SAFETY & TRAINING GUIDELINES

for Developing Breath Control & Underwater Kicking Ability

Introduction

Breath-holding is an integral part of all aquatic sports; actions and timings to allow breathing are incorporated into all strokes and performances. Swimmers may choose to hold their breath longer to streamline, stay underwater for longer, and reduce drag as this often improves performance. But there is a happy balance to be made.

When athletes exercise, they increase their oxygen requirements and need to get rid of excess carbon dioxide, a waste product of 'burning fuel'. They do this by increasing heart rate to pump blood to and from the muscles and essential organs, and by breathing more rapidly. Through training, swimmers improve efficiency of energy usage and develop the ability to withstand longer periods of breath-holding without loss of performance, or putting themselves at risk.

There is a potential risk of swimmers losing consciousness under water due to critically low oxygen levels, which can lead to drowning. This is known as 'shallow water blackout'. This has been reported during Artistic Swimming training and in instances of 'swimming for distance underwater' without adequate supervision.

Normally, it is rising carbon dioxide levels within the blood stream that forces us to break breath-hold. Hyperventilating before breath-holding burns off much of the normal carbon dioxide. Oxygen levels steadily fall with breath hold, and at a more rapid rate if exercising. It is then possible that dangerously low levels of oxygen may occur before the drive to take the next breath kicks in, causing the swimmer to blackout, potentially still underwater.

The risks appear to be hyperventilation before underwater swimming, swimmers undertaking underwater swims when not fully prepared or fatigued, and inadequate supervision from the pool side.

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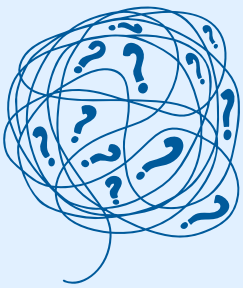
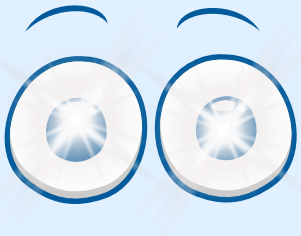
Following intense exercise, athletes may experience fatigue, rapid breathing, and may appear ‘exhausted’. These are typically normal and positive responses to training. However, concerning symptoms can be more difficult to recognise and may include:

Headache

Dizziness



Confusion



Flashing lights in the eyes

Excessive shortness of breath

In extreme cases: loss of consciousness

In the worst-case scenario, the swimmer’s face needs to be brought up into the air as soon as possible. This relies on someone getting into the water and doing this for them. Usually, they will begin to breath spontaneously. Such problems can be prevented with structured progression, focused breath control training, and vigilant supervision. Swimmers can safely develop the ability to breath hold and execute effective underwater kicking, gaining a competitive edge while minimising risk.

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Safety Guidelines

1. Educate: Improve awareness of shallow water blackout amongst swimmers, coaches and parents

2. Supervise: Never allow breath-hold work or underwater sets without a coach or lifeguard present

3. Avoid competition: Don't allow swimmers to compete against each other

4. Leave something in the lungs: Educate swimmers to surface when they feel the urge to breathe

5. Avoid hyperventilation before submersion: 2 or 3 deep breaths are sufficient to optimise oxygen levels

6. Monitor fatigue: Swimmers respond differently and may have other reasons to be fatigued (such as intercurrent illness). Limit the number of underwater reps when swimmers are tired.

7. Provide adequate recovery during breath hold work: Start with a Rest:Work ratio of 3:1 (ie. 10 seconds breath hold with 30 seconds rest) and progress to a maximum of a 2:1 ratio

8. Manage volume: Limit repetitions to 3-5 per set allowing full recovery between sets

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Training Guidelines

Foundation Breath Control Training

- Incorporate breath training into dryland training and/or pre-pool warm-ups
- Start with short breath-hold exercises during dryland training (e.g., 10–30 seconds), gradually increasing duration whilst remaining under supervision
- Teach swimmers to exhale slowly while underwater and remain calm
- Include floatation work and relaxed exhalation drills (for example, pencil float & sink it drill) within the training plan
- Breath control while swimming (e.g. breathing every 3/5/7/9 strokes, or a set number of breaths per length) to build tolerance



Underwater Kick Training

- Emphasise core-driven, tight amplitude kicks with minimal drag
- Begin with 5–7m underwaters and progress by 2–3m increments to 15m, ensuring the swimmer maintains a relaxed, efficient form
- Practice underwater dolphin kicks into breakout strokes to mimic race conditions and maintain rhythm
- Gradually introduce longer underwater segments after turns to simulate race fatigue and ensure technique holds

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Summary

This document highlights the potential problem of shallow water blackout and outlines safe and effective practices for developing a swimmer's ability to breath hold and kick underwater.

Safety guidance should be followed at all times and progressive training practices, based on best current advice, are provided.

This document has been produced by Swim Ireland Performance with review and input from Dr Kevin Boyd, Consultant in Orthopaedic & Sports Injuries, member of the British Association of Sport & Exercise Medicine, and World Aquatics Medical & Anti-Doping Delegate between 2011-2023.

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