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THE EFFECT OF POOL LENGTH ON THE RESULTS OF PROFESSIONAL LIFEGUARD SAVING TESTS

INFLUENCIA DE LA LONGITUD DEL VASO SOBRE LAS PRUEBAS DE SOCORRISMO ACUÁTICO PROFESIONAL

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ABSTRACT

In this study 2.528 aspirants for aquatic lifeguard certification (1.798 men and 730 women) were selected. All the participants of the study have performed the four physical tests of chronometric water required in order to work as a lifeguard for swimming pools, aquatic and open water in the Comunidad Autónoma de Madrid (Spain). Of the whole participants, 1.887 aspirants were tested in a 25-meter pool and 641 were done so in a 50-meter pool. The aim of this study is to know the influence of the length of the pool in which these physical tests are developed, on the pass rate and on the time needed by the sample to carry them out. The results of this research show that the length of the pool in which the aspirants are evaluated, influences on the time marks obtained by them and also on the number of approved ones.

KEY WORDS: Lifeguard, length of the pool, course length, physical condition, evaluation.

RESUMEN

En este estudio se ha seleccionado a 2.528 aspirantes a la certificación de socorrista acuático (1.798 hombres y 730 mujeres). Todos ellos han realizado las cuatro pruebas físicas de agua cronometradas que se exigen para trabajar de socorrista en piscinas, instalaciones acuáticas y medio natural en la Comunidad Autónoma de Madrid (España). Del total de los participantes, 1.887 aspirantes realizaron dichas pruebas en vaso de 25 metros y 641 lo hicieron en vaso de 50 metros. El objetivo de este estudio es conocer la influencia de la longitud del vaso en el que se desarrollan estas pruebas físicas, sobre el porcentaje de aprobados y sobre las marcas de tiempo que emplean los participantes para realizarlas. Los resultados de esta investigación demuestran que la longitud del vaso en el que se evalúa a los aspirantes a socorrista, influye significativamente sobre las marcas de tiempo que obtienen y también sobre el número de aprobados.

PALABRAS CLAVE: Socorrista, longitud del vaso, condición física, evaluación.

1. INTRODUCTION

The literature states that aquatic lifeguards must know and apply appropriate prevention and surveillance measures to the bathing environment. They must also master the methods and techniques of water rescue intervention and first aid, and they must show a high level of skill and physical condition in the water. At the same time it is recommended that this knowledge and skills are kept up-to-date throughout the lifeguard's career (Ellis & Associates, 2002; García Sanz et al., 2015; International Life Saving Federation, 2000; International Life Saving Federation, 2007; International Life Saving Federation, 2013; Palacios Aguilar, 2008; Real Federación Española Salvameno y Socorrismo, 2003; Sanz Arribas, 2011; Schwebel et al., 2010; The United States Lifesaving Association, 2016). Therefore, the acquisition and mastery of these skills and abilities is a priority objective for the training of the aquatic lifeguard. Although all these parameters have a considerable influence on the level of competence of the lifeguard, this study focuses on the timed physical tests that are used to assess the level of skill of the lifeguard in the water. In relation to this issue, it is important to note that there are many public or private entities or bodies, which establish or recommend different objectives and evaluation criteria to obtain the same or equivalent certificate (Consejería de Sanidad y Consumo, 2006; Cruz Roja Española, 2017; Federación Madrileña de Salvamento y Socorrismo, 2017; International Life Saving Federation, 2000; International Life Saving Federation, 2013; Ministerio de Trabajo e Inmigración, 2011; The United States Lifesaving Association, 2016). Precisely the lack of harmonization existing in the objectives and evaluation criteria of training courses of lifeguard could cause important differences in the level of competence of professionals working in similar environments.

Apart from this important issue, it also happens that some of the evaluation criteria recommended or established to examine aquatic lifeguards are not

properly protocolized, or they are in such a way that there is the possibility that applicants for lifeguard can be evaluated under different conditions when performing the same test. An example of this is the general absence of Common Tables that establish the influence of the length of the swimming pool on the time stamps required to lifeguard applicants in the physical pool tests. In fact, it is known that the time stamps obtained in swimming tests performed in 25-meter swimming pools are significantly better than those obtained in 50-meter ones (Keskinen et al., 2007; Koch-Ziegenbein et al., 2013; Wolfrum et al., 2013; Wolfrum et al., 2014). This is because the tests developed in a 25-meter swimming pool allow the athlete to make more turns and, therefore, he/she can be pushed more times on the wall when covering a set distance. Having a greater number of impulses on the wall allows the swimmer to move faster and with less energy expenditure during the slip phase after the turn. Along this line, some authors have determined that swimming the same distance in a 25-meter pool causes a lower maximum heart rate and accumulation of lactic acid in blood than those produced in tests performed in 50-meter swimming pools (Keskinen et al., 2007; Lowensteyn et al., 1994). For these reasons, some sports entities apply conversion tables that allow canceling or attenuating the influence of the swimming pool's length on the time stamps that the athletes accredit in the different tests. Thus, the minimum time required by these sports institutions for their competitors to participate in certain events depends on the type of swimming pool in which they were previously accredited (Real Federación Española Natación, 2016; Real Federación Española Salvamento Socorrismo, 2016). However, these conversion tables are thought and designed to be used in swimming and/or sport aquatic rescue competitions and therefore these scales should not be used with time stamps required from aquatic lifeguard applicants, since the tests, the population that carries them out and their purpose are completely different. On the other hand, there are institutions that establish the time limits of the timed water tests in order to evaluate the lifeguard applicants in 25-meter swimming pools; there are even institutions that also require the performance of open water tests (Consejería de Sanidad y Consumo, 2006; International Life Saving Federation, 2007; Ministerio de Trabajo e Inmigración, 2011). However, it does not seem wise to dispense with the 50-meter swimming pools to develop lifeguarding training courses because these facilities are clearly valid for this purpose and because there is currently a great availability of them. Moreover, the use of 50-meter swimming pools seems especially suitable for training lifeguards who aspire to work in open waters or natural aquatic spaces.

Therefore, the objective of this study is to know the influence of the length of the swimming pool, in which the tests are carried out, required by the Order of the Community of Madrid (Consejería de Sanidad y Consumo, 2006), on the time stamps that aquatic lifeguard applicants achieve. At the same time, it is intended to know if this variable influences on the pass and failure rates of these tests. The achievement of these objectives would allow rethinking the time limits required from lifeguards, depending on the length of the swimming pool in which the evaluation is carried out. Thus, lifeguards would be examined under equal conditions, regardless of the length of the swimming pool in which the tests are developed.

Finally, it should be pointed out that this article is part of a broad investigation linked to the level of physical condition and water skills of lifeguards.

2. METHODOLOGY

In relation to the ethical standards and requirements to participate in this study, it is indicated that all participants are over 16 years old and have passed the 4th year of Compulsory Secondary Education (E.S.O.) or equivalent. In addition, they have presented an official medical certificate, which states that they do not suffer from any infectious-contagious disease and that they are suitable for physical exercise in the water. With regard to ethical standards, the anonymity of all the people who have been part of the study has been maintained. To carry out this study, no invasive or harmful method that could affect the participants has been used. It is also pointed out that all ethical standards of research and data protection, both national and international, have been respected. In short, in no case have the limits of privacy and the respect that people demand have been invaded.

The study is conducted with 2,528 applicants for an aquatic lifeguard certificate (1,798 men, 71.1%, and 730 women, 28.8%). All participants received the necessary training to obtain this certificate between 2006 and 2016. All of them were timed to perform the four water tests required by the Community of Madrid (Consejería de Sanidad y Consumo, 2006), to be able to work as a lifeguard in swimming pools, aquatic facilities and natural environments in that territory. Of all participants, 1,887 (74.6%) applicants conducted the tests in a 25-meter swimming pool and the remaining 641 (25.4%) did them in a 50-meter one. Regarding gender distribution in the different swimming pools, it is shown that 74.5% of the men (1.341) and 74.7% of the women (546) performed the tests in a 25-meter one, while 25.4% of the men (457) and 25.2% of the women (184) performed the tests in a 50-meter one. In order to know the influence of the length of the swimming pool on the time stamps obtained in the timed physical tests, we have compared the time stamps achieved by the applicants who passed all the tests in a 25 meter swimming pool with the time stamps of all those who also passed these same tests in a 50-meter one. Those applicants who did not pass all required tests (Consejería de Sanidad y Consumo, 2006), were included in the group of “suspended” and therefore they were only considered to know the pass and failure rates. On the other hand, it was decided not to assess the influence of gender on the results of physical tests because it is considered that people who use the aquatic areas monitored by lifeguards are only interested in knowing that the lifeguard is competent to develop the job and not in their gender.

Below is a brief description of the physical tests and their time limits:

I. 300-meter test of crawl or breaststroke: The lifeguard applicant must swim continuously for 300 meters in crawl and/or breaststroke style. The time limit of this test is: 8 minutes.

II. Combined test I: Diving into the water with sighting of the victim with adequate rescue material for the victim. The victim must pretend that

he is in a situation of low level of water stress. Swimming 50 meters to approach the victim, making contact with the victim and transporting the victim for 50 meters with correct technique (with continuous assessment of the victim). The time limit of this test is: 3 minutes and 30 seconds. Once the timed part of the test is finished, the applicant must take the victim out of the water and perform the assessment and basic cardio-pulmonary resuscitation maneuvers (CPR) for 3 minutes on a manikin of CPR. As it can be read in the description of the test, the material to be used in the rescue is not defined; therefore, the examiner may ask the applicant to perform the timed part of this test with any of the materials of usual individual rescue (lifebuoy, rescue tube, torpedo float...). Along this line, previous studies concluded that the recue tube and the lifebuoy are equally fast in rescues of 50 and 100 meters with unconscious victims and in calm waters (Sanz Arribas, 2015; Sanz Arribas, 2016), although there are also studies that differ in this (Barcala-Furelos et al., 2016). Apart from this difference within the literature, the results of this test will not be used to know the influence of the swimming pool's length on the time stamps because both the physical characteristics of the subjects who pretended to be the victims (weight, complexion, gender, size) and their behavior at the moment they are rescued (conscious, unconscious) may influence significantly on the times stamps accredited by applicants. That is, the test is not normalized. However, as with the rest of the tests, all study participants who did not pass this test were included in the group of "suspended".

III. Combined test II: Diving into the water with sighting of the victim. Swimming 50 meters to approach the victim and 15 meters of uninterrupted diving until picking up the victim (manikin) that is at the bottom of the swimming pool. Finally, the applicant must perform 35 meters of transfer of the manikin, taking care of his airways not to be hindered by water or by the hands of the applicant. The time limit of this test is 3 minutes. It is emphasized that this test always uses a standard manikin, full of water and watertight, which will be described in the section of material resources. Consequently, all study participants have performed the combined test II with the same type of manikin. That is, the victim is standardized and inert. On the other hand, the regulation of the Autonomous Community of Madrid establishes that the minimum depth at which the mannequin must be found during the test is 180 centimeters (*Consejería de Sanidad y Consumo*, 2006). That said, the facilities in which the courses with the results of this study were developed, fulfilled this requirement.

With regard to physical tests, according to the referenced regulations (Department of Health and Consumer Affairs, 2006), to be able to work as a lifeguard in swimming pools, aquatic facilities of the Community of Madrid, it is necessary that the applicant passes the previous three tests. However, if the applicant wants to obtain certification to work as a lifeguard in swimming pools, aquatic facilities and natural environment of the Autonomous Community of Madrid, it is necessary to pass a fourth test that requires the use of fins and is

not sued to work in pools. This criterion makes a lot of sense, since the distances and characteristics of the rescues that are demanded in the natural spaces make the use of the fins totally advisable (Palacios-Aguilar et al., 2012; Palacios Aguilar, 2012; Sanz Arribas et al., 2017).

IV. 100 meters rescue test with fins: Standing on the edge of the swimming pool or on the shore of the natural environment, with fins in hand, the applicant entries into the water. Performing lifesaving swimming for 50 meters, picking up an unconscious victim (manikin) located at the bottom. Transporting the victim another 50 meters without the water passing over the head of the victim. Taking the victim out of the water. All this done in a maximum time of two minutes and thirty seconds. In this test, the same standard manikin is used as in the combined test II; therefore, the victim is standardized and inert. In addition, all participants performed the tests in swimming pools. On the other hand, there are studies that show that the different types of fins influence the time needed to perform a rescue. In particular, it is stated that the fins of fiber and the longer fins provide greater speed to the rescue than rubber fins, especially if the fins are very short (Abraldes et al., 2010; Palacios Aguilar, 2010). The fins used in this study have not always been the same, but all of them corresponded to the type of fin that is usually used in swimming training, that is, the fins were made of rubber and of medium length and rigidity. In no case were long or fiber fins used. Therefore, the results of this test should be interpreted prudently, as they could be influenced by the type of fin used by the applicants. Even so, and taking into account that the characteristics of the fins used in this work are very similar, it has been considered worthwhile to show the results of this test.

In addition to the nuances specified in the description of the four tests used in this investigation, the following are the causes for which the applicants were qualified as “approved” or “suspended” in the tests:

- Exceed the time limit set for each test.
- Hold onto the ledge or the lane ropes during the performance of the test.
- In those tests in which it is necessary to transport the manikin, the water or the hands of the applicant must not cover the respiratory tract of the manikin.
- Technical criterion of the examiner. It is clarified that the teacher may come to consider that the applicant does not possess the skills or level of skill necessary to rescue another person in the water without compromising their own safety or that of the victim, even when the applicant passes the quantitative criteria.

2.1. MATERIAL RESOURCES

The material resources required to develop this study were the following:

- Swimming pool: 50 meters long and minimum 180 centimeters deep at the place where the manikin is placed.
- Swimming pool: 25 meters long and minimum 180 centimeters deep at the place where the manikin is placed.
- In the 100 meter combined test II and in the 100 meter rescue test with fins, water rescue manikins approved by the Royal Spanish Lifesaving Federation were used. The tests were performed with watertight and full of water manikins.
- In the combined test I, certified lifebuoys were meant to be used in the aquatic facilities of the Autonomous Community of Madrid and/or rescue tubes, approved by the Spanish Lifesaving Federation to be used in sports competitions.
- Casio HS-30W chronometers, water resistant and with storage for 10 partials.
- Medium length rubber fins. This type of fins corresponds to the one usually used in swimming and training.
- Whistles to give the start signal of the timed test.
- All study participants performed the tests without swimming goggles.

2.2. HUMAN RESOURCES

- The teaching team of Madrid Lifesaving Federation, accredited by the Department of Health and Consumer Affairs from the Autonomous Community of Madrid to teach this type of training (Consejería de Sanidad y Consumo, 2006).
- Students who volunteered to assume the role of victims in the combined test I.

3. RESULTS

The "IBM SPSS Statistics 19" program was used for the statistical analysis.

3.1. DESCRIPTIVE ANALYSIS

Of the 2,528 lifeguard applicants who took part in this research, 2,288 (90.5%) passed the four tests evaluated in this study, while 240 (9.5%) failed at least one of the four tests. The number and percentage of approved and suspended

applicants that performed the tests in the different swimming pools are shown in the following figures:

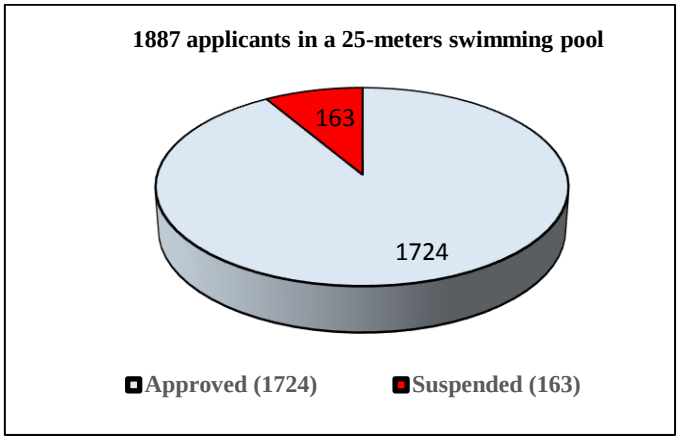

Figure 1. Percentage of approved and suspended applicants in a 25-meter swimming pool

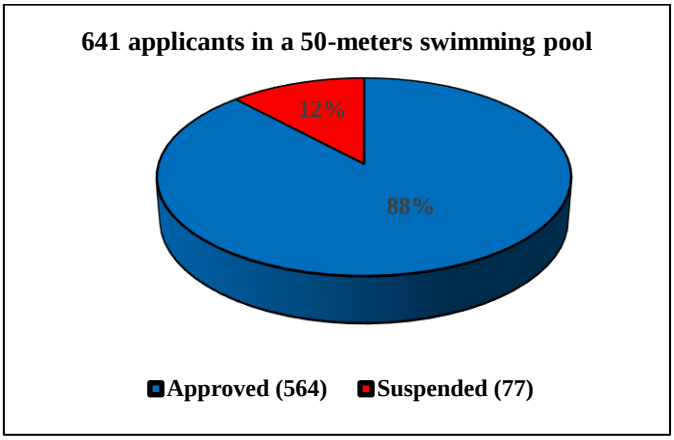

Figure 2. Percentage of approved and suspended applicants in a 50-meter swimming pool.

Table 1. Statistical Descriptions of the four tests which were evaluated in this research.

Statistical descriptions				
Tests	**Tiempo en 300 nado libre**	**Tiempo en combinada I****	**Tiempo en combinada II**	**Tiempo en 100 aletas**
Total participants	2,528 (100%)	2,528 (100%)	2,528 (100%)	2,528 (100%)
Suspended	93 (3.7%)	79 (3.1)	230 (9.1%)	69 (2.7%)
Mean *	366.6	163.7	149.9	136.0
Standard Dev. *	62.2	20.6	19.4	23

*Time expressed in seconds.

** Since the combined test I is not standardized, only the statistical descriptions will be shown, but they will not be analyzed with the *t*-test.

Table 2. Statistical descriptions according to the tests

	Group Statistics					
	Swimming pool's size	N	Mean in seconds	Difference in means by %	Standard dev. in seconds	Standard error of mean
Time in 300-meter free swim	Short (25 meters)	1,724	360.6	6.2%	61.6	1.4
	Long (50 meters)	564	384.8		60.4	2.5
Time in combined test II	Short (25 meters)	1,724	148.8	2.8%	19.4	.4
	Long (50 meters)	564	153.1		19.2	.8
Time in 100-meter swim with fins	Short (25 meters)	1,724	135.3	1.9%	22.7	.5
	Long (50 meters)	564	138.0		23.9	1

Table 3. t-test to check the times of the tests and the time stamps obtained in the different swimming pools.

Independent sample test									
	Levene's test to compare the equality of variances		*t*-test to verify the equality of means						
	F	Sig.	t	gl	Sig. (bilateral)	Mean difference	Standard error of the difference	95% Confidence interval for the difference	
								Lowest	Highest
Time in 300-meters free swim	0.101	.750	-8.142	2,287	.000	-24.2	2.9	-30	-18.3
Time in combined test II	.182	.670	-4.611	2,287	.000	-4.3	.9	-2.4	-6.1
Time in 100-meters swim with fins	2.380	.123	-2.356	2,287	.019	-2.6	1.1	-4.8	-.4

4. DISCUSSION

Once the results of this study are shown, it can be observed that the length of the swimming pool in which the timed physical water tests were developed affects the percentage of applicants that failed any of the physical tests required by the Community of Madrid. In fact, 8.6% of the lifeguard applicants who performed the four tests in a 25-meter swimming pool did not pass one or more of the tests required. However, when these same tests were developed in a 50-meter swimming pool, the percentage of lifeguard applicants who failed one or more of those same tests increased to 12%. It can also be stated that the length of the swimming pool in which these tests are developed significantly influences the marks obtained by the applicants who passed all the tests. Specifically, there are statistically significant differences in the three tests analyzed in this research: ($p \leq 0.001$) in the 300-meter crawl and/or breaststroke test, ($p \leq 0.001$) in the combined test II and ($p = 0.019$) in the 100-meter rescue test with fins. These results coincide with the conclusions of the research carried out in the field of competitive swimming (Keskinen et al., 2007; Koch-Ziegenbein et al., 2013; Lowensteyn et al., 1994; Wolfrum et al., 2013; Wolfrum et al., 2014). In this sense, it is paradoxical that the sports institutions that organize their water

tests in swimming pools of different sizes, use conversion tables to limit the influence of the length of the swimming pool on sports results (Real Federación Española Natación, 2016; Real Federación Española Salvamento Socorrismo, 2016); however, no conversion tables have been found that perform this same function in the field of lifeguard assessment. On the other hand, it does not seem wise to use the same tables that are used in the sports field to also evaluate the lifeguards. This is because the level of skill (swimming speed, technique and physical condition...) of aquatic sportsmen is not, or mustn't be, the same as that of people who apply to be lifeguards. In addition, it must be added that the tests used to evaluate lifeguards are different and do not have the same purpose as the sports competition events. Regardless of the above, we must not forget that swimming 300 meters in a 25-meter swimming pool allows you to touch and push on the wall 6 times more, than to swim that same distance in a 50-meter swimming pool. In the case of the other two tests analyzed in this study (100-meter combined test II and 100-meter rescue with fins), the applicants who performed the test in a 25-meter swimming pool could touch and push on the wall 2 times more than those who performed the test in a 50-meter one. Therefore, performing the tests in a 25-meter swimming pool allows the applicants to have more opportunities to briefly stop their swim each time they approach the edge of the swimming pool and to swim the meters corresponding to the sliding phase after each one of the turns, without hardly consuming energy. For all this, it is understandable that these circumstances generated feelings of inequity among the lifeguard applicants, since some applicants who were able to pass the tests in a 25-meter swimming pool may have not been able to pass these same tests in a 50-meter one and vice versa. In short and as a result of the results of this study, it is recommended that if the institutions that grant the lifeguard certifications considered that this type of timed tests must be maintained, it is necessary that the time scales of said tests were adapted to the length of the swimming pool in which they are evaluated. However, given the wide range of time available to perform the tests studied in this research it would also be desirable for the lifeguard applicants to have a level of skill in the water high enough to be able to comfortably pass the tests.

5. CONCLUSIONS

The results of this study show that the length of the swimming pool in which the lifeguard applicants are evaluated influences the percentage of applicants who pass the tests and the time stamps that are accredited for their performance.

REFERENCES

Abraldes, J. A., Fernandes, R. J., Soares, S., Lima.;, A. B., & Vilas-Boas, J. P. (2010). Assessment of A Lifesaver's Instantaneous Velocity in Mannequin Carry using Diferent Types of Fins. The Open Sports Sciences Journal,, 3(19), 19-21. https://doi.org/10.2174/1875399X01003010019

Barcala-Furelos, R., Szpilman, D., Palacios-Aguilar, J., Costas-Veiga, J., Abelairas Gómez, C., Bores-Cerezal, A., . . . Rodríguez-Núñez, A. (2016). Assessing the efficacy of rescue equipment in lifeguard resuscitation efforts for drowning. The American Journal of Emergency Medicine, 34(3), 480-485. https://doi.org/10.1016/j.ajem.2015.12.006 PMid:26782793

Consejería de Sanidad y Consumo. (2006). Orden 1319/2006, de 27 de junio, de la Consejería de Sanidad y Consumo, por la que se establecen los criterios que permitan establecer los niveles de formación del personal que preste sus servicios como socorrista en piscinas, instalaciones acuáticas y medio natural de la Comunidad de Madrid. Boletín Oficial de la Comunidad de Madrid 14 de julio,(166), 53-82.

Cruz Roja Española. (2017). Socorrista en piscinas e instalaciones acuáticas, 2017, from http://www.cruzroja.es/principal/documents/1151742/1524540/socorrista.pdf/dc3663c4-f74f-429f-aa4f-8f3281bdf8b3

Ellis & Associates. (2002). El profesional del rescate acuático. Barcelona: Paidotribo.

Federación Madrileña de Salvamento y Socorrismo. (2017). Curso de Formación de Socorrista en Playa y Medio Natural 2017, from http://www.fmss.es/ajax.php?accion=modalcomo-es-el-curso&id_curso=374

García Sanz, A., García Sanz, J. L., & Díez Herrero, J. M. (2015). Técnicas de rescate y lesión medular en el medio acuático (Real Federación Española de Salvamento y Socorrismo ed.). España: Difusión Avances de Enfermería.

International Life Saving Federation. (2000). International Life Saving Federation, Pool Lifeguard 2017, from http://www.ilsf.org/sites/ilsf.org/files/Certification/ILSCertificates/APP%2008%20ILS%20Lifeguard%20Pool.pdf

International Life Saving Federation. (2007). Fitness Testing for Lifeguards, from http://www.ilsf.org/content/fitness-testing-lifeguards

International Life Saving Federation. (2013). International Life Saving Federation, beach lifeguard., 2017, from http://www.ilsf.org/sites/ilsf.org/files/Certification/ILSCertificates/APP%2010%20ILS%20Lifeguard%20Beach.pdf

Keskinen, K., Keskinen, O., & Mero, A. (2007). Effect of pool length on blood lactate, heart rate, and velocity in swimming. International Journal of Sports Medicine, 28, 407–413.https://doi.org/10.1055/s-2006-924505 PMid:17111309

Koch-Ziegenbein, P., Knechtle, B., Rüst, C. A., Rosemann, T., & Lepers, R. (2013). Differences in swimming speed on short course and long course for female and male breaststroke swimmers: A comparison of swimmers at national and international level. OA Sports Medicine 1(18). https://doi.org/10.13172/2053-2040-1-2-910

Lowensteyn, I., Perry, A., Nash, M., & Salhanich, D. (1994). Differences in peak blood lactate concentration in long course versus short course swimming. Journal of Swimming Research., 10, 31-34.

Ministerio de Trabajo e Inmigración. (2011). Real Decreto 711/2011, de 20 de mayo, por el que se establecen tres certificados de profesionalidad de la familia profesional Actividades físicas y deportivas que se incluyen en el Repertorio Nacional de certificados de profesionalidad. Boletín Oficial del Estado de 20 de mayo (711), 59404-59439.

Palacios-Aguilar, J., López-García, S., Navarro-Patón, R., & L.;, C.-R. (2012). Rescue material: The flippers. The chance of surviving of a victim of a cardiac arrest

increases. Resuscitation (83), 120 - 121. https://doi.org/10.1016/j.resuscitation.2012.08.310

Palacios Aguilar, J. (2008). Socorrismo acuático profesional "formación para la prevención y la intervención de accidentes en el medio acuático. A Coruña SADEGA.

Palacios Aguilar, J. (2010). IV Congreso Internacional de Salvamento Acuático, Rescate y Reanimación Cardiopulmonar "El Socorrismo en la actualidad, una actividad vital y cada vez más compleja"". Paper presented at the El beneficio de la utilización de aletas en Socorrismo Acuático, POSADAS. Misiones. Argentina.

Palacios Aguilar, J. (2012). II CONGRESO INTERNACIONAL DE ACTIVIDADES ACUÁTICAS, SALVAMENTO Y SOCORRISMO. "La importancia de la capacitación en las actividades acuáticas, socorrismo y el salvamento". Paper presented at the Técnicas para incorporar en el salvamento: El beneficio en la utilización de aletas en socorrismo acuático POSADAS. Misiones. Argentina.

Real Federación Española Natación. (2016). Normativas natación, aspectos generales. Temporada 2016-2017, from http://www.rfen.es/publicacion/userfiles/NAT_00_Normativa_ASPECTOS_GENERALES_2016-2017.pdf

Real Federación Española Salvamento y Socorrismo. (2003). Salvamento acuático y primeros auxilios. Madrid: Real Federación Española de Salvamento y Socorrismo.

Real Federación Española Salvamento Socorrismo. (2016). Mínimas individuales campeonato de España. Normativa de competición 2016/2017, from https://salvamentopalencia.files.wordpress.com/2013/03/minimas-invierno-2017.pdf

Sanz Arribas, I. (2011). La coordinación de socorristas en piscinas con gran superficie de lámina de agua. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte, 11(44), 650-673.

Sanz Arribas, I. (2015). Jornadas Técnicas de Salvamento y Socorrismo 2015. Paper presented at the El aro salvavidas versus el tubo de rescate en las instalaciones acuáticas, Madrid.

Sanz Arribas, I. (2016). Estudio comparativo del tiempo de intervención con aro salvavidas y tubo de rescate. Paper presented at the V Congreso Internacional de Actividades Acuáticas. Celebrado los días 1, 2 y 3 de Julio de 2016 en la ciudad de Benidorm (Alicante) España., Benidorm (Alicante). PMid:27497397

Sanz Arribas, I., Aguado Gómez, R., & Martínez de Haro, V. (2017). Influencia de las aletas sobre el tiempo de ejecución en los rescates de víctimas con parada cardiorespiratoria Retos. Nuevas tendencias en Educación Física, Deportes y Recreación(31), 133-136.

Schwebel, D. C., Heater, J., Holder, E., & Marciani, F. (2010). Lifeguards: A forgotten aspect of drowning prevention. Injure & Violence, 2(1), 1-3. https://doi.org/10.5249/jivr.v2i1.32 PMid:21483192 PMCid:PMC3134895

The United States Lifesaving Association. (2016). Guidelines for open water lifeguard agency certificaction, from http://c.ymcdn.com/sites/www.usla.org/resource/resmgr/docs/usla_certguidelines.pdf

Wolfrum, M., Knechtle, B., Rüst, C. A., Rosemann, T., & Lepers, R. (2013). The effects of course length on freestyle swimming speed in elite female and male swimmers – a comparison of swimmers at national and international level. SpringerPlus, 2, 643. https://doi.org/10.1186/2193-1801-2-643 PMid:24349949 PMCid:PMC3862862

Wolfrum, M., Rüst, C. A., Rosemann, T., Lepers, R., & Knechtle, B. (2014). The Effect of Course Length on Individual Medley Swimming Performance in National and International Athletes. Journal of Human Kinetics, 42, 187-200. https://doi.org/10.2478/hukin-2014-0073 PMid:25414752 PMCid:PMC4234758

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