

FITNESS AND MEDICAL STANDARDS FOR BEACH LIFEGUARDS

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EXECUTIVE SUMMARY

The University of Portsmouth were tasked by the Royal National Lifeboat Institute (RNLI) to:

- a. Consider the medical standards used by other organisations, and convene a group of experts to determine the standards that should be employed by the RNLI for Beach Lifeguards (BLG).
- b. Consider the physical fitness standards required of BLG, attempt to establish a minimum fitness standard and easily administered tests that could be used as part of the selection process for RNLI BLG.

After discussion with the RNLI and Medical Officers from the Royal Lifesaving Society (RLSS) and Surf Lifesaving Association (SLSA), it was unanimously agreed to base the RNLI medical standard on those of the Joint Aviation Authority. A draft medical standard, written by Dr David Anton, and associated paperwork are presented in Annexes D-E.

The primary purpose of beach lifeguards is to save life. It follows that, where reasonable, a beach lifeguard should be able to reach a person in difficulties within the area for which they are responsible (patrolled area) before that person becomes a drowning victim. On the basis of a survey of 39 beaches supervised by the RNLI it was established that the median distance to be covered on land is 170m and the median patrolled area at sea is 400m. It was established with the RNLI that the maximum distance offshore that a rescue would be attempted by swimming was 200m. Following discussions with leading authorities in the area of immersion and drowning, it was concluded that a BLG should be able to reach a potential casualty within the patrolled area within 3.5 minutes and return them to the beach within 10 minutes.

Following testing of 28 RNLI BLG at Bournemouth, Caradon and Carrick, it was found that 95% of BLG were able to swim 200m in 3 min and 31 seconds, but only 30% were able to paddle 400m in 3.5 minutes. However, 95% of beach lifeguards tested could paddle 289m in 3.5 minutes. It is recommended that on beaches with only rescue boards the patrolled area at sea should be reduced to 300m.

On the basis of structured interviews with 91 BLG (10 female) from every region operated by the RNLI, the most demanding physical tasks undertaken by BLG were identified as: towing a casualty at sea; paddling with a casualty on the rescue board; and casualty handling.

The performance on these tasks was assessed with a total of 41 subjects in the sea and in a laboratory (swimming flume). Tests were also undertaken on the beach and in a swimming pool with the aim of developing simple to administer tests of BLG fitness for task.

A test of underwater and surface sprint swimming was developed (25m underwater followed immediately by 25m on the surface) and a target time set at 50 seconds. A strength test based on casualty handling was developed that requires the BLG to lift a 41kg torso manikin (bag of sand) and carry it 10m backwards. Pool swimming times were found to correspond to sea paddling times, and towing a casualty was found to be more demanding than paddling with a casualty on the rescue board. Indeed, towing was the most demanding aerobic activity undertaken by BLG.

The distance paddled in 3.5 minutes in the sea and the time taken to swim 400m in the pool were found to correlate ($r=-0.82$, $P<0.001$). On the basis of this relationship, a regression equation was identified ($r=0.72$, $P<0.001$) in which the distance paddled to a casualty in 210s is estimated by:

$$\text{Distance paddled in 210s} = 850 - (1.2 \times 400\text{m front crawl time in seconds}).$$

From this, a BLG should be able to paddle 310 metres in the sea in less than 3.5 minutes provided they can swim 400m front crawl in a pool in less than 7.5 minutes.

This relationship underpins the requirement for prospective BLG to swim 400m in under 7.5 minutes. 91% of subjects achieved this time.

On their own, none of the pool tests used, or a land-based indirect test of maximum aerobic capacity ("bleep" test) predicted maximum aerobic capacity during towing. The best predictors of this were maximum aerobic capacity during swimming (assessed in a swimming flume), swimming performance and anthropometric measures (lean body mass, deltoid [shoulder] circumference, chest circumference). As the direct measurement of aerobic capacity and lean body mass require specialist equipment and methods, the relationship ($r=0.83$, $P<0.001$) between deltoid circumference, swimming performance and towing was explored further. On the basis of this relationship, the regression equation estimates that:

$$\text{Tow } \text{VO}_{2\text{max}} (\text{L}\cdot\text{min}^{-1}) = -1.97 + 0.106 (\text{deltoid circumference (cm)} / \log_{10} 400\text{m swim time[s]})$$

The maximum distance a BLG would need to cross-chest tow an unconscious casualty has been determined to be 100m, the time to cover this distance is 6 minutes (10 minutes minus 3.5 minutes [time to swim to casualty] minus 30s [to secure subject]), requiring a towing speed of $0.28 \text{ m}\cdot\text{s}^{-1}$. From the relationship between towing and oxygen consumption, the average oxygen consumption needed to support this towing speed is $1.7 \text{ L}\cdot\text{min}^{-1}$. To avoid excessive anaerobic metabolism and fatigue this should not represent more than 70% of maximum aerobic capacity, which must therefore be at least $2.43 \text{ L}\cdot\text{min}^{-1}$. This corresponds to a deltoid circumference/log400m swim time of 41. This was achieved by 89% of the subjects achieved this figure.

On the basis of the present project, the following selection tests are recommended to the RNLI (see also Section 13): these should not be undertaken until after the candidate has undergone a medical appraisal:

Task-Related Tests

- Pool swim of 400m in less than 7.5 minutes.

- Pool swim of 200m in less than 3.5 minutes. This can be undertaken as part of the 400m swim, the first or second 200m of which should take less than 3.5 minutes.
- 25m underwater swim immediately followed by 25m surface swim. Complete in less than 50 seconds.
- Lift 41kg torso manikin by grabbing around the circumference with both arms and move backwards 10m.
- Candidate's deltoid (shoulder) circumference (cm) to be measured and divided by the \log_{10} of his/her 400m front crawl swim time (s). Resulting number to exceed 41. For guidance only at this time.
- 200m beach run as fast as possible, complete in less than 40s.

Non Task-Related Targets – not to be used as a reason for exclusion

The following tests should not be used for selection. Rather they are recognition of the importance of upper body strength and aerobic capacity in the role of BLG. They are easy targets to train towards and could be sent to potential BLG with their application form along with details of the task related tests.

- Push-ups, body straight knees off floor, chest lowered until it touches the clenched fist of the tester. Males to achieve 37, females 15 in one minute, resting permitted within the minute.
- A 2.4km (1.5 mile) run to achieve "good" or above according to norms presented in Annex C. Potential male recruits should train so that they can run 1.5 miles in 10 min 15s and no slower than 11 min 44s. Potential female recruits should train so that they can run 1.5 miles in 11 min 56s and no slower than 14 min 24s.

The task-related tests describes above should not be used in isolation; success in one test does not guarantee adequate physical fitness for beach lifeguarding.

It is recommended that the RNLI consider:

1. Continuing to collect data to further strengthen and validate the new tests described above.

2. Obtaining feedback from Head Lifeguards on impact of new standard and recommendations for improvement.
3. Convene a workshop for Head Lifeguards entitled “The New RNLI Beach Lifeguard Standard”. To include a presentation on the standard, and instruction on its implementation, testing and manual handling.
4. Introducing a “Probationary” week. For those who successfully achieve the fitness standard. To include:
 - a. Assessment of the candidate’s ability to interact with the public and other BLG.
 - b. Beach knowledge.
 - c. Local knowledge.
 - d. Rescue scenarios – compendium of case studies produced by Head Lifeguard for study and testing during the week.
 - e. Specific skills/fitness – to test such aspects as sea running/swimming, rescue boards skills. Provides an opportunity for additional and specific fitness assessment.
 - f. Observational skills – to test vigilance – best tested on the beach – several possible tests could be developed.