen (most often perianal and gluteal) or a limb (usually due to the absence of drain covers), evisceration of bowel loops of varying degrees of severity and death by drowning due to suction and immobilisation at the bottom of the pool.<sup>12</sup>

## Strategies that have proved to be effective for the prevention of drownings

- *Supervision and surveillance* of any child in proximity to any aquatic environment, including swimming pools, baths, beaches, buckets containing water, etc., is an essential strategy for the prevention of drownings.<sup>1,11</sup> Proper supervision implies that the distance to the child is less than the length of the caregiver's arm; in other words, literally keeping children within arm's reach.
- *The presence of a lifeguard* is the best way to avoid water accidents that end in drowning. However, a lifeguard cannot supervise all bathers at the same time, and it is therefore essential to *keep children under constant surveillance*. Although deaths are infrequent when there is a lifeguard present, they can happen.<sup>1,5</sup>

With respect to swimming pools:

- *Complete fencing* of pools around their entire perimeter, so that the pool is totally isolated from the garden and the house, is effective in preventing many drownings of children in pools.<sup>1,8,10,13</sup>

- The fencing must enclose the entire perimeter of the pool, it must be high enough to prevent children from climbing or jumping over it, and the distance between the bottom edge of the fence and the ground must be less than 10 cm to avoid children squeezing underneath it. The gate is the most important component of the fence. It must be self-latching and self-closing and the latch must be out of the reach of children (at a height of at least 1.34 m from the ground). The fencing must never block the view of the pool.<sup>1</sup>
- If pool covers are used, they must be rigid and cover the whole length and breadth of the pool to prevent children from walking across them or slipping in at the sides of the pool and being trapped under the cover and unable to get out.
- The depth of the pool must be indicated at the sides.
- Diving must be prohibited if the depth is less than 1.20 m and permitted only if the water is over 1.80 m deep. However, children should be advised to jump into the pool feet first.<sup>1</sup>
- Children's pools or paddling pools must also be fenced off to prevent children having access to them on their own. If they are recreational or multipurpose pools they must include arrangements to prevent collisions.
- The drains of both public and private swimming pools, including jacuzzis, must have safety devices to prevent suction and hair entanglement or entrapment of other parts of the body (drain covers or any other anti-entrapment mechanism).<sup>12</sup>
- If pool alarms are used (alarms in the pool to detect movement, infrared perimeter alarms, etc.), both owners and other users must be familiar with how to operate them correctly. Alarms are insufficient if they are used as the only preventive measure.<sup>1</sup>
- Swimming lessons and learning water survival skills can reduce rates of drowning in children. It is advisable for children to learn to swim, particularly from the age of 4. However, the decision on when a child should begin such lessons must be made on an individual basis. There are studies that maintain that beginning lessons between the ages of 1 and 4 reduces drowning rates. Parents must take into account the frequency of the child's exposure to water, emotional maturity, physical limitations and other health concerns, such as hypothermia, infectious illnesses, lung damage from pool chemicals, etc. Parents have to be aware that swimming lessons for small children, small children or those who have not acquired sufficient skills will not prevent drowning or provide complete protection, and that constant supervision must therefore be maintained. Knowing how to swim well in a swimming pool does not necessarily make a child safe in natural water environments, so children should never swim without adult supervision.<sup>1</sup>
- *The use of personal flotation devices (PFDs)* when riding in any kind of recreational watercraft is an important preventive measure against drownings. In a study of boating-related deaths carried out in the United States, 86% of those who died were not wearing a flotation device, whereas the remaining 14%, who were wearing one, died from other causes, such as hypothermia.<sup>14</sup> Children should not wear air-filled swimming aids that can be deflated (such as armbands or

water wings) as these represent a risk. Life jackets are preferable.

- *Training in CPR procedures*, for parents, adolescents and older children, *is also an effective measure*. Appropriate cervical protection, the time elapsed since drowning and prompt application of CPR by trained personnel are crucial for improving the prognosis in a drowning.<sup>2</sup>

## Recommendations of the Committee on Safety and Injury Prevention in childhood

Paediatricians must alert parents to the dangers that water presents at different ages and in different situations, and must therefore:

- Advise parents and caregivers that on no account can a child be left alone or in the care of another child while in the bath, in swimming pools or spas, or near any irrigation ditches.
- Recommend emptying water from any container after use, such as mop buckets, or any other container.
- Warn parents that infant bath seats can never be regarded as a substitute for adult supervision, since children can slip out of them.
- Remind them that to prevent drowning in toilets, small children should not be left alone and unsupervised in the bathroom.
- Warn them that whenever infants or toddlers are in or around water, whether a swimming pool or any open body of water (lakes, sea, rivers, etc.), they must be within arm's reach and supervised by an adult with swimming skills. In the case of older children that can swim, the adult with swimming skills or a lifeguard must supervise them, keeping them constantly in sight, with his or her attention focused at all times on the child or children in the water, avoiding potentially distracting situations such as talking on the telephone, socialising, etc.
- Remind them that in an emergency the supervising adult must know how to swim, perform a rescue, initiate CPR and call for help.
- Identify families who live in residential areas with swimming pools and offer periodic drowning-prevention counselling. Recommend that any family swimming pool should be equipped with safety devices: protective fencing, alarms in the pool to detect movement, an infrared perimeter alarm and a rigid cover or structure that will bear the weight of an adult without collapsing, among others.
- Ask specifically about portable or above-ground pools, because they are usually unfenced.
- Remind parents that swimming lessons do not guarantee prevention of drowning but are just one more strategy in a multi-faceted approach that also includes effective fencing, appropriate adult supervision and experience in CPR.
- Advise parents that they should teach their children never to swim without adult supervision.
- Recommend that whenever children are riding in any kind of watercraft or practising water sports (even if they can swim), they should wear a personal/individual flotation device (PFD), such as a life jacket.

- Air-filled swimming aids are not to be recommended. Furthermore, small children and any non-swimming minors should wear a life jacket whenever they are at the water's edge (by a river, the sea, a lake or on a dock or pier, etc.).
- Inform parents and children that jumping or diving into water can result in serious injury. Parents should know the depth of the water before allowing children to jump in. In any case, children should be advised to enter the water feet first.
- Remind parents that in open bodies of water they should choose areas supervised by lifeguards.
- Warn adolescents about the risk involved in consuming alcohol or drugs while swimming or practising any other water sports activity.
- Advise parents that children who suffer epileptic seizures should be supervised when swimming or taking a bath.
- Recommend to parents that they should never lower their level of vigilance towards their children, despite the safety measures adopted.

### Interventions at national level

Current legislation on swimming pools in Spain has remained almost unchanged since the Ministerial Order of 31 May 1960 issued by the former Ministerio de la Gobernación. Although it has been updated by a Royal Decree (RD 742/2013 of 27 September 2013, establishing technical and health standards for swimming pools),<sup>15</sup> family swimming pools, where the largest numbers of drownings are recorded, remain exempt from compliance with safety standards, which are applicable only to public pools.<sup>15</sup> Moreover, pools belonging to private communities of homeowners (where the number of drownings is currently increasing more rapidly) are not subject to standardized regulations in Spain's different regions, in terms of whether they are regarded as public or private.

We on the Committee therefore consider that the actions required to improve water safety and prevent drownings should include:

- Establishing minimum safety requirements at a national level so as to harmonise the legislation of the different regions and increase safety measures at swimming pools, making it compulsory, among other things, for both public and private pools to be completely fenced.<sup>16-18</sup>
- Developing European standards for public swimming pools, including signs to indicate the water depth, coloured edging on steps, life-saving equipment and covers on suction drains.<sup>9,11</sup>
- Making it obligatory to employ lifeguards who should be regularly re-certified.
- Establishing compulsory use of personal flotation devices/life jackets while practising any water sport or aquatic activity.
- Implementing the use of standardised safety signs and symbols (such as diving not permitted, a red flag indicating that bathing is prohibited, etc.) in all aquatic environments.
- At public beaches and swimming pools appropriate and sufficient information should be provided regarding preventive safety measures and include situations that could pose a health risk, on prevention of drowning and of other

injuries, such as traumatic brain injuries and spinal cord injuries, among others.

- Information should also include the location of the life-guard, as of the first-aid post and the addresses and telephone numbers of the nearest health care centres and accident and emergency departments.

### Conflicts of interest

The authors have no conflicts of interest to declare.

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