SINGAPORE SPORTS COUNCIL

Sports Safety

Water Surveillance Guide

Look out for swimmers in distress

Think Safe. Play Safe. Stay Safe.

A Sports Safe Singapore

The Singapore Sports Council (SSC) recognises that safety must be a fundamental component of a sporting culture and a prerequisite for every healthy lifestyle. Therefore, SSC has set a corporate goal of zero injuries, in the belief that all accidents are preventable. Emphasising the need for personal accountability, SSC also urges people to be responsible for the safety of others. SSC's first Sports Safety Division was formed in 2006 directly under the purview of the CEO's office. It is tasked to promote safety throughout Singapore's sporting community and to inculcate a safety first mentality in the minds of every stakeholder. For more information, please visit **www.sportssafety.ssc.gov.sg**

Acknowledgement

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SLSS Founded 1967 **Singapore Life Saving Society** www.slss.org.sg	NATIONAL WATER SAFETY COUNCIL **National Water Safety Council** www.watersafety.sg
National Resuscitation Council www.nrcsingapore.org	Shallow Water Blackout Prevention BREATHE to LIVE **Shallow Water Blackout Prevention** www.shallowwaterblackoutprevention.org

Think Safe. Play Safe. Stay Safe.

Another initiative by the Sports Safety Division, Singapore Sports Council

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INTRODUCTION

Water surveillance is paramount to prevent injuries. It involves maintaining constant watch over people participating actively at aquatic venues[1] in order to identify circumstances that may cause injuries. Lifeguards[2] can then respond quickly to prevent or minimise injury. Effective water surveillance requires lifeguards to monitor the aquatic environment, supervise swimmers, inform swimmers of potential injury and take necessary measures to prevent injuries. The Water Surveillance Guide aims to empower the ability of surveillance of lifeguards in an aquatic environment.

Definition of key terms

Terms	Definition
Surveillance	The total system of keeping close watch over the aquatic activity and people to prevent injury. It includes safety checks of the facility and/or an event before and after it opens and/or commences.
Scanning	A system of several visual techniques and patterns for surveying and monitoring swimmers through repeated sweeps. Scanning should include a variety of strategies that change with conditions and facilities.
Sweep	A sweep is a singular visual pattern used to cover the lifeguard's/ spotter's zone. A sweep must be accomplished quickly, continuously and should not have delays.

[1] Aquatic venues include swimming pools, water theme parks, reservoirs, open water (triathlon/biathlon), canals, beaches and aquatic centres.

[2] Lifeguards include spotters, volunteers and anyone who supervises people in an aquatic setting.

LEVEL OF READINESS

It is crucial that one holding the responsibility of surveillance is conscious of one's own health and condition on the day of duty. Self-awareness is to be strongly emphasised due to the responsibility one holds while performing water surveillance. It does not affect just one's own life, but others as well.

Factors to check on yourself before duty:

- Is your body experiencing a high fatigue level?
- Is the reflection and refraction of light blinding your eyesight?
- Is the design/layout of the facilities affecting one's view?
- Are you clear on the expectation on what you can see and recognise?
- What is your capacity to remain vigilant?
- Is the noise level too high that it hinders your attention and focus?
- Is the weather affecting your sight and judgement?

It is important to understand your health readiness before assuming surveillance duties, as it ensures that you are ready to safeguard the lives of others while not putting yourself at risk. PAR-Q, a self-screening questionnaire, is a good way to assess one's level of readiness for physical activity.

The Physical Activity Readin

is designed to help you assess your level of readiness for physical act

Regular physical activity is fun and healthy. Increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctors before they start becoming more physically active.

If you are planning to become more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are above 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions.
Please read the questions carefully and answer each one honestly: **check YES or NO**.

YES	NO	
☐	☐	Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
☐	☐	Do you feel pain in your chest when you do physical activity?
☐	☐	Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?
☐	☐	Do you lose your balance because of dizziness or do you ever lose consciousness?
☐	☐	Do you know of any other reason why you should not do physical activity?
☐	☐	Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart conditions?
☐	☐	In the past month, have you had chest pain when you were not doing physical activity?

If you answered YES to one or more questions:

Consult your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want – as long as you start slowly and build up gradually. Or you may need to restrict your activities to those which are safe for you. Consult your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programmes are safe and helpful for you.

ness Questionnaire (PAR-Q)

ivity. It is simple and it only takes a fraction of your time to complete.

Personal Safety

- Listen to your body. Know when to stop, bearing in mind that not all of us have the same level of physical abilities.
- Have adequate rest and water before you exercise.
- Warm up before exercising and cool down after the activity.
- Wear attire that is appropriate for the sports.
- Do not overlook safety gear. If unsure, please check with the relevant people.

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure to:

- Start becoming much more physically active. Starting slowly and building up gradually is the safest and easiest way to go.
- Take part in a fitness appraisal. This is excellent for determining your basic fitness so as to plan the best way to live actively. Evaluating your blood pressure is also strongly recommended. For readings above 144/94, consult your doctor before you become more physically active.

Delay becoming much more active:

- If you are not feeling well because of a temporary illness such as a cold or a fever – wait until you feel better, or;
- If you are or may be pregnant – consult your doctor before you start becoming more active.

Please note:
If you answered Yes to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Download PAR-Q in Chinese, English, Malay or Tamil from www.ssc.gov.sg For more information, please call 6500 5431.

Source: Canadian Society for Exercise Physiology

SCANNING STRATEGIES

Scanning strategies change with conditions and location therefore one has to adapt and improvise based on the surroundings.

- The act of scanning involves looking back and forth across the venue in a sweeping action.

- Lifeguards must be careful to keep turning their heads to clearly monitor the whole area because the human vision is best focused when the observed object is directly in line of vision.

- Lifeguards use peripheral vision (the ability to see objects and movement outside of the direct line of vision) to maintain a general awareness of the surroundings.

- Scanning must be constant, vigilant and systematic.

Our senses are important attributes in monitoring the surroundings. Take a look at how we can use our senses in scanning the area.

Sight

- Watch the flow of activity, monitor the position of other lifeguards, or look for changing weather conditions. Follow the progress of swimmers who are at high risk of injury or accident.

Hearing

- Listen for unusual sounds such as people arguing, many people talking at once, or equipment breakage. Listen for signals from the surroundings such as siren or a distressed swimmer calling for help.

- Listen for sounds that come from beyond your visual field. Listen for sounds of potential environmental hazards such as thunder.

Smell

- Smells can betray the use of liquor or some drugs, chemicals which might indicate a leak or spill, or smoke from a fire or cigarettes.

Touch

- Feel the sun's heat, the roughness or slippiness of the surfaces underfoot, drops of rain, or a breeze developing into stronger winds.

How to scan

- Sweep your eyes over your zone, moving your head to see things to the right and left, and looking behind you regularly.
- During a sweep, the eyes should momentarily stop to pick up details every 10˚ - 15˚.
- Focus on people and what they are doing. Make eye contact whenever possible. Observe the facial expression.
- Look and listen for the unusual.
- Avoid staring fixedly at the same thing.
- Give your eyes a break by focusing momentarily on some distant object or the horizon.
- Use your peripheral/side vision to detect movement.
- Never stop scanning even when speaking to someone.
- In outdoor facilities, monitor changes in environmental conditions (weather and water) for impact on swimmer behaviour and safety.
- Avoid turning your back on the area - walk backwards or sideways to avoid loss of eye contact.
- Check adjacent partner on each sweep to receive any visual communications they might be sending.
- Attend to the danger points more often.

Where to scan

Certain areas of aquatic venues may need greater attention:

- The bottom of the water body
- Deep ends, rapid changes in depth
- Edges, handrails, channels and gutters
- Areas around raised platforms and other outlets
- Areas around slides
- The water around inflatable equipment and floating toys
- Open water

Effective scanning

- Develop and practise systematic sweep patterns.
- Determine the average sweep time for each position deployed; the average time is between 10-30 seconds depending on the size of the area and number of swimmers.
- Be positioned with clear, unobstructed sight lines.
- Minimise the effects of reflection and glare.
- Be aware of weather changes for outdoor venues and the effects they may have on one's visibility.
- Understand the signs of potential trouble and the characteristic behaviours of those in need of help.

Below are two recommended methods for effective scanning:

10:20 Rule

It is calculated that an accident is less likely to occur if a swimmer in distress is spotted within the first ten seconds, and aid provided within an additional twenty seconds.

5-Minute Strategy

- First Sweep - generally assess people in the zone
- Second Sweep - group, categorise or place swimmers into quadrants
- Third Sweep - focus on person within each group for a short moment
- Each Successive Sweep - change the person you are focusing on

After five minutes, estimate the number of swimmers in the zone, check for high-risk swimmers, hazardous places, change posture and mentally rehearse a rescue. Then pick a different scanning pattern and repeat the above steps for five minutes.

Considerations for specific venue

Feature	Safety Precautions
Concourse	• Prevent build up of water, no running
Shallow Water	• No jumping and diving from the edge
Deep Water	• To have effective barriers when located next to child play areas
Starting Blocks	• Not to be installed when depth is less than 1.2m • To be isolated when depth is less than 2m • Only used under direct instruction when depth is less than 2m
Floating Play Equipment (Inflatables)	• Look out for o Deep water as non-swimmers may fall from equipment o Shallow water as people may fall from equipment and make an impact against the floor o Jumping from poolside onto the floating items o Falling from equipment onto pool edge or concourse o Entrapment underneath the equipment o Large equipment or too many items may restrict lifeguard visibility o Mixed/incompatible users
Wave Pools	• During wave motion, pay specific attention to o Tired swimmers o Swimmers who are out of breath o Swimmers holding young children o Injured swimmers o Non-swimmers • Prevent jumping or diving into or onto waves • Keep swimmers away from the wave generation wall during wave motion • Use of flotation devices only under supervision by lifeguards when there is no wave motion • Avoid the use of floating lines or ropes in the 'breaking zone' • Ban the use of snorkelling equipment etc during wave motion • Limit wave motion periods (lasting from 5 to 10 minutes) every hour
Open Waters	• Check weather, tide, currents and wind conditions • Safety briefing on rules and regulations • Educate swimmers/participants on the potential dangers of swimming in open waters o Water conditions o Debris o Marine Animals (jelly fish and sea snakes) • Close supervision required, especially for young children

SWIMMERS BEHAVIOURS

In most drowning cases, the victim may show no symptoms or complaints, hence it's important for lifeguards to understand behaviours that indicate a person is in distress, violating rules, or drowning.

Types of drowning:

Swimmer	Distressed Swimmer
	
Passive Drowning Victim	**Active Drowning Victim**
	

Arm and leg action, body position and movement through the water are good indicators of weak swimmers and those in trouble. Drowning can happen quietly and quickly; between 20 to 60 seconds. Lifeguards must acquire the ability to identify a potential incident within seconds and respond immediately.

Behaviours to look for:

Water Bobbers - Swimmers jumping up and down in the water, just breaking the surface with their mouths.

Side Jumpers - Swimmers leaping from one side to the other, or those who jump from the side and try to turn face to the side in mid-air.

Disoriented People - may have been doing somersaults, flip-turns, dives, or who have just come down from a slide.

Breath Holders - swimming long distances underwater; having breath-holding contests and swimmers playing 'dead man floating'.

Children under 5 years old must be accompanied into the water by a parent or guardian and be supervised within arm's reach at all times.

Children under 10 years old must be accompanied into an aquatic venue and be directly supervised by a parent or guardian at all times.

DEALING WITH THE SURROUNDINGS AND DIFFERENT SITUATIONS

Being a lifeguard is never as easy as ABC. Unexpected situations do happen in unexpected surroundings. So it is crucial to be prepared for such situations.

Communicating with the swimmer while scanning:

- Scanning should only be interrupted to make a rescue or prevent someone from breaking the rules. Only a few seconds are required to explain the dangers to someone breaking the rules and it is possible to continue scanning while doing this. Do ask for assistance if more time is needed which will disrupt the flow of scanning.

- If a swimmer asks a question or has a concern, acknowledge them and explain that you are listening but still need to scan your area. Refer the swimmer to the supervisor or person in charge if needed.

Dealing with issues that arise

- Move into action before swimmers or participants realise they are in trouble.
- The lifeguard closest to the incident area should handle it.
- Each lifeguard must know where and what each other is doing at all times.
- When one lifeguard moves to deal with an incident, the other partner must relocate to adequately cover the 1st lifeguard's area.

Maintaining surveillance on a crowded day

Consideration should be paid to swimmers with specific needs. Spotters may discern swimmers with specific needs by their physical appearances, coordination, comprehension, behaviour or combination of these.

There are a number of strategies that could be used in this situation:

- Head Counting: notice the changes as you count the swimmers in your zone during each scan
- Grouping: sort swimmers into groups by age, sex, risk potential, activity and combinations of the above. Monitor changes as it happens
- Mental Filing: on successive sweeps, build swimmers profiles based on swimming abilities, skills, activities or other relevant factors. Track changes on each scan
- Profile Matching: on each scan, measure what you see against the characteristic profiles of potential trouble or types of person in difficulty
- Tracking: track the progress of individuals who fit the high-risk profile

Emergency stops

During emergencies, lifeguards may signal for all swimmers to leave the water to check that no swimmer is in difficulty or at the bottom of a pool. Lifeguards can also seek cooperation or make announcements to educate swimmers.

ZONE SUPERVISION SYSTEMS

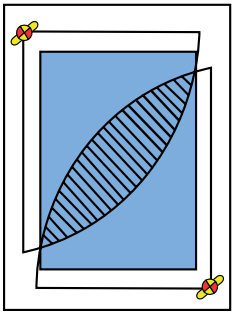
Having definite zones make life a lot easier for all the lifeguards on duty because each one:

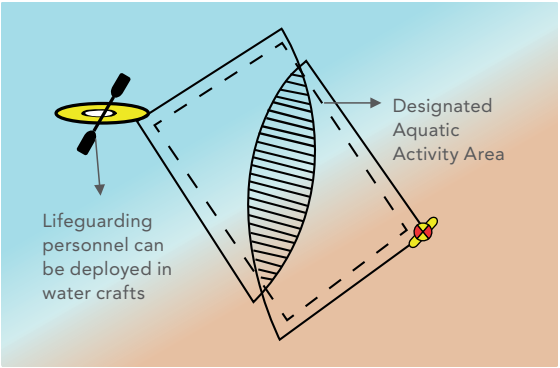
- Is responsible for fewer swimmers
- Is nearer the people they supervise
- Can concentrate on a more manageable area
- Can rotate between zones to keep them alert and stop them from getting bored
- Can share the observation of high-risk areas with other team members
- Can be assigned according to their experience, knowledge and skills

There are a total of 3 different zone supervision systems which we would focus on in this guide. They are:

- Intensive zones
- Extensive zones
- Combined zones

Intensive Zones





Intensive Scanning

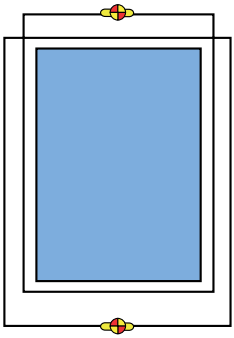
An Intensive Zone System identifies and designates an area of responsibility for each lifeguard. It is used where at least two lifeguards are responsible for the swimming area.

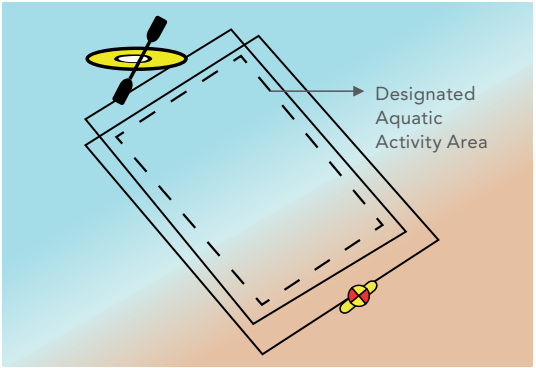
For events and races organised at the open waters, the activity areas should be clearly marked out (by lane ropes, sinkers and buoys, etc). This would facilitate the planning and deployment of lifeguards and the system most appropriate to supervise the activity.

Over-lapping adjoining zone boundaries eliminates the risk of "dead zones" (unsupervised areas) which one lifeguard might assume another lifeguard is watching. This system allows the greatest flexibility for management and the greatest definition of area for lifeguards.

Advantages	Disadvantages
• Lifeguards concentrate on limited areas • Double coverage in overlap areas • Rotation keeps lifeguards refreshed • Lifeguards can interact with swimmers more easily	• More lifeguards required • Confusion about areas of responsibility may result in areas being unguarded • May not spot an incident • Lifeguards in neighbouring zones will also miss it because they're concentrating on their own zone • Can be hard to recognise boundaries

Extensive Zone



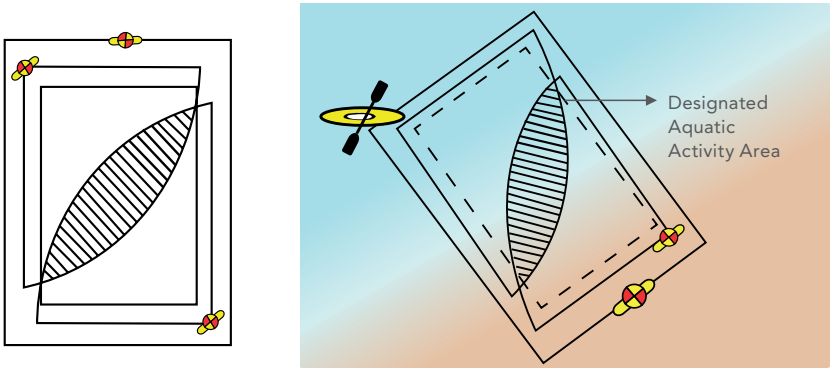


Extensive Scanning

In an entire-area coverage, a single lifeguard supervises the entire swimming area. It is used where only one or two lifeguards are responsible for the entire swimming area. The system works best when the swimming area is small and there are few swimmers.

Advantages	Disadvantages
• Improved teamwork and communication • Fewer lifeguards required • Continuous scanning of the whole pool by more than one lifeguard • Lifeguards can be easily positioned to suit activities and positions of swimmers more easily	• Lifeguards scanning a large area may not see a potential incident developing until it becomes serious • Difficult to supervise different areas with different physical characteristics i.e. diving boards or slides • Lifeguards tend to concentrate on boundaries rather than entire swimming area • Lifeguards cannot change positions as much during a shift. • High risk areas may not get enough attention

Combined Zones



Combined Scanning

A Combined Scanning System has the advantages of the Intensive and Extensive Zone Systems. At many aquatic venues, particularly larger facilities or those with unusual shapes, a combination of extensive and intensive coverage can provide the most effective supervision.

Advantages	Disadvantages
• Many or all lifeguards have an overview of all activities • Easier for lifeguards to work as a team • Lifeguards can identify trends and patterns in use • In emergencies, lifeguards can contact other services (such as police, fire or ambulance) without leaving a zone entirely unsupervised	• Greater concentration on the whole swimming area, so less interaction with swimmers • A need for elevated observation positions

Factors to consider in designating zones for a facility:

- Zones should not require a lifeguard to scan more than 180 degrees
- Zones should minimize blind spots
- High-risk areas should overlap into the areas of responsibility for two lifeguard positions, ensuring double coverage

Zone coverage in an emergency

Whenever there are two or more lifeguards and one must enter the water, the other lifeguards on duty must shift their responsibilities to cover a larger area. The lifeguards remaining out of the water will have to move to new positions to cover the swimming area effectively and to perform emergency procedures.

Never leave an aquatic venue unsupervised – accidents can happen in a split second.

The zone supervision systems can be applicable to open water situations, depending on the length of the swim course, competency of the participants, number of lifeguards deployed over the swim course, etc. Some of these systems can be combined to provide more effective coverage in the open waters where it is subjected to the weather and water condition as compared to a confined pool environment.

Open water environment

The following areas should be evaluated before establishing an open water supervision area:

- The supervision area should be elevated (considering the beach man-made structures such as jetty) and clear of man-made items that may interfere with the lifeguards' line of sight.

- Ideally the bottom conditions in the supervision area should be free of rocks, inshore holes and have a clean sandy bottom with a gentle slope.

LIFEGUARDING POSITIONS

A lifeguard's position can have an immediate influence on swimmers behaviour.

Patrolling & Moving position

Patrolling should include surveillance of the water immediately adjacent to the waters edge, an area frequently missed.

Roving is especially effective when one of the lifeguard team is free to roam without responsibility for a particular zone.

Chair & Static position

For open waters, lifeguards can be positioned on the beach, jetty, tower, on a safety vehicle (such as jet skis or motorised boats) or in paddle crafts.

Combination of Static & Moving position

The ability to combine both of these techniques relies on the venue design/ layout and the number of lifeguards in the team and on duty. The use of both methods allow for good rotation of staff and an interchange of information between staff.

Rotation of duty between lifeguards in fixed positions and those who are patrolling the water edge helps to keep everyone alert and relieves the fatigue of long periods spent sitting or standing.

In an emergency, central control can be exercised from the elevated lifeguard chair position while other team members can move about to deal with specific aspects of the incident.

Safety pointers

- Do not supervise from a fixed location. In order to see the bottom of the water body the lifeguard must move and get close to that section.

- Develop and follow walking patrols that optimise the lifeguards' ability to see the bottom throughout their lifeguarding zone or area of responsibility. Where the bottom of water body is not visible (like open water), follow the participants moving across your zone/area.

- Design the patrol paths to keep them short and minimise the time required to travel from the starting point and return to that point. The objective is to minimise the time between repeat observations throughout the patrol area.

- Always closely inspect any object on the bottom and remove items (e.g. t-shirts or toys).

- Do not allow the use of sinking toys or other objects that will settle on the bottom that are large enough to cause false alarms.

- Lifeguards have to wear sunglasses to improve visibility during bright weather conditions.

BASIC CARDIAC LIFE SUPPORT (BCLS)

Basic Cardiac Life Support (BCLS) refers to the recognition of sudden cardiac arrest, call for help, maintaining airway patency, supporting breathing and the circulation without the use of equipment other than personal protective devices. This is also commonly referred as cardiopulmonary resuscitation (CPR). This skill could be used by the layperson and healthcare provider in both the out-of-hospital and in-hospital settings.

The majority of sudden cardiac arrests occur in the community (out-of hospital). The success of the chain of survival depends on the layperson. Rescuers who are unwilling or unable to do mouth-to-mouth ventilations must at least do continuous chest compressions.

Chain of Survival

Early Recognition and Access (to get help)	Early CPR (to buy time)	Early Defibrillation (to restart heart)	Early Advanced Care (to stabilize)

1-MAN CPR PROTOCOL

1-MAN CPR PROTOCOL

D — **CHECK FOR DANGER**

↓

R — **UNRESPONSIVE?**
Tap shoulder firmly.
Ask loudly

↓

S — **SHOUT "HELP! CALL AMBULANCE 995, GET AED!"**

↓

A — **OPEN AIRWAY**
Head tilt, chin lift

↓

B — **NOT BREATHING NORMALLY?**
Look, Listen, Feel
Up to 10 seconds

No ↓ | No ↓

C — **30 CHEST COMPRESSIONS**
Centre of chest / lower half of sternum
Depth of at least 5cm
Rate of at least 100 per minute
Allow complete chest recoil

← No

CHECK CAROTID PULSE
(For healthcare providers only)
Define pulse and normal breathing within 10 seconds

↓

OPEN AIRWAY
Head tilt, chin lift

↓

2 BREATHS
1 second per breath
Tidal volume 400-600 ml till chest just rises

↓

CONTINUE UNTIL CASUALTY WAKES UP
AED ARRIVES AND ANALYSING HEART RHYTHM
EMERGENCY TEAM TAKES OVER CPR

If unable / unwilling to do mouth-to-mouth for any reason, do continuous chest compressions at a rate of at least 100/minute

SHALLOW WATER BLACKOUT (SWB)

A person losing consciousness in water may be a result of shallow water blackout (SWB). There is no known standard definition of SWB. The following aims to create awareness of this condition which, hopefully, will facilitate prevention of such occurrences.

Who:

It affects the physically-fit swimmer, but can affect anyone breath-holding underwater. It is especially seen in competitive swimmers, snorkelers, spear fishermen or anyone who free-dives.

What:

Shallow Water Blackout occurs because of low carbon dioxide (CO2) and low oxygen (O2). Unconsciousness occurs because of the low O2. What triggers us to breathe to get O2 is high CO2 not low O2 as one might think. Hyperventilation done before breath-holding lowers the CO2 abnormally so one can hold their breath longer. With lower CO2, our body is robbed of its built-in mechanism to protect us and tell us to breathe before unconsciousness happens. One basically faints in the water, and then automatically the body breathes taking water into the lungs; death from drowning then occurs.

When:

It occurs without any warning. In fact, because of the hypoxia, one feels euphoric and empowered to continue breath-holding. Unlike regular drowning where there can be 6-8 minutes before brain damage and death, there is only about 2 ½ minutes before brain damage then death with SWB.

Where:

It can occur in any body of water when breath-holding, with and without supervision, because it is hard to detect from above the water.

Why:

Shallow Water Blackout occurs because of the lack of education and understanding of the dangers of breath-holding. It also results because of the lack of safety training for swimmers, free-divers, snorkelers, and spear-fishermen.

For more information on SWB, do visit **www.shallowwaterblackoutprevention.org**

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