

HYPOXIC BLACKOUT

A Partnership to Raise Awareness



2017 World Congress on Drowning Prevention

Presentation by:

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BACKGROUND

Hypoxic Blackout—

- Is a condition in which the body is deprived of adequate oxygen supply.
- Is the result of a person who engages in activities such as hyperventilation preceding underwater swimming and extended breath-holding in the water.
- Happens very quickly and usually without warning when a swimmer engages in these dangerous activities. Educate them about the dangers of these actions.



BACKGROUND

- Despite educational efforts, deaths related to hypoxic blackout in the water are still occurring.
- At YMCA Pools since 2008—
 - At least 5 hypoxic blackout-related deaths have occurred
 - At least 18 more swimmers have been successfully rescued after losing consciousness following extended breath holding.
- Over the past few years, there have been highly-publicized deaths related to hypoxic blackout.



HYPOXIC BLACKOUT- CAMPAIGN TO RAISE AWARENESS

Raising awareness at all levels within the Y

- All Y-USA communication vehicles
- E-mail to 27,000 Y certified lifeguards
- Annual Y-USA COO Aquatic Safety letter to local CEOs
- Heat sheets at short & long course YMCA National Swimming Championships
- Incorporated into the NEW Y Swim Lesson program outlines

HAVE YOU HEARD OF HYPOXIC BLACKOUT?

DID YOU KNOW...

- Hypoxic Blackout is a condition in which the body is deprived of adequate oxygen supply.
- Hypoxic Blackout is the result of a person who engages in activities such as hyperventilation preceding underwater swimming and extended breath-holding in the water.
- Hypoxic Blackout happens very quickly and usually without warning when a swimmer engages in these dangerous activities.

ENJOY THE WATER SAFELY THIS SUMMER

Having a good time swimming or playing in the pool is something we all enjoy. However, enjoying the water means being safe in the water too. Some activities may seem like a game or training but can be dangerous. Breath-holding contests, underwater swimming challenges and hyperventilating before swimming are potentially deadly activities, even when performed for competitive or military training.

Be smart and do not engage in, or let your family members participate in such activities. Being confident and comfortable underwater is an essential aquatic skill. Being educated and participating only in safe breathing practices is an essential life skill.

IS YOUR SWIMMER LIFEGUARDING THIS SUMMER?

Help your child have a safe and fun summer while he or she works as a lifeguard. Educate your child about the dangers of Hypoxic Blackout. Remind him or her to be alert while on duty and prevent swimmers from attempting to hyperventilate and engage in extended breath-holding activities. Encourage them to educate patrons about the dangers of these actions. If your child sees such activities, remind them to enforce their facility's rules and intervene if they see anyone engaged in these risky behaviors.

Working as a lifeguard is a great responsibility - help make your child's summer job experience as a lifeguard a positive one they will remember for a lifetime!

TRAIN (SAFELY) LIKE A CHAMPION!

Strong, fast underwaters and a steady breathing pattern are both essential for competitive swimming success. There are plenty of safe ways for swimmers to improve both. But there are also some training activities that are dangerous, even deadly. Without adequate oxygen, swimmers can suffer Hypoxic Blackout.

- Never hyperventilate then practice underwater kicking.
- Do not participate in underwater swimming or kicking contests.
- Do not participate in swims or underwater kicking exercises in which breathing is not allowed.

Work with your coach to incorporate safe training practices that will improve your speed and power without putting you at risk for Hypoxic Blackout.



**VIGILANCE
SAVES LIVES**

HYPOXIC BLACKOUT— CAMPAIGN TO RAISE AWARENESS

American Red Cross, USA Swimming, and YMCA of the USA joint statement on Hypoxic Blackout

- Goal to educate the public about the risks of hypoxia in the water
- Defined Hypoxic Blackout
- Our educational programs reinforce the proper methods to breathe before entering and while in the water



Joint Statement from the American Red Cross, USA Swimming and YMCA of the USA on Hypoxic Blackout and Inaccurate Use of the Terminology Shallow Water Blackout

FOR IMMEDIATE RELEASE

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CHICAGO, September 30, 2015 – The practices of hyperventilation preceding underwater swimming and extended breath-holding in the water are dangerous and potentially deadly activities. These actions can put the body in a state of hypoxia—a condition in which the body is deprived of adequate oxygen supply.

It is our goal to educate the public about the risks of hypoxia in the water and help ensure that those we teach do not engage in behavior that could result in loss of consciousness and death. Our educational programs reinforce the proper methods to breathe before entering and while in the water.

Some refer to the aftereffects of improper breathing as “shallow water blackout.” The use of this language in these cases is misleading since water depth is not a factor in the body’s response to hyperventilation and extended breath-holding.

In an effort to be more clear and accurate, the American Red Cross, YMCA of the USA (Y-USA) and USA Swimming do not use nor endorse the term shallow water blackout. In our training programs and public education, our organizations use terminology that describes the dangerous behaviors that should be prevented—voluntary hyperventilation preceding underwater swimming and extended breath-holding. For simplicity, we refer to this condition as hypoxic blackout.

Shallow water blackout is the medical condition that can result in unconsciousness in water that is typically less than 15 feet (5 meters) deep either from diving equipment failure or as a breath-hold diver returns to the surface. There are specific precautions and prevention strategies for this condition.

**VIGILANCE
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SAFETY MEASURES— SWIM LESSONS

- Breath control is important part of learning to swim—but limits are set
 - Never “see how far” or “how long”
- Limited to one breath before submerging
- Underwater activities should never be competitive or repetitive
- Instructors should never ask you to do more
- Lifeguards will make you stop

4 / STROKE INTRODUCTION Safety & Character Topics

Safety & Character Topics

At the Y, we set ourselves apart because we are committed to delivering an experience that goes beyond physical skills. Use the character and safety topics that follow to promote cognitive and social-emotional development. This holistic approach creates a safe space where adults and children can build relationships and feel like they belong, in addition to feeling a sense of achievement as they develop important life skills.

TOPIC 4.1	TOPIC 4.2	TOPIC 4.3	TOPIC 4.4
<p>WEATHER</p> <p>Discuss why it's important to pay attention to weather when swimming:</p> <p>Storms can come up fast and can produce strong winds, heavy rain, and lightning.</p> <p>Share the following tips for staying safe in potentially dangerous weather:</p> <ul style="list-style-type: none"> - Monitor (forecasting) weather. - When thunder rums, go indoors. - Get to a safer structure. - Postpone aquatic activities. - The pool can be considered safe to reoccupy 30 minutes after the last lightning is seen or thunder is heard. 	<p>FIRST AID</p> <p>Discuss the basic first aid steps students should take if someone is bleeding:</p> <ul style="list-style-type: none"> - Call for help. - Get gloves and put them on. - Cover the wound. - Apply direct pressure. <p>Have students role-play victim and rescuer.</p> <p>Make sure rescuers call for help, put on gloves, apply direct pressure to the wound with a sterile pad, and apply roller gauze or an elastic bandage.</p>	<p>HYPOXIC BLACKOUT</p> <p>Discuss hypoxic blackout and how it can happen.</p> <p>Holding your breath and swimming underwater for a long time can cause a person to black out or lose consciousness.</p> <p>Discuss how to prevent hypoxic blackout:</p> <ul style="list-style-type: none"> - Don't hold your breath and swim underwater for long distances. - When swimming short distances underwater, always have a buddy. 	<p>OPEN WATER</p> <p>Ask students to list some of the dangers of open water:</p> <ul style="list-style-type: none"> - Swimmers can get caught in currents. - It's harder to see your swimmers. - Cold water can make swimming and floating more difficult. <p>Ask students what they can do to keep themselves safe in open water:</p> <ul style="list-style-type: none"> - Know how to swim. - Never swim alone. - Always swim near a lifeguard. - Don't float where you can't swim. - Don't fight the current. If you get caught, just go with the flow. - Don't dive in headfirst.

YSA & Topic Library | WSA Swim Lessons V3 | page 28

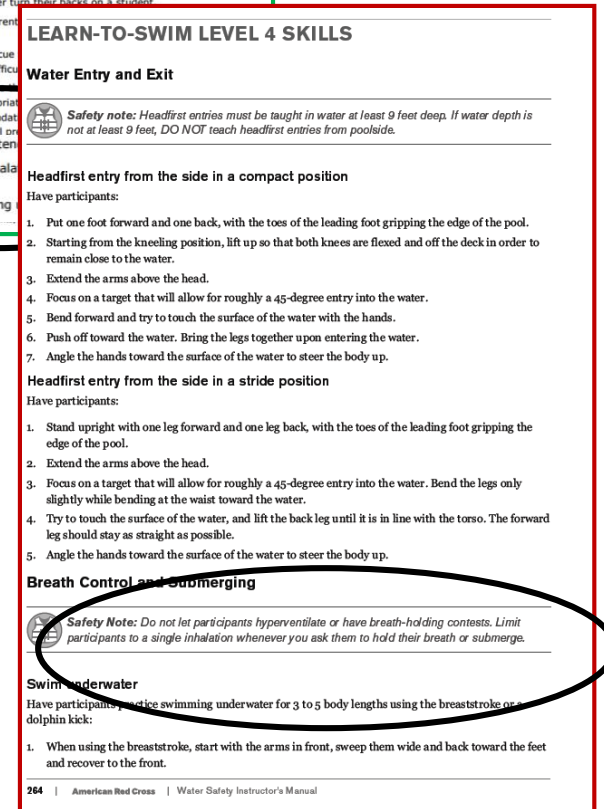
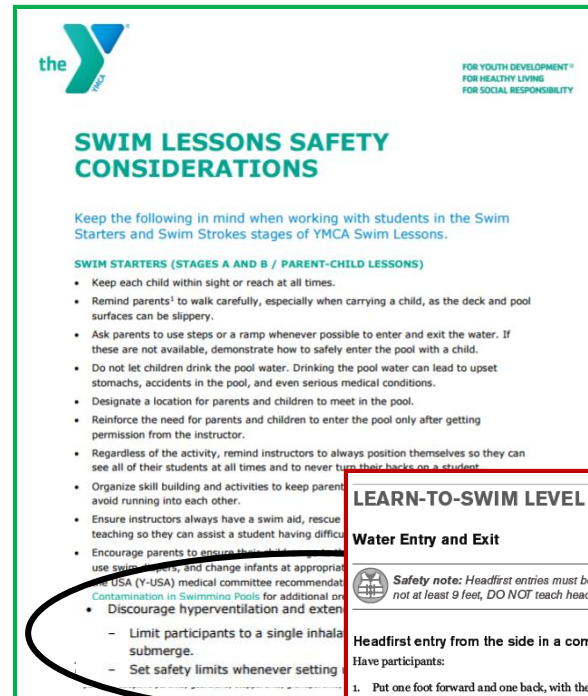
TOPIC: DEVELOPING BREATH CONTROL SAFELY

<p>Key Points to Cover (for Children, Teens and Adult Participants)</p>	<ul style="list-style-type: none"> ■ Learning breath control is an important part of learning to swim. ■ In the courses that make up the American Red Cross Learn-to-Swim program, you learn skills such as bobbing, rotary breathing and swimming underwater for certain distances. You also learn to breathe in certain patterns while swimming strokes. ■ When your Water Safety Instructor asks you to bob 5 times. Or, your instructor does “see who can swim the longest”
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<p>Key Points to Cover (for Children, Teens and Adult Participants) <i>(Continued)</i></p>	<ul style="list-style-type: none"> ■ In developing breath control safely, the instructor is working to develop your abilities without causing a dangerous situation. ■ Your instructor will limit you to one breath before any underwater or breath control activities. He or she will stop you if you try to hyperventilate—take multiple rapid, deep breaths—before working on any underwater or breath control activities.
The Dangers of Hyperventilation and Extended Breath-Holding	
<p>Key Points to Cover (for Children, Teens and Adult Participants)</p>	<ul style="list-style-type: none"> ■ Voluntarily hyperventilation—extremely rapid or deep breathing—followed by swimming underwater or extended breath-holding is dangerous and can cause a person to suddenly lose consciousness and die. ■ A rule at all pools should be: <ul style="list-style-type: none"> ○ Prolonged breath-holding or hyperventilation is not allowed. In fact, lifeguards are taught to stop any games, contests or activities that encourage this dangerous behavior. ■ You should never hyperventilate before swimming underwater. ■ Underwater activities that involve breath-holding should never be competitive or repetitive. ■ Prolonged breath-holding while swimming underwater can cause even an accomplished swimmer to blackout underwater and possibly drown.
<p>Sample Questions</p>	<p><i>Engage the participants in answering questions, such as the following:</i></p> <ul style="list-style-type: none"> ■ What is hyperventilation? ■ Why is it a dangerous practice? ■ What should a lifeguard do if he or she sees someone having breath-holding contests?

SAFETY MEASURES— SWIM INSTRUCTORS

- Trained to teach:
 - Safety principles of breath control and warn of dangers
 - Progressions for improving breath control and breath management
- Expectations for safety protocols during instruction:
 - Limit participants to a single inhalation
 - Set safety limits for practice
 - Number of body lengths
 - Amount of time



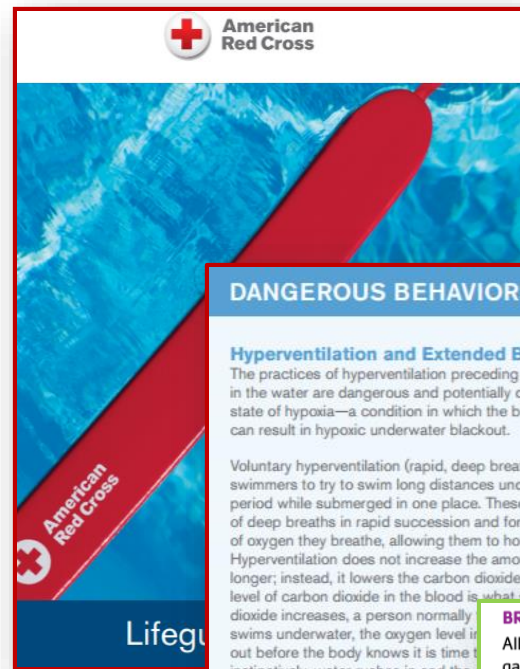
SAFETY MEASURES—LIFEGUARDS

Taught to prohibit these activities:

- Hyperventilation
- Contests, games, or repetitive activities that challenges ability to:
 - Swim extended distances underwater
 - Hold their breath underwater for extended periods

Trained to:

- Watch out for and prevent these activities including in competitive swimming
- Intervene and stop the activity
- Explain that they should only take a single inhalation before submerging when swimming and playing underwater



BREATH-HOLDING AND HYPERVENTILATION
All swimmers must learn to hold their breath as they gain skills and confidence in the water; however, prolonged breath-holding and hyperventilating are dangerous! Make it a priority to prevent breath-holding activities or games of any kind.

a person breathes normally, inhaling and exhaling to regulate the level of carbon dioxide in the blood. As the level of carbon dioxide in the blood increases between breaths, it triggers the part of the brain that controls breathing (the medulla oblongata) and tells it to take a breath. Hyperventilation is excessively deep, rapid breathing. People think if they cause themselves to hyperventilate it will increase the oxygen level in the blood and allow them to hold their breath longer and stay underwater longer. This is false. Hyperventilation is very dangerous. Hyperventilation lowers the level of carbon dioxide in the bloodstream by tricking the brain and delaying the signal to take a breath. As the oxygen level in the blood drops, a person can pass out before they feel a need to breathe. If this happens to someone who is underwater, when the person finally instinctively takes a breath, water can rush in and begin the drowning process.

Prevention and education are critical when dealing with hyperventilation and breath-holding because these activities can so quickly lead to blackouts and drowning. Watch for patrons who talk about

SAFETY MEASURES— COACHES

- Additional experience and training advocated
- Monitor carefully and instruct swimmers to breathe when necessary
- Have swimmers take only one or at the most two deep breaths
- Only use in a training program of experienced swimmers in good physical condition with proper supervision and instruction
- Generally conduct this activity on the surface of the water (except dolphin kick training)
- Limit the number of repeats of hypoxic swimming
- Allow adequate time for recovery, which will vary from swimmer to swimmer

The screenshot shows a web-based training module. At the top left are the American Red Cross and USA Swimming logos. The page is titled 'Chapter 2' and 'Safety Awareness in Competitive Swimming'. The main heading is 'Hypoxic Training and Hyperventilation'. A video player shows a swimmer underwater. A text box on the video says: 'Because of the danger, hyperventilation should never be taught or allowed at your facility.' A sidebar on the left lists various topics with checkmarks, including 'Coaching Your Swimmers', 'Swim Practice Safety and Important Safety Considerations', 'Organizing Your Swim Practice', 'Hypoxic Training and Hyperventilation', 'Scenario', 'Quiz', 'Turns', 'Head-First Entries and Racing Start Safety', 'Quiz', 'Dryland Training', 'Event Safety', 'Open-Water Swimming Safety', and 'Quiz'. The video player has a progress bar at 01:15.

HYPOXIC TRAINING AND HYPERVENTILATION

Coach Jordan's swimmers love contests. Their favorite is to see who can swim the farthest underwater. Recently Graham swam about 40 yards underwater before surfacing. Coach Jordan keeps teasing Graham about "quitting" 10 yards from the end and telling him that he can make the entire 50 yards. Graham and some other boys are ready to try it. Coach Jordan tells Graham to take "a lot" of deep breaths so that he can "build up the oxygen in his blood." Graham inhales deeply about 10 times. He feels a little dizzy and starts to swim underwater. He turns and starts back. Suddenly Coach Jordan notices something is wrong with Graham. What did Coach Jordan do that was dangerous?

The screenshot shows a website page for the National YMCA Competitive Swimming & Diving. The header includes the YMCA logo and the text 'FOR YOUTH DEVELOPMENT® FOR HEALTHY LIVING FOR SOCIAL RESPONSIBILITY'. The main heading is 'NATIONAL YMCA COMPETITIVE SWIMMING & DIVING'. The page title is 'Hypoxic Blackout' and the date is 'June 3, 2016'. The text explains that hypoxic blackout is the result of hyperventilation and prolonged breath-holding, and that coaches should assign breathing patterns or underwater kicking sets as part of their training plans. It notes that excessive lengths, breath-holding exercises can be dangerous and even deadly. It also states that hypoxic blackout occurs when a swimmer hyperventilates (inhaling deeply then forcefully exhaling repeatedly, resulting in abnormal loss of carbon dioxide from the blood) then swims or kicks without breathing. It most often occurs when a swimmer is trying to stay underwater for extended distances or time. A link is provided for more information: 'Please see the [Hypoxic Blackout sheet](#) for more information and tips for swimmers, coaches and parents.' The page also features a 'REGISTER COACHES & TEAMS NOW!' button and social media links for Facebook and Twitter.

2017 OPERATIONAL RISK WORKSHOP PRESENTATION



HYPOXIC BLACKOUT

Hypoxic blackout and its dangers

*Mike Espino
YMCA of the USA*

Safety measures for prevention

*Connie Harvey
American Red Cross*

Realities of hypoxic blackout Safer strategies for training athletes in breathing management

Q&A

*Coach Bob Bowman
Arizona State University*

SAFER STRATEGIES FOR TRAINING ATHLETES



USA Swimming, Inc.
Operational Risk Committee
Hypoxic Training Recommendations
Wednesday, September 21, 2016

If hypoxic training is utilized by coaches in the development of advanced competitive swimmers, it must be conducted only when following appropriate principles and under the direct supervision of an experienced coach. These principles are:

1. Coaches should stress to athletes that they should never ignore the urge to breathe.
2. Hypoxic training should involve progressive overload, in line with the athlete's physical and skill development – for example, beginning with efforts over 5m, 10m, then 15m etc. - as the swimmer develops the appropriate skills and physiological capacity.
3. Coaches should ensure adequate rest between hypoxic efforts to ensure full recovery.
4. Athletes should not hyperventilate (take multiple, deep breaths) prior to any underwater or other hypoxic efforts.
5. Hypoxic training should not involve competitive efforts of maximum duration, or distance covered.

Hypoxic Training – On the Surface and/or Underwater

Drills may be conducted as part of on top of the water training or under water training. Extreme care must be undertaken by the coach when under water training is being conducted. The risk of a swimmer losing consciousness when on the surface is lower than during underwater swimming drills. While on the surface, swimmers are more likely to take a breath when needed whereas underwater they may resist the urge to breathe. In addition, any loss of consciousness while swimming on the surface is more likely to be noticed by coaches or aquatic supervisors, allowing for a faster rescue response. If a swimmer loses consciousness underwater, that swimmer may go unnoticed for a period of time thereby increasing the likelihood of injury.

Common risk reduction strategies include:

- Hypoxic training should involve progressive overload, in-line with the swimmer's physical and skill development – for example, beginning with efforts over 5m, 10m, then 15m etc. - as the swimmer develops the appropriate skills and physiological capacity.
- Adequate aquatic supervision is provided. Swimmers should never swim alone.

- Never hyperventilate (take multiple, deep breaths) prior to any hypoxic training or efforts or before any underwater swims.
- Structuring sessions to minimize involuntary hyperventilation immediately prior to a hypoxic set.
- Encouraging swimmers to breathe as needed and to stay within their comfort zone.
- Ensuring adequate rest for full recovery between hypoxic efforts. Recovery time will vary from swimmer to swimmer.
- Hypoxic training should not involve competitive efforts of maximum duration, or distance covered. Coaches and swimmers must not engage in breath holding games or challenges.

Underwater Drills

Common underwater activities that can lead to hypoxic blackout include repeated underwater swims or underwater kicking drills as well as stationary breath holding competitions for time. In all instances, the nature of the risk can be high. Even with successful resuscitation, complications including hypoxic brain damage and respiratory infection can occur.

The following considerations must be factored into hypoxic underwater training:

1. Coaches should be aware of the dangers and understand the risks of hypoxic training.
2. Swimmers should be instructed to surface and breathe when they feel it necessary when swimming underwater. Never resist the urge to breathe.
3. Stationary breath holding should never be used as a training method.
4. Only one deep breath should be allowed prior to submersion. Hypoxic blackout is closely linked to hyperventilation.
5. Underwater drills should be at the start of a workout when swimmers are not close to their maximum aerobic capacity (VO2 max).
6. In general, the drill distance should not exceed 25 yards for a one time attempt. No immediate repeat attempts or challenges should be undertaken. More experienced, elite, athletes may attempt longer distances but should only do so under direct supervision of an experienced coach.
7. Allow adequate time for recovery, which will vary from swimmer to swimmer. Some guidelines suggest at least a two minute recovery time should be allowed before attempting another underwater swim, depending on age and experience.
8. No competitions or challenges; i.e. see who can swim the greatest distance underwater or hold their breath for the longest time will be conducted by coaches or swimmers.
9. There will be no pressure or penalties for swimmers who are unable to hold their breath as long as other swimmers.

ON-GOING EFFORTS

- This level of collaboration of these leaders in water safety education in the United States to address a specific issue is unique.
- Having this common goal—and using common language—while leveraging the resources and relationships of each respective organization is sure to achieve greater impact to reduce drowning due to hypoxic blackout.
- All three organizations will continue the awareness campaign to stakeholders, by—
 - Expanding content in existing educational materials
 - Development of new educational materials and messaging.
 - Engaging in joint presentations.



QUESTIONS?