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## Lifeguard Performance Skills: A Systematic Review

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### **Abstract**

Drowning is one of the leading causes of death worldwide and lifeguards' action can be regarded as a significant contribution to change that reality. In this regard, the purpose of this systematic review was to identify factors associated with lifeguards' performance. After extensive research on PsycArticles, PsycBooks, PsycInfo, SportDiscus, Web of Science, PubMed, Scopus and SportDiscus databases, containing the keywords "lifeguard" AND "performance", "lifeguard" AND "skills" and "lifeguard" AND "drowning", we obtained 429 research articles. After eliminating duplicates, excluding those that had no relevance to the study, and screening against set criteria, a total of five articles were fully reviewed. Four quantitative studies and one qualitative study were included in the present review. An analysis of the data was carried out and the findings indicated that there are determining factors for the successful performance of the lifeguard's activity. Results indicate that factors related to the physical, technical, and psychological components are essential for an improved lifeguard's performance. The analysis of the data also highlights the lack of studies related to behavioural competencies.

*Keywords:* drowning prevention, competencies, lifeguards, performance.

### **Introduction**

Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid (van Beeck et al., 2005). According to the World Health Organization (2014), drowning is the 3rd leading cause of unintentional injury death worldwide. It is estimated that there are 372 000 drowning deaths per year worldwide, and more than 90% of these deaths occur in low and middle-income countries. Data from World Health Organization (2014) reported that everyday around the world about 42 people die per hour from drowning. As a result, drowning is considered a major public health problem. It is twice as common in men than in women, and over half of drowning deaths are among people under the age of 25 years. The recently released World Health Organization (2021) guideline on the prevention of drowning reports that approximately 236 000 people died from drowning in 2019, highlighting that these global estimates may significantly underestimate the actual public health problem concerning drowning.

Drowning is among the 10 leading causes of death in children and young adults worldwide. Leading the way is the Western Pacific Region, with drowning being the leading cause of death in children aged 5 to 14 years, followed by the South-East Asia Region, with drowning being the second leading cause of death in children aged 10 to 14 years. In the Region of the Americas, drowning is the third leading cause of death in children aged 5 to 14 years. In the European Region, drowning ranks fourth in ages 10 to 14 years. In the Eastern Mediterranean Region, drowning is the fifth cause of death in children aged 10 to 14 years. Finally, the African Region records drowning as

the ninth cause of death in children aged 10 to 14 years. In the age groups of new-borns to 5 years and 15 to 24 years drowning is also one of the leading causes of death in the different geographical areas analysed (World Health Organization, 2014).

The lifeguard actively contributes to safeguard human life and seeks to counteract this reality through prevention, awareness, and rescue actions (Koon et al., 2020). Specifically in rescue actions, the training process of lifeguards allows them to intervene in any aquatic scenario. These professionals acquire technical training that allows them to perform safer and less risky rescue actions and have extensive training on rescue techniques applicable to rescue in the aquatic environment, such as rescue belt, torpedo buoy, rescue board among other equipment (Barcala et al., 2016).

Regarding physical skills, lifeguards develop physical fitness training, which allows them to perform the rescue action with a higher probability of successful intervention. The physical demands in the rescue action are associated with running, locomotion, rescue, and resuscitation techniques (Sousa et al., 2017).

Behavioural and psychological skills are crucial for the achievement of better prevention, since the way the lifeguard can influence the behaviour of other people (DePaulo & Friedman, 1998). Effective prevention translates into a set of practices of risk analysis and control which may prevent drowning situations. The topic of prevention is widely addressed in the training of lifeguards. However, non-verbal communication may contribute to a better preventive performance, although it is not addressed in the training of these professionals. Through certain behaviours such as the appropriate use of the whistle in the timing of the infraction and/or warning, the performance of assertive gestures, the posture and body movement of the professional, his/her facial expression through eye contact and control, style and composure, the lifeguard will be more respected, and his/her orientations will be better accepted by the bathers (Santiago et al., 2020).

Despite the growth of the research on lifeguard skills, there is a need to contextualize this knowledge. Thus, through this systematic review we sought to identify the technical, physical, and psychological factors associated with improved performance of lifeguards. It is known that 99% of lifeguards working time is based on preventive behaviours (Szpilman, Oliveira, et al., 2018). Hence, preventive factors may be crucial for a better detection of drowning situations, ability to act swiftly and improve the quality of life of victims who faced this situation. Although few articles discuss factors that influence lifeguard's performance or skills, there are no studies that review preventive behaviours. Prevention seems to be the key factor to lifeguard's performance

(World Health Organization, 2017), given that the first step to save people from drowning is avoiding rescues.

## **Method**

### **Search Strategy: Databases and Inclusion Criteria**

A systematic review was performed according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines (Page et al., 2021). The databases searched were PsycArticles, PsycBooks, PsycInfo, Web of Science, PubMed, Scopus and SPORTDiscus. The following keywords and Boolean operator were used: “lifeguard” AND “performance,” “lifeguard” AND “skills” and “lifeguard” AND “drowning.” The research included articles up to August 2020. Only reviewed and published articles were considered in the analysis.

### **Quality of the Studies and Extraction of Data**

All articles resulting from research were analysed and the assessment guidelines of qualitative (Letts et al., 2007) were followed. Authors answered the following criteria: 1) Was the purpose and/or research question stated clearly?; 2) Was relevant background literature reviewed?; 3) What was the design?; 4) Was a theoretical perspective identified?; 5) Method(s) used?; 6) Was the process of purposeful selection described?; 7) Was sampling done until redundancy in data was reached?; 8) Was informed consent obtained?; 9) Clear and complete description of site and participants?; 10) Role of researcher and relationship with participants; 11) Identification of assumptions and biases of researcher; 12) Procedural rigor was used in data collection strategies?; 13) Data analyses were inductive?; 14) Findings were consistent with reflective of data?; 15) Decision trail developed?; 16) Process of analysing the data was described adequately?; 17) Did a meaningful picture of the phenomenon under study emerge?; 18) Was there evidence of the four components of trustworthiness?; 19) Conclusions were appropriate given the study findings?; 20) The findings contributed to theory development & future OT practice/ research?

For quantitative study, the authors followed the critical review form criteria proposed (Law et al., 1998). In this case, the authors responded to the following questions: 1) Was the purpose stated clearly? 2) Was relevant background literature reviewed? 3) What is the study design?; 4) What is the size of the sample?; 5) Was the sample described in detail?; 6) Was sample size justified?; 7) Were the outcome measures reliable?; 8) Were the outcome measures valid?; 9) Intervention was described in detail?; 10) Contamination was avoided?; 11) Co-intervention was avoided?; 12) Results were reported in terms of statistical significance?; 13) Were the analysis of methods appropriate?; 14) Clinical importance was reported?; 15) Drop-outs were reported?; 16) Conclusions were appropriate given study methods and results. In case of disagreement in the classification, the authors of the study discuss until they reach a consensus.

## **Results**

### **Search, Selection and Inclusion of Publications**

The initial search identified 429 titles in the previously mentioned databases. Any duplicates were eliminated automatically (n = 210), leaving 219 articles for analysis. These data were exported to reference manager software EndNote™ 20, and the articles were then screened for relevance based on their title and abstract; 205 articles were rejected due to lack of relevance and because they did not meet the inclusion criteria. The full text of the remaining 14 articles was examined in more detail. The factors for study exclusion were “included data from other areas” (n = 4) and “missing scientific data” (n = 5). After screening against set criteria, a total of five articles were fully reviewed.

### **Quality of the Studies**

Four quantitative studies and one qualitative study were included in the present review. These studies were evaluated and rated for their quality and obtained a score ranging from 84% to 90% (Letts et al., 2007).

### ***General Description of the Studies***

In order to assess the effectiveness and efficiency of lifeguards, studies have been conducted to prove that physical factors such as running, and swimming are crucial for the rapid intervention and survival of drowning victims. Likewise, technical factors such as swimming technique and mastery of basic life support algorithms are critical for the successful reversal of a serious situation. Psychological/behavioural factors such as distraction can easily lead to a drowning situation. To identify the factors associated with improved performance of the lifeguard, please see Table 1 with information of the analysed studies in which the assumptions, the methodology and the results obtained are presented.

## **Discussion**

In the present review, we analysed studies exploring preventive behaviours among lifeguards. To our knowledge, no previous studies have investigated prevention behaviours on lifeguards.

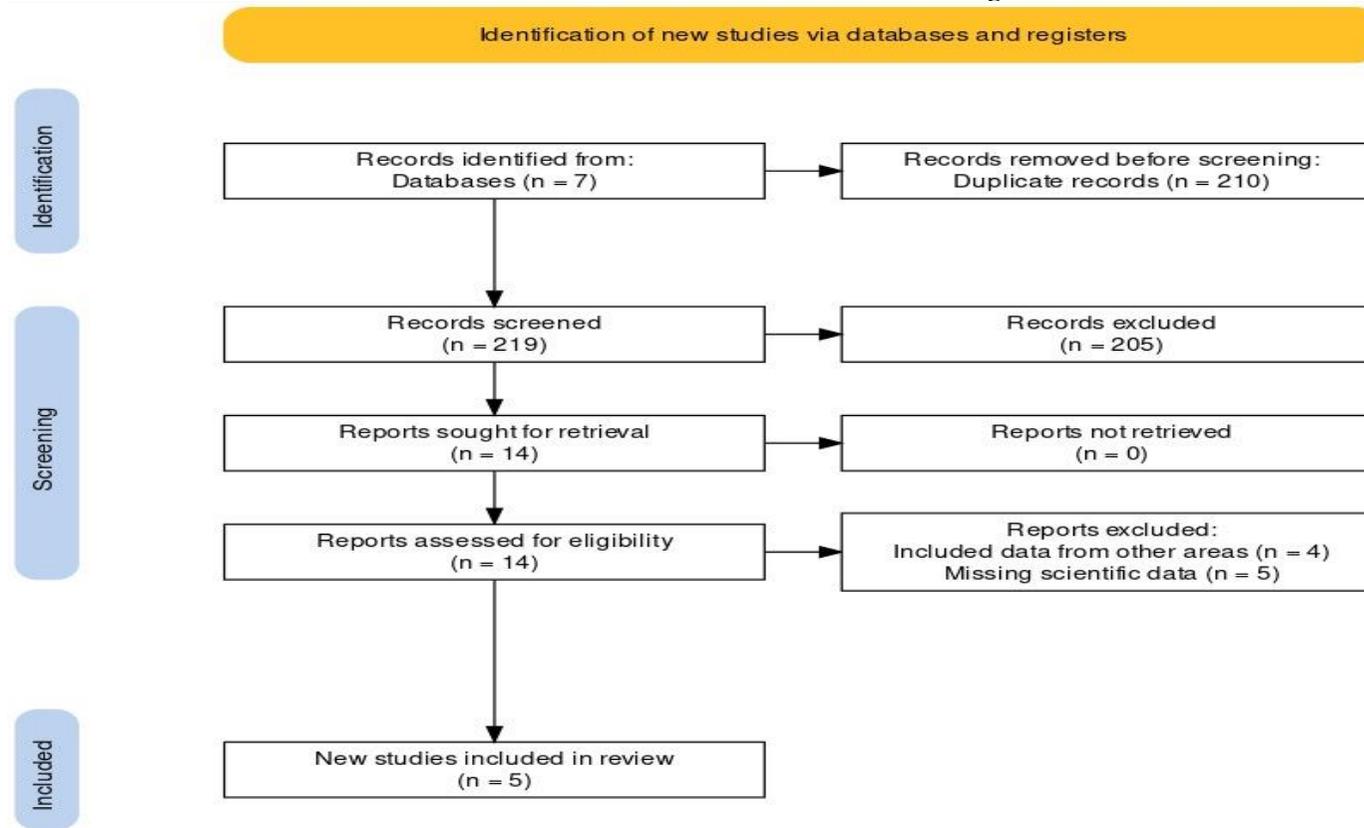
According to Connelly et al. (2018), integrity and competence are key factors to achieve an improved performance at work. The most relevant soft skills needed for today's workplace and after analysing the studies, we identified three broad areas that we consider essential for the improved performance of lifeguards: technical, physical, and psychological (Robles, 2012).

Accordingly, technical and physical factors are analysed together, since in these studies the evaluation of the results did not allow their dissociation as they are interconnected. Psychological factors refer to lifeguards' behaviour and thoughts. Physical and technical factors refer to lifeguards' physical capacities and their technical skills refer to the ability to perform job specific tasks.

**Figure 1**

*Flow chart of the procedures used for the article search*

*PRISMA 2020 Flow Diagram*



**Table 1**  
*Studies analysis*

Study	Sample	Main variables	Strategies used	Quality score (%)	Identified factors	Results
(Tipton et al., 2008)	65 beach lifeguards	Lifeguards with surf experience	swimming capacity, assessment in calm sea and pool	88	Technical and physical	There is a significant and measurable difference in lifeguards' performance with experience in the surfing activity.
(Page et al., 2011)	69 lifeguards	Lifeguards with and without experience	Screen with video simulations	84	Technical	There was a significant difference in detection rates between experienced and less experienced lifeguards. Experienced lifeguards are 4.9 times more likely ( $p = 0.044$ ) to detect a person exposed to the risk of drowning.
(Griffiths & Griffiths, 2013)	839 lifeguards	Lifeguards with experience	Online survey	84	Psychological	The most prominent topics lifeguards mentioned they thought about while on duty were: "pool" ( $n = 239$ ), "relationships" ( $n = 184$ ), "patrons" ( $n = 115$ ), "family" ( $n = 111$ ), "plans after work" ( $n = 108$ ), "weekend plans" ( $n = 91$ ) and "doing after work" ( $n = 76$ ).
(Reilly et al., 2006)	91 lifeguards	Lifeguards with and without experience	Beach running, swimming in the sea, board paddling and swimming in a pool	88	Technical and physical	The most demanding strength-related tasks were casualty handling onto a rescue boat, board, or beach. The most demanding endurance-related tasks were sea swimming while towing a casualty, board paddling with a casualty and beach running.
(Moran & Webber, 2013)	252 lifeguards	Lifeguards with surf experience	Skill Reporter manikins to measure a range of resuscitation parameters	90	Technical and physical	Most of the lifeguards (72%) ensured safety conditions. Almost all lifeguards checked whether the victim responded to stimuli (98%) and performed airway management (92%), then assessed breathing (94%) and initiated chest compressions (98%), establishing a correct compression/ventilation ratio of 30:2 (90%). Only 48% of participants complied with the correct basic life support algorithm sequence.

In Tipton et al. (2008) study we note that experience and the relationship with the aquatic environment through the practice of surfing significantly improve the lifeguard's performance. In the tests performed, swimmers who had little, or no surf swimming experience were on average 9.3 seconds slower than those who had experience. This experience in adverse conditions allows lifeguards to have greater ease of movement in the water and contributes significantly to the mastery of the techniques used in rescue with the rescue board.

However, the calm sea swim times of the two groups did not differ significantly. On the contrary, the same test performed in surf sea (with waves) shows a marked difference, since the swimmers with a high level of surf swimming experience were faster. As surfing is developed in rough sea conditions (with waves) it is natural that the adaptation to the aquatic environment is better developed, resulting in a better performance than non-surfers. When comparing the pool swim times, the two groups did not differ. These findings indicate that in calm waters the surfing experience factor is not determinant. The aquatic conditions existing in a pool environment are very similar to the conditions found in a sea with few waves. Possibly, because of this fact, surfers do not stand out from pool swimmers.

Moreover, the ability to detect drowning victims was studied by Page et al. (2011). This study has shown that the rates of detection of a drowning victim differed significantly between groups of lifeguards (experienced and inexperienced). Experienced lifeguards were able to detect 4.9 times more drowning situations. In this sense, we realise that the experience factor is determinant for a better performance in the identification of possible drowning. The time factor is also decisive for the possible survival of those who find themselves in this situation. Therefore, the prompt identification of these events is crucial. We can then perceive that the practice of board sports and professional experience are key factors in reducing drowning situations.

As regards the use of strength by lifeguards required for the performance of their duties, the study of Reilly et al. (2006) identified that the most physically demanding tasks are lifeboat, board, or sea rescues. Another factor associated with strength is endurance. Endurance is a key factor for a successful rescue. The most demanding tasks were running, rescue swimming, towing, and board paddling.

In the procedures for approaching a drowning victim, Moran and Webber (2013) investigated the performance of the basic life support protocol and the resuscitation technical implementation. Most of the lifeguards (98%) checked whether the victim responded to stimuli. However, the study identified some situations that might jeopardise the victim's recovery, namely poor external cardiac compression, 4% of lifeguards performed incomplete releases, 9% placed their hands too low, 18% compressed the chest too deeply, 25% compressed the chest using a wrong hand position, and 35% compressed too superficially. Another compromising factor is ventilation. Most lifeguards (87%) over-ventilated the lungs on each rescue breath. Thus, we found that the techniques used in performing compressions and ventilation technique are crucial for the victim's recovery. The development of these skills should be performed through regular training on CPR training manikins that monitor and identify errors during performance (Perkins et al., 2015).

Griffiths and Griffiths (2013) study defines that internal noise, as thoughts and emotions, distract the lifeguard from a task. A small distraction may be enough to lose a life. This study explores two analysis categories: thoughts and emotions. External distraction factors were also identified such as talking on the phone and texting. Avert one's gaze from the surface of the water can compromise effective prevention, as well as the number of working hours

associated with the work routine can contribute to this type of behaviour. Death by drowning is quick and silent so any distraction can be potentially fatal (Salomez & Vincent, 2004).

The lifeguard experience proves to be a key and decisive factor in the proper performance of the lifeguard's functions in detecting and assisting victims in pre-drowning/drowning situations. This is expected to happen, since these are skills that are grounded during the training process, but only consolidated with the practice and knowledge that the lifeguard acquires (Page et al., 2011). Likewise, surfing experience develops skills that enable better performance in the aquatic environment (Tipton et al., 2008).

Moran and Webber (2013) found that the quality of basic life support is higher in younger and less experienced lifeguards. This fact may be due to the lack of practice of basic life support manoeuvres throughout their career. Recently graduated lifeguards have practiced these manoeuvres several times in their course, so it is expected that they have more quality in the resuscitation process than more experienced lifeguards, since the provision of basic life support is not a recurrent practice in the lifeguard's work.

The lifeguards' decreased ability to concentrate is largely due to their shifts being too long and characterised by some monotony inherent in the profession. Griffiths and Griffiths (2013) show in their study the most frequent distracting thoughts of lifeguards during their working hours. Given this, it is important to train lifeguards to be aware of this issue. Distractions caused by thoughts can mean the difference between life or death of a victim. Training the focus of attention and awareness of how we can move from a narrow or wide internal focus to an external focus will help combat this problem of thoughts and consequent distractions (Sherwood et al., 2020).

Also, physical dexterity also proves to be a determining factor for the success of lifeguards in their work, since in the last instance, the lifeguard will have to render aid to victims in a pre-drowning/drowning situation. Specifically, Reilly et al. (2006) show that the most physically demanding activities in the performance of the lifeguard's duties are: running, swimming, and paddling on the board. This is a recurring practice in almost all rescue actions and is part of the training framework of these professionals (Tipton & Wooler, 2016).

Sousa et al. (2017) show in their study that trained lifeguards are able to maintain the quality of basic life support manoeuvres after performing a simulated rescue over the 100m distance. Moran and Webber (2013) discuss the quality of the provision of basic life support. Although this algorithm is not one of the most demanding activities performed by lifeguards, it is also an activity that, over time, leads to fatigue and loss of technical quality of compressions-inflations, thus further increasing the importance of this professional's physical fitness.

### **Limitations and Future Research**

A possible limitation of this systematic review is that it only includes studies in English from the databases searched, since no other relevant publications were available in other languages (e.g., Portuguese, Spanish, French, Italian). Several limitations of research on lifeguard skills can be highlighted. First, since most of lifeguards' service time is focused on hazard avoidance attitudes (Szpilman, Oliveira, et al., 2018), further research should consider lifeguards' drowning prevention skills given the lack of studies. Second, there is a need for longitudinal studies that look at the long-term effects of lifeguard training and the annual refreshing skills activities. Third, the analysis and identification of water incidents should be the subject of further in-depth studies that prove a better efficiency of the ability to use peripheral vision, as in driving (Wolfe et al., 2017). Fourth, future studies should also continue to examine the impact

of internal noise on lifeguards' vigilance (Baek & Chong, 2020), namely assessing the influence of thoughts on concentration ability.

Evidence from other areas of research suggests that fatigue has a significant effect on attention span (Holtzer et al., 2011). Therefore, it would be relevant to analyse the effects of fatigue on the preventive actions of lifeguards. Finally, social, psychological, and behavioural skills are fundamental for effective prevention. Even experienced lifeguards reveal the need to obtain formal knowledge in the development of behavioural skills, and it will be necessary to further explore this topic in the future (Santiago et al., 2020).

### Conclusions

Drowning is a real and dangerous risk, and the most important tool to avoid it is prevention (Szpilman, Sempstrott, et al., 2018). The assessment of the available data allows us to conclude that the factors associated with improved performance of the lifeguard can be categorized as physical, technical, and psychological factors. The combination of the identified factors can undoubtedly lead to improved lifeguard performance. Lifeguards' presence in the aquatic environment may give a false sense of security if they are not vigilant, since a small distraction can be costly, and an accident may occur (Modell, 2010). Research addressing the performance of lifeguard's is scarce and, to our knowledge, there is no scientific evidence regarding the lifeguard's psychosocial and behavioural skills to deal with potentially stressful situations. The scarcity of scientific work in the field of lifeguards' performance assessment is remarkable. According to (Szpilman, Oliveira, et al., 2018) lifeguards spend 99% of the time carrying out preventive actions, so it is essential to promote the conduct of new scientific studies in the psychological/behavioural field, which might highlight the best way to prevent drowning accidents. This study aimed to revise and introduce a new line of study in aquatic rescue.

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