Survey of safety requirements for swimming pools associated with accidents through the jurisprudence

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Summary

Jurisprudence has considerable interpretive value in understanding how health regulations are applied to swimming pools. As such, it is of unarguable interest to focus on the most outstanding aspects that have required legal resolution due to the impact on the health of swimming pool users. A comparative examination of 23 legal disputes has allowed us to explore the assessments of the main technical-health requirements that the courts of justice draw from when acknowledging a causal link between these and the injuries incurred at swimming pools. The typical profile of a swimming pool accident victim was identified to be a healthy adult suffering injury to the lower extremities following a slip and subsequent fall on a walkway area around the swimming pool. Injuries were also observed following thoughtless or negligent behaviour by the swimmer. In this study, various legal appraisals were investigated and we offer reliable technical criteria regarding health requirements for publically used swimming pools in Andalusia involved in the occurrence of accidents, analysing technical concepts and non-compliance with regulations put forward in the most recent jurisprudential rulings. From the court rulings examined in the context of swimming pool safety, it would appear highly advantageous to review the assessment criteria regarding the scientific-technical parameters associated with the causes of injuries, with the aim of proffering a greater degree of specification by incorporating established international rules that contribute a higher level of legal safety in protecting the rights of users.

Key words:
Swimming pool. Accident. Prevention. Safety. Case reports. Jurisprudence (source: MeSH, NLM).

Examen de requisitos de seguridad de piscinas asociados con accidentes a través de la jurisprudencia

Resumen

La jurisprudencia tiene un notable valor interpretativo para comprender cómo se aplican los reglamentos sanitarios sobre piscinas. Por ello es de indudable interés fijarse en los aspectos más sobresalientes que han tenido que ser resueltos judicialmente por su impacto en la salud de los usuarios de este tipo de instalaciones acuáticas. El examen comparativo de 23 conflictos judiciales nos permitió indagar en la valoración de los principales requisitos técnico-sanitarios que sirven como fundamento a los tribunales de justicia, para admitir su nexo causal con las lesiones derivadas de accidentes ocurridos en piscinas. El perfil típico de la víctima por accidente en una piscina quedó caracterizado por un adulto sano que sufre lesiones en la extremidad inferior, después de caerse por un resbalón en una zona de tránsito en el entorno del vaso. También se observaron lesiones derivadas de un comportamiento irreflexivo o culposo del bañista.

En este trabajo se cuestionan diversas apreciaciones en sede judicial y proporcionamos criterios técnicos fiables sobre requerimientos sanitarios para piscinas de uso colectivo de Andalucía implicados en la producción de accidentes, analizando conceptos técnicos e incumplimientos normativos esgrimidos en los pronunciamientos jurisprudenciales más recientes. De las resoluciones judiciales examinadas en el contexto de la seguridad de las piscinas surge la conveniencia de revisar los criterios valorativos acerca de los parámetros científico-técnicos asociados con las causas de las lesiones, procurando dotar mayor grado de concreción con la incorporación de normas internacionales asentadas que aporten mayor seguridad jurídica en la protección de los derechos de los usuarios.

Palabras clave:
Piscina. Seguridad. Accidente. Prevención. Informe de casos. Jurisprudencia (Fuente: MeSH, NLM).

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Introduction

The radical technological development of swimming pools over recent years has led to a major revolution in the devices, equipment and techniques used with the aim of creating safe environments and preventing public health risks. The presence of danger in these environments and coexisting alongside the risks emerging from modernisation and human behaviour constitute an unavoidable phenomenon. Even so, the activities that take place at swimming pools often involve a certain degree of risk that is voluntarily accepted as "normal", though in other cases the risks are unknown, unexpected, or simply misunderstood.

This reality has given rise to the intensive monitoring of swimming pools by public administration health departments, as well as the development of an exhaustive and varied legislation, covering each environmental and health aspects separately or drawing them together with safety or constructive aspects. All this has created a complex regulatory landscape, which proves difficult for citizens, professionals, companies and legal practitioners to fathom, hindering the development of a comprehensive approach on public health safeguarding strategies.

Recently, on a state level, a swimming pool health regulation was passed[1], following over 50 years under the previous system[2], which had not been updated since 1960. Over this long period, apart from some new provisions included in the technical construction code[3], the autonomous communities had acted as legislators, which by legitimately using their competencies, established additional protective health measures, legally approved rules to regulate the technical-health conditions of collectively used swimming pools, eventually creating a preventive instrument to safeguard public health.

One of the most adverse health outcomes that arises from the use of swimming pools are accidents to swimmers[4], which with varying degrees of severity, have resulted in multiple compensatory complaints against facility owners, whether natural or legal entities, or Public Administrations, grounded on the alleged liability which they incurred. In this respect, protecting public health is bound to be conditioned by the interpretation of the rules regulating this type of leisure facility by public authorities.

The importance of the issue presented has given rise to wide-spread legal unrest that has caused a sustained jurisprudence in various jurisdictional divisions. From this point, when trying to obtain an adequate application of health regulations for swimming pools, it may be useful to look at the most recent jurisprudence to understand how the technical regulations for swimming pools have been configured.

The aim of this study was to provide some interpretive criteria from disputes that have been settled in different legal institutions, regarding the technical-health requirements of swimming pool facilities involved in the occurrence of accidents. To do so, we draw upon the characterisation and causal analysis of the accidents identified in court decisions regarding health regulations in force for public swimming pools in Andalusia[5], excluding legal analyses, which would require a specific study.

Method

Design

Observational. The *study type* consisted in a descriptive analysis. The basic investigation unit was the court ruling, defined as the ruling o jurisdictional act that *"definitively decided the litigation or grounds, in any instance or appeal, or when according to the procedural laws they should be this way"*[6], indexed in a national legal database. As source of identification for the documents, the legal database at the Centre for Judicial Documentation of the General Council of the Judicial Branch in Spain was used. Access to this database was made during March 2013, using the CENDOJ jurisprudence system search engine.

Sample studied

The analysis was chronologically limited to the period 1999-2012, both included, within the region of the Autonomous Community of Andalusia. The search strategy to capture the court rulings was fundamentally based on the "search text" field with the description (accident AND swimming pool). The search results produced 23 court rulings to be analysed.

Inclusion criteria

Only the records that identified accidents with injuries occurring at swimming pools and aquatic parks were selected, in the field of application of current swimming pool health regulations.

Main measurements

Based on the analysis of the contents and by extracting information from court rulings, a database was created to study the following variables: judicial body, procedural field, location, province, year/resource, swimming pool type, no. of victims, sex, adults/minors, physical activity (that the victim was carrying out just before the accident took place), deviation (description of the unusual occurrence that took place in order for the accident to happen), form of accident (the way the victim was injured by the physical agent that produced the injury), physical agent (element or object with which the victim had an accident), part of the body injured and description of the injuries. Essentially, the classification conforming to NTP 592 (Technical Prevention Notes) was used to codify the fields, governing document handling and the investigation into accidents of the National Occupational Health and Safety Institute[7].

Analytical procedure

Two parallel and complementary strategies were used in a causal analysis by, on the one hand, identifying the circumstances and/or behaviours that could lead to the occurrence of an accident, and on the other hand, the setting and limiting of parameters or technical requirements of the swimming pool facilities employed by the different legal bodies in their respective decisions.

Statistical handling

A quantitative analysis was carried out and different graphic presentations were produced (tables, bar charts, pie charts), using the Microsoft®Excel 2010 v.14 for Windows 7 software. To ensure data quality control, revision was carried out in pairs to correct possible errors in data entry.

Results

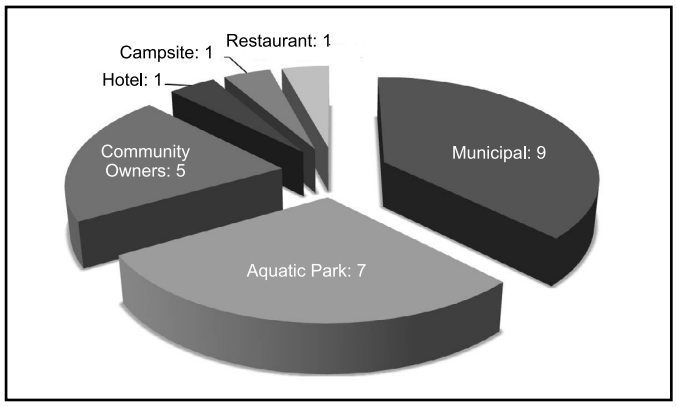
The court rulings analysed mainly corresponded to civil procedures (n=16), followed by contested administrative procedures (n=5) and two in the criminal field, issued mainly by the Provincial Court (n=18) and in 5 cases by the Superior Court of Justice in Andalusia.

Behind the cases there were 4 mortal victims, minors, with equal division in sexes. Three deaths were caused by drowning and one from a dive. In 8 cases the accidents had an aftermath. In 7 sentences no details were provided regarding injuries, however diverse injury patterns were identified. The most frequent diagnosis was bone fracture, mainly to lower extremities. In two cases the drowning mechanism was not specified (submersion-asphyxia, submersion-inhibition), and in the third, cardio-respiratory arrest was diagnosed through water on the lungs. Table 1 displays the relationship between the injuries extracted from the database, compensation acknowledged on one occasion for psychological damages occurring as a result of injuries suffered.

The majority of the swimming pools were privately owned (n=14) compared to public swimming pools (n=9). In the latter, all the accidents occurred in municipal facilities, whereas in the private pools, 7 occurred in aquatic parks (Figure 1).

The activity the victims were carrying out just before the accident (Figure 2) cannot be classified as dangerous, with the most common activity being walking near the pool (n=8) or going up the pool steps (n=2), compared with actions with an intrinsic risk, such as going down a slide (n=5). The anomalous event that is most frequently associated with accidents was slipping and falling on a level surface (n=8); three cases of drowning were identified; whilst in 3 cases the judges ruled that the impacts that occurred were incidental. In accordance with the aforementioned, the most common way an accident was produced was by coming into contact with a slippery surface (n=10), followed by an impact against a surface (n=5), with the least frequent being the inhaling of chemical substances resulting from the creation of a cloud of toxic gas due to an incompatible chemical mixture (Figure 3). The physical agent associated with the form of contact describes the facility element with which the victim incurred an injury, not implying the existence of a causal connection, the most common being even-levelled walkways, the bottom of the pool, and slippery floors (Table 2).

Figure 1. Accidents by swimming pool type.



In analysed 12 cases, deficiencies in the facilities were mentioned, but only 5 of them were related, in the judgement of the courts, to the events that led to the accident. Among the most litigated technical requirements, the slippery nature of surfaces stands out (n=12), followed by professional and organisational aspects relating to the task of surveillance by lifeguards (n=4) and/or monitors (n=2). The technical requirements breached that founded the attribution of liability, included incorrect lifeguard surveillance, inadequate anti-slip properties of floor surfaces, deficient maintenance of the facilities, and insufficient abilities of an operator. Mention was made on only 6 occasions to the drawing up of expert reports, of which 5 refer to assessing the anti-slip properties of the floor or paving where the swimmer was moving when the accident occurred.

In more recent jurisprudence, it is indicated that the causal link between the incurrence of injury and the behaviour of the agent is

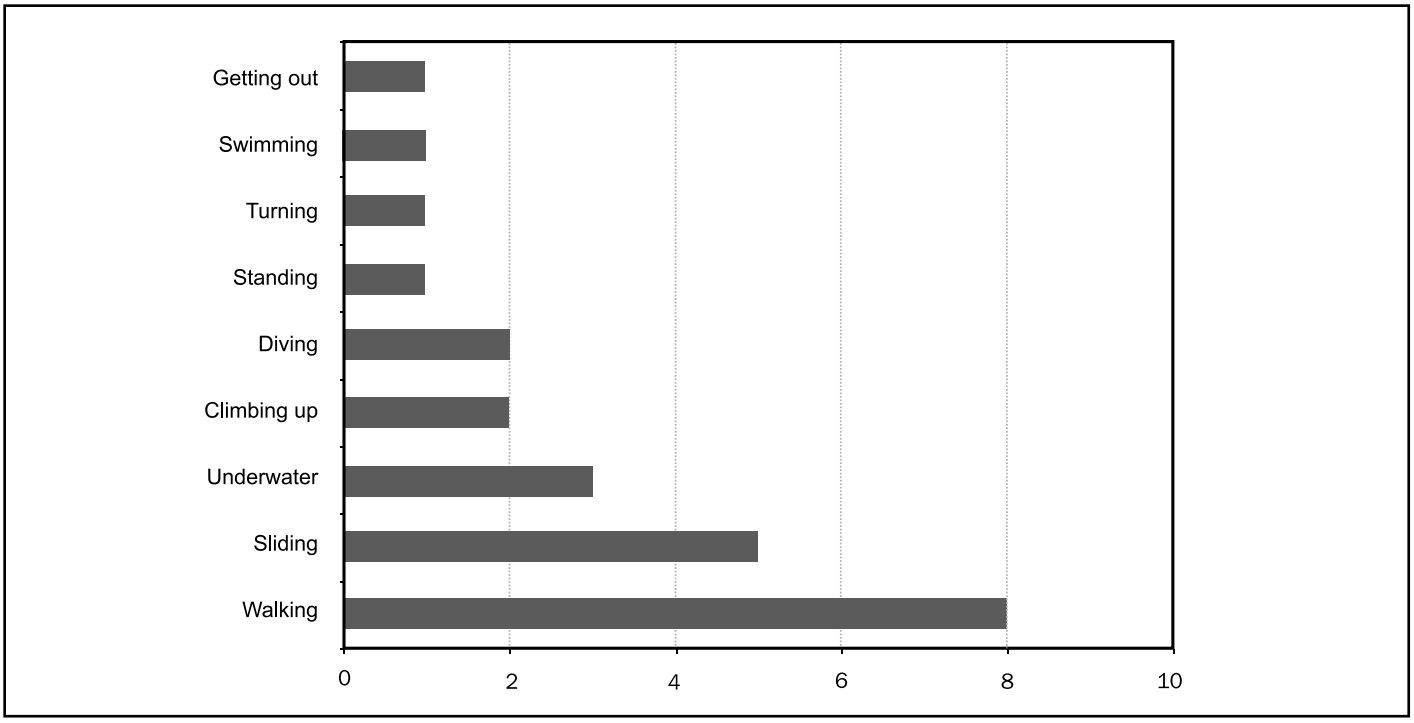
Table 1. Description of the injuries.

Type	n	Injured part of the body	n
Bone fracture	7	Non-specified body parts	7
Drowning and mortal submersion	3	Lower extremity	7
Open wounds	2	Head	6
Dental fracture	2	Thoracic region, including organs	4
Internal injuries	1	Back	2
Mortal cranial-encephalic trauma	1	Neck	1
Dislocations, severe sprains and twists	1	Upper extremity	1
Psychological damage	1		
Severe intoxication	1		

Table 2. Description of the accident.

Physical agent	n	Deviation	n
Surface below ground level (bottom of the pool)	5	Slip with a fall on the same level	8
Level surfaces or walking areas	5	Incidental impact	3
Slippery floor	3	Drowning	3
Water	3	Untimely movement	2
Humans	2	Dive	2
Electrical installation (spotlight)	1	Slip with a fall on a different level	2
Handrail on a different height	1	Standing on a sharp object	2
Gaseous chemical substances	1	Formation of toxic gases	1
Steps	1	Uncoordinated movement	1
Ladder	1		

Figure 2. Activity of the swimmer prior to the accident.

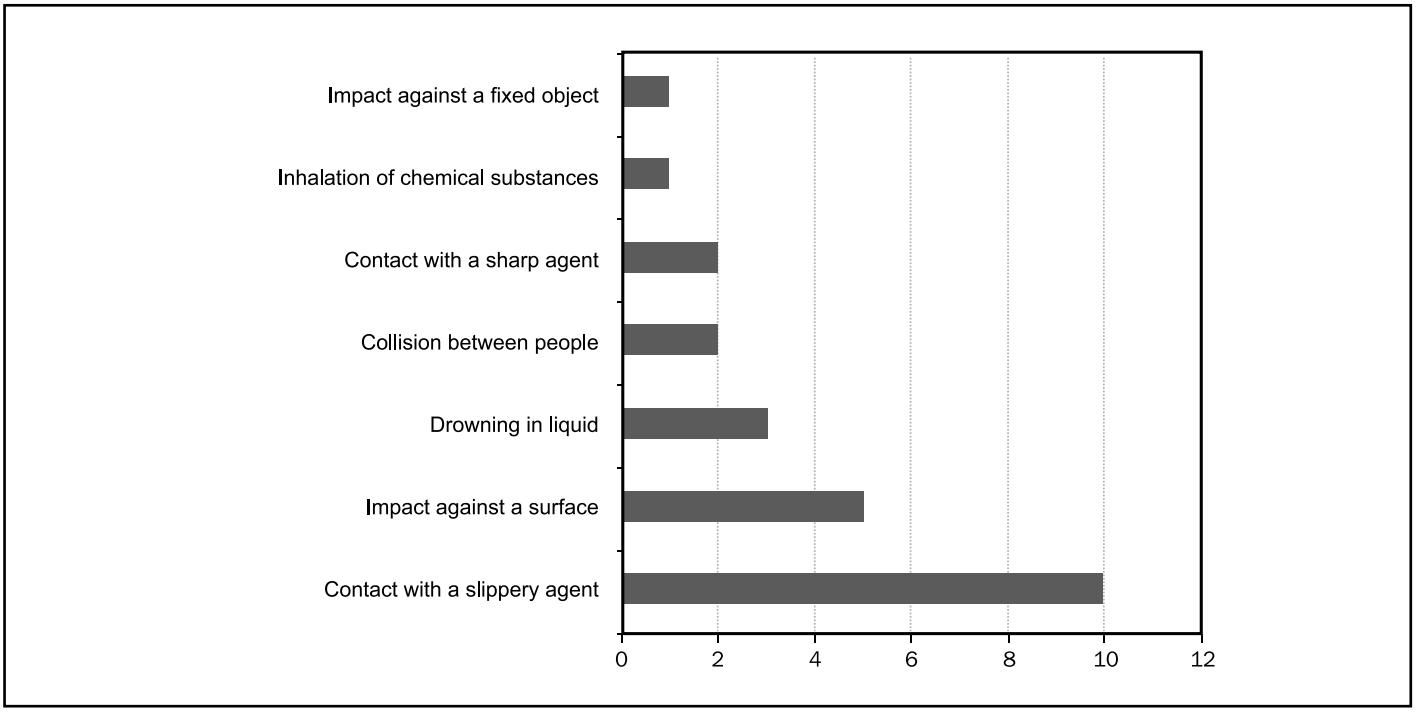


a legal matter, for example, that the service operation was normal or unusual would be considered irrelevant. In order to determine the causal link, it must be supported by some evidential certainty, which cannot be undermined by a possible application of the risk theory, the objectification of responsibility or the reversal of the burden of proof[8]. With regards to anti-slip characteristics, no causal link was found in 8 of the 12 demands for falls associated with slippery floors or surfaces. In these cases, the courts allow carefully considered individual factors that indicate that the victim may have provoked the accident by behaving in a thoughtless, distracted or reckless way.

The aetiology of the submersion is not featured in 2/3 of the drowning cases, for example, through interrupted digestion, apnoea, diving or resistance under the water; whilst in one case it was specified that the cause of death was asphyxia through breathing underwater. Of the three accidents with this motive, one was produced in the presence of a lifeguard who did not have an exclusive job title (shared job assignment as a gardener, concierge, cleaner and maintenance worker); another occurred without the presence of a contracted lifeguard, and in the third case, the sentencing court attributed part of the liability to the lifeguard for insufficient, though not negligent, surveillance of the swimmers.

In the accidents associated with the use of the slide, none of them was due to the poor state of the surfaces, joins, side edges or flaps, rather linked to the impact, whether incidental or not, between people and surfaces in the reception area.

Figure 3. Physical agent associated with the accident form.



A lack of due care or reckless behaviour of the injured swimmers was present in 10 cases (Table 3).

Table 3. Causal analysis of the accidents.

Act/Unsafe condition	n
Not paying attention	7
Slippery walkway floor surface: deficient maintenance	4
Incidental accident: chance	3
Reckless conduct	3
Sharp material: inadequate maintenance	2
Deficiency in taking on or interpreting instructions	2
No lifeguards	1
Lack of response by lifeguard	1
Insufficient lifeguard monitoring	1
Negligent conduct: collision between people	1
Human error: incompatible mixture of chemicals	1

Discussion

Injuries associated with using swimming pools still constitute a pertinent public health issue, in terms of human injury and economic losses. 24 episodes of injury-incurring accidents in swimming pools and aquatic parks have been identified, corresponding to a 12 year period of judicial rulings.

By analysing the data it was possible to describe the typical profile of a swimming pool accident victim, as a healthy adult, suffering injuries to the lower extremities following a fall caused by slipping on a walkway in the vicinity of the pool.

The victims were equally distributed in terms of sex and age (adults/minors), though they varied depending on the type of accident. All drowning cases occurred in the paediatric age group, indicating that the infant population is a particularly vulnerable group to this type of process[9]. Accidents associated with slipping on slides predominantly occurred with males, which indicates behavioural risk factors and health consequences may differ by sex[10-12].

Falls caused through slipping were more common among adults, representing the most frequent cause for the described injuries in people of advanced age[13,14], where factors such as a decrease in psychophysical aptitudes lead to a greater chance of accidents.

The most represented type of swimming pool was the municipal pool, where a greater level of responsibility and demand is expected regarding the protection of users, versus the provision of services, in accordance with the health authorities in the field of swimming pools assigned to Public Administrations.

Accidents in swimming pools may result in serious injuries, develop an aftermath, and constitute a major cause of morbidity. Falls were the main reason behind the injuries incurred, and slipping was the prevailing mechanism behind these falls. Tripping or losing balance due to discontinuities or irregularities in flooring (joins, unevenness, grooves, relieves, floor covers, etc.) are not mentioned. Injuries to the lower extremities and to different parts of the head were mainly associated with slips that occurred on surfaces that were wet or in contact with water.

Jurisdictional theses regarding the technical criteria required to understand how a non-slip floor affects the safety of swimmers prove to be insufficient. In the jurisdictional acts studied, no benchmark standards were found to be able to analyse compliance with non-slip conditions, a property that changes its variability over its lifespan. In fact, the deliberation of the specific requirements of non-slip surfaces and floors is particularly poor, and generally, the assessment of a "non-slip" attribute lies, quite wrongly, in the complete conception of the term, and in some cases, in characteristics such as the roughness of the surface, which does not necessarily make it less slippery[15]. International regulations state that there are no measurable parameters for determining when a surface is no longer non-slip, i.e. no discrimination can be made between safe and dangerous conditions. Instead, there are different measuring methods (dynamic slider, friction pendulum, ramp trial) that classify, without any methodological equivalences, flooring based on a level of recommended slipperiness and taking into account usage conditions[16-19]. Some authors have disputed the safety criteria based on the friction demand and the friction used, which is independent from slipping, finding very wide variations depending on the measurement method[20,21].

Despite the main risk factor of slipping is by definition poor control or little friction between foot/contact surfaces, the deliberations of judges cover a wide range of individual factors subject to the people that injured themselves incidentally, and also due to dangerous behaviour or reckless conduct.

In any case, accreditation in accordance with a standard of some minimum safety conditions on floors and paving in compliance with available scientific-technical evidence is essential in determining the non-legal nature of the injuries, given that by complying with current state-of-the-art recommendations and scientific knowledge, we would reduce the appearance of injuries and avoid heterogeneous interpretations made by professionals and Governments regarding the first-degree technical requirements, making it easier to effectively apply swimming pool health regulations, and eventually, provide guarantees in terms of the right to protect the health of swimmers.

Slipping on slides is one of the most injury-inducing activities[22]. However, here there is no clear evidence of regulations that should be complied with to avoid injury, meaning that legal analyses focus on the human factor, examining the conduct of the user and the role of the monitor. Despite the separate reception area at the slide, for exclusive usage and with sufficient depth constituting an important and common requisite[23], it was an obviate measure when collisions occurred between swimmers, with only signage requirements and the instructions of monitors being valued.

Diving is another worrying activity in terms of public health, especially given the severity of the injuries produced[24-26]. In one case, the traumatic impact of a swimmer's head against the bottom of the pool caused *ipso facto* death, whilst on another occasion it produced a spinal-cervical injury following the reckless behaviour of the swimmer. Despite this behaviour being very dangerous and difficult to control, notices prohibiting "dive-bombing" or "head-first" diving, especially in shallow water, are not mandatory in publically-used swimming pools. However, the physical factors that affect this type of injury such as the impact of colours, contrast, location, design and size used for the visualisation of depth markers and gradient changes, were barely considered in legal hearings.

A different problem emerges regarding drowning, as the public generally perceives that the main responsible individual for monitoring swimmers is the lifeguard. It should be considered that these events were described as quick and silent, and it is widely accepted that lifeguards are effective in improving safety conditions during recreational activities, but they alone are not enough to prevent all incidents of drowning and their ability to safeguard swimmers is limited[27]. It is true that the death of swimmers in pools in the presence of lifeguards is unusual, but it does happen.

As a general recommendation, promoting active prevention strategies aimed at improving risk awareness among vulnerable groups may be beneficial, including safety advice and training programmes on safe practices when swimming.

The jurisprudence studied seems to have little effect on compliance with the health rules of swimming pools, given that generally it offers solutions based on a heterogeneous regulation that covers legislation regarding consumers and users[28], the civil code[29], and administrative procedure[30]. In this respect, jurisprudence may end up perverting the standards that should be met within a facility, equipment or accessories, to comply with their function, by excessively downplaying their influence on reducing injuries incurred in swimming pools.

The main conclusion drawn from this investigation is that the observation of specific technical requirements and scientific evidence provides contrasting criteria when giving effective guarantees for the right of health protection. One beneficial line of action could be to introduce legal modifications in the regulation of swimming pools with more reliable, accurate and predictable regulatory requirements, where UNE standards regarding swimming pools could act as a driver for change and update technical criteria[31,32].

The results of this study should be interpreted within the context of its limitations. A reduced number of court rulings were obtained and the study was not designed to infer statistically; two elements that are essential for reaching more solid conclusions. Due to the very nature of the source of data, the health information was less detailed. The exploratory nature of this work determines that the results are provisional and act as a foundation for more in-depth investigations.

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