SHW/02/2023 Date: 4 April 2023

Next Review: 3 April 2024

HEAT STRESS MANAGEMENT PLAN

1 INTRODUCTION

- 1.1 Meteorological Service Singapore (MSS) has said that Singapore's average surface temperature has been rising at a rate of about 0.25 degrees Celsius per decade since the 1950s, and it is projected to continue to rise.
- 1.2 Heat is primarily received on the earth's surface as radiation from the sun and May tends to be the warmest month of the year. According to NEA, a heatwave is defined as
 - daily maximum air temperature is at least 35 degrees for at least 3 consecutive days and
 - the daily mean temperature throughout the period is at least 29 degrees.
- 1.3 It is therefore important to introduce additional heat injury prevention measures to mitigate the increased risks of heat injury during sport.

2 AIM

2.1 The severe hot weather plan is developed to protect the sporting fraternity from heat related injuries. It aims to help the sporting fraternity to better prepare, plan and respond during severe hot weather and prevent/reduce heat injuries by raising public awareness and highlighting key actions to be taken. This plan provides guidelines on heat injury prevention measures to be adopted and incorporated by respective divisions and their stakeholders into their operational plans.

3 SCOPE

- 3.1 This plan shall apply to all sports facilities and events / programs / physical activities. The information will be featured in SportSG website.
- 3.2 The 3-band formulation recommended by NEA and its expert panel shall be adopted for this plan. It also builds on the expertise of the Sport Safety Committee when developing this plan so as to help the sport fraternity to better prepare and plan for severe hot weather.

	ss Health Advisory for General and measures to prevent heat-rel	•
Low Risk (WBGT<31°C)	Moderate Risk (31≤WBGT<33°C)	High Risk (WBGT≥33°C)

3.3 Intrinsic and extrinsic factors shall be covered in the plan:

Intrinsic factors	a. Operational	Intensity of activities/work, interval of
	Requirements	breaks, accumulated fatigue, sleep
		deprivation.
	b. Well-being of	Dehydration, inadequate nutrition,
	staff and	medical history, physical
	participants	conditioning/training, physical fitness,
		obesity, stress.
Extrinsic factors	a. Environment	Ambient temperature / humidity,
		surroundings, flooring.
	b. Physical barriers	Confined spaces, attire/clothing.
	contributing to	
	heat loss	

4 HEAT INJURY PREVENTION (HIP) MEASURES

4.1 The following HIP measures have been designed to reduce the risk of heat injury during sport.

5 RISK ASSESSMENT

5.1 In the absence of any measures for specific activities, one must exercise discretion and conduct a risk assessment to eliminate or reduce risks to as low as reasonably practicable for any physical activities. Please refer to links below for information on risk management:

 $\underline{https://www.sportsingapore.gov.sg/sports-education/sports-safety/safety-resources-useful-links/}$

https://www.udemy.com/course/sports-safety-risk-management/

5.2 Other factors for consideration include the following:

i) Conduct of Physical Activities

- a. When conducting physical activities especially for the first time and/or conducted in an unfamiliar environment (outdoors and/or indoors without air-conditioning), the following shall be included in the risk assessment plan:
 - Person's health status and level of preparedness (Participants, Instructors, volunteers etc),
 - Appropriate attire and use of sunscreen,
 - weather conditions (temperature, humidity) and

- intensity of activity.
- b. Access to water and first aid/AED shall be easily available. First aid items/AED shall be inspected regularly to ensure that items are serviceable and replenished.
- c. Participants, instructors, volunteers etc shall complete the Get-Active Questionnaire (GAQ) (Annex A) and/or checklist of intrinsic risk factors for exertional heat stroke, and/or conduct equivalent assessments prior to commencement of physical activities.

	Checklist of	Intrinsic Risk Factors for Exertional Heat Stroke
	Are yo	u at risk for Exertional Heat Stroke (EHS)?
1.	Are you physically ready for training and competition?	Athletes need to match their exercise intensity with their fitness level. Novice athletes with poor physical fitness tend to outpace themselves during competition. An overload in exercise intensity is a key factor contributing to EHS.
2.	Have you acclimatised to the climate?	In Singapore's context, it is important for visiting athletes to have adequate acclimatisation to the heat and local climate.
3.	Have you been ill recently?	Heat stroke risk can be increased by disturbances to the immune system e.g. from a recent bout of illness or subclinical infection.
4.	Are you taking any medications?	Athletes on medication for chronic medical conditions need to consult their prescribing physician on the risks of undertaking strenuous physical activity. Stimulants, antihistamines, diuretics and other common medications can impair the body's ability to mount an effective thermoregulatory response during exercise in the heat. Athletes taking medication for recent illness should be advised against participation in view of the dual risks medication and recent illness pose.
5.	Do you tend to push your body hard?	An athlete's high level of motivation is one of the most consistent hallmarks of exertional heat stroke. Signals which urge the body to slow down are blocked out when athletes knowingly pushing the limits to reach the highest levels of performance.
6.	Are you at risk for heat injury?	High Body Mass: High body-mass athletes expend metabolic energy at higher absolute rates than their lean counterparts, placing high body-mass athletes at higher risk of heat injury. Children and Youth: It is well established that classical heat stroke (results from prolonged passive exposure to extreme environmental heat and occurring mostly during heatwaves affecting infants, toddlers, and the elderly) typically affects the very young and the very old. Children and youth may be unable to assess and mitigate risks of training and competing in the heat.

Source: Extracted from the Sport Safety Committee Report 2019

- d. Participants, instructors, volunteers etc shall be briefed on safety precautions such as stopping the activity when unwell or breathless and to seek medical treatment when necessary. They must also know their own state of health and be conscious of the risks of exceeding their threshold for safe participation in the physical activity. They shall also be advised to adopt good dietary habit, well-regulated sleep routine and catering for recovery in between training bouts to prevent training-induced immune suppression.
- e. Intensity of sporting activities shall be introduced progressively and at a level suitable to the participant.
- f. Instructors and supporting manpower such as volunteers, parents shall maintain high vigilance on participants who are unwell, on medication and/or recently recovered from illness.
- g. Warm-up and cool-down exercises including static and dynamic stretches shall be conducted before and after the sporting activity.
- h. Ensure that participants, instructors, volunteers etc are hydrated and drink at least 250ml of water every 30 mins. On hot days, ice slurry may also be provided to induce greater internal cooling.
- i. Check that urine colour is clear or light yellow. If urine is darker yellow than usual, this may suggest early signs of dehydration.

Urine Colour Chart

Colour	Level of Hydration
No colour (clear)	Good hydration
Pale yellow	Good hydration/mild dehydration
Dark yellow	Mild/moderate dehydration
Orange	Moderate/severe dehydration
Brown	Severe dehydration

j. If vendors / partners are appointed to conduct the said physical activities, they shall submit their risk assessment plans and its risks mitigated to as low as reasonably possible (ALARP) to ActiveSG facility management prior to commencement of activities.

ii) Environment

a. Sport/event/interest group organisers shall take reference from NEA website or myENV app to check weather conditions prior to conducting physical activities

outdoors and/or indoors without air-conditioning. See link below: https://www.nea.gov.sg/weather

b. According to NEA, the hottest part of the day is typically between 11am to 4pm. Sport/event/interest group organisers, instructors and participants should exercise caution and review their risk assessment plans for additional safety measures for any outdoor activities during that period. Examples of additional measures include instituting more frequent breaks; increase hydration, etc.

6 FACTORS THAT CONTRIBUTE TO HEAT STRESS

- 6.1 Generally, 3 factors that contribute to heat stress when engaging in physical activities:
 - a. Personal persons with the following conditions (non-exhaustive) are at higher risk of developing heat stroke: persons who are unwell and/or on medication; persons who have just recovered from an illness; persons fitness level; acclimatisation to hotter environment; persons medical conditions; and alcohol consumption.
 - b. Environmental risk factors refer to temperature, humidity, and level of ventilation/air movement; and direct heat source.
 - c. Types of exercise high intensity; endurance level; degree of strength. The higher intensity of the physical activity, the more internal heat the body produces.

7 SIGNS AND SYMPTOMS OF HEAT INJURY

- 7.1 Early recognition of symptoms of exertional heat stroke and rapid first responder intervention can reduce morbidity and mortality. The consequence of heat injury can be significantly alleviated by early cooling and intervention measures. Therefore, it is imperative that suspected heat injury casualties are identified early.
- 7.2 Participants, instructors, volunteers, staff and medical care providers etc shall be educated on the recognition of early signs of heat injury and activation of an emergency medical responder when these signs are observed. Such information shall be included in safety briefings conducted prior to activity or event.
- 7.3 The symptoms of heat injury may include:
 - a. Inability to continue physical activity due to extreme fatigue.
 - b. Hot and flushing (redness) of skin.
 - c. Severe muscle cramps.
 - d. Nausea and/ or vomiting.
 - e. Headache, giddiness, and/ or fainting spells during sudden change in position.

- f. Change in mental status confusion, agitation, disorientation, seizures or loss of consciousness.
- g. A comatose, non-arousable state.
- 7.4 For details, please refer to the link below: https://www.sportsingapore.gov.sg/sports-education/sports-safety/safety-resources-useful-links/

Sport Safety Committee Report 2019 SS681: 2022 Code of Practice for Sport Safety

8 3-Phase Approach

8.1 The table below features the plan for the 3-phased approach.

LOW HEAT STRESS (WBGT<31°C)	MODERATE HEAT STRESS (31≤WBGT<33°C)	HIGH HEAT STRESS (WBGT≥33°C)
CONTINUE with normal activities Hydrate normally Wear appropriate attire ⁵⁶ Be aware of signs and symptoms ⁵⁶ of heat-related illness	REDUCE outdoor [#] activities Take regular breaks [indoors/under shade] for prolonged outdoor activity Drink more fluids Wear appropriate attire [®] Be aware of signs and symptoms ^A of heat-related illness	MINIMISE outdoor® activities, stay under shade where possible Take more frequent and/or longer breaks [indoor/ under shade] for prolonged outdoor activity Drink more fluids Cool yourself actively during breaks (e.g., sponging, pouring water over arms and legs) Wear appropriate attire® Be aware of sign and symptoms° of heat related illness
1) Sports facility owners, event and program organisers to review their risk assessment plan, in particular weather condition, participants' profile, intensity of activity and additional mitigating measures. 2) Prior to activity, administer the Get Active Questionnaire (GAQ)	1) Sports facility owners, event and program <u>organisers</u> to review their risk assessment plan, in particular weather condition, participants' profile, intensity of activity and additional mitigating measures. 2) Schedule events / activities for the cooler part of the day. 3) Reduce intensity and duration of outdoor activities between 11am to 4pm where possible, subject to review of the risk assessment plan.	1) Sports facility owners, event and program organises; review their risk assessment plan, in particular weather condition, participants' profile, intensity of activity and additional mitigating measures. 2) Cancel or postpone endurance events / competitions outdoor activities between 11am to 4pm where possible subject to review of the risk assessment plan.
Get Active Questionnaire (GAQ) and/or equivalent assessments. Communicate to participants on hydration regime, recognition of heat injury symptoms, proper attire, etc. Reference #1. 3) During activity, remind participants on hydration and hydration points (e.g., water coolers provided in public sports facilities).	4) Prior to activity, administer the Get Active Questionnaire (GAQ) and/or equivalent assessments. Communicate to participants on hydration regime, recognition of heat injury symptoms, proper attire, etc. Reference #1. 5) Conduct safety briefing on activity day, with emphasis on heat injury prevention and measures. 6) Nominate a person to monitor weather conditions and take necessary action should there be any risk.	3) Commence public communication. 4) If participants are already at venue, whilst waiting for transport, participants are advised to rest under shelter and hydrate. 5) Monitor participants for the onset of heat injury symptoms as they have been exposed to abnormally hig temperatures.

	MODERATE HEAT STRESS (31≤WBGT<33°C)	HIGH HEAT STRESS (WBGT≥33°C)
LOW HEAT STRESS (WBGT-31*C) CONTINUE with normal activities Hydrate normally Wear appropriate attire [%] Be aware of signs and symptoms^ of heat-related illness	MODERATE HEAT STRESS (31sWBGT-33*C) **REDUCE outdoor** activities **Take regular breaks [indoors/under shade] for prolonged outdoor activity **Drink more fluids **Drink more fluids **Wear appropriate attire** **Be aware of signs and symptoms* of heat-related illness	HIGH HEAT STRESS (WBGT2-33*C) MINIMISE outdoor* activities, stay under shade where possible Take more frequent and/or longer breaks [indoor/ under shade] for prolonged outdoor activity Drink more fluids Cool yourself actively during breaks (e.g. sponging, pourin water over arms and legs) Wear appropriate attive ⁸ Be aware of sign and symptoms^ of heat related illness
	7) Constantly check on participants well-being, especially those appearing unwell and advise them to rest and refrain from carrying on with activity. Remind participants on adequate hydration methods and sun protection, e.g. easy access to water / drinks points, application of sun block, etc. 8) Where possible, identify shelters / air-conditioning facilities / shady areas, etc. for event officials, staff, volunteers, participants, etc, and ensure drinking water supplies are	Outdoor sport facilities will be closed between 11am to 4pm. except public swimming pools.
	sufficiently replenished. 9) Schedule frequent intervals / breaks for rest, drinks, cooling down.	
	10) Provide adequate medical coverage at events including ice and cooling measures for heat injury management and medical plan for evacuation to nearest hospital.	
(Clause Stheat Injuries) *This does not apply to people who have recently *Outdoor activities refer to activities under direct. *Lightweight, loose-fitting, heat permeable and lightweight of a strength of the strength o	2033; VP Protection Guidebook: SEAG (2015), Next Disorders Prevention & UV Protection Guide (2016), Sports Safety Committee Report March recovered from Illense or have Intercurrent Illense, who should rest and avoid streamous outdoor activities. Recent travelers from cooler clima on exposure control of the Accordent marchine been good and climinals bursters to exposure bursters to exposure the stream of the Accordent marchine been good and climinals bursters to exposure bursters to exposure the stream of the Accordent marchine stream of the Accordent stream to the stream of the Accordent stream of the Accordent stream of the Accordent stream to the Accordent stream of t	tes also exercise greater precaution 18. 19. 19. 19. 19. 19. 19. 19.

9 Work / Physical Activity Scheduling

- 9.1 Under moderate risk, work/physical activities shall be alternated, for example by scheduling 15 minutes of rest for every 45-60 minutes of work/physical activities. The duration of rest period shall be increased under high-risk exposure conditions.
- 9.2 Below are the proposed guidelines:

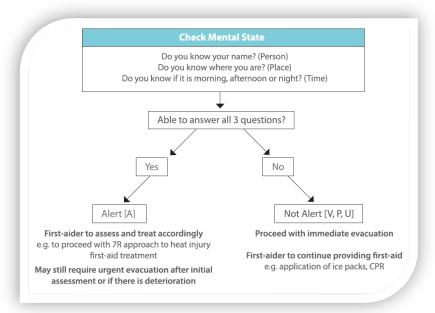
Heat Stress Level	WBGT	Work/Physical Activities: Rest
Low	<31°C	45-60 mins: 15 mins
Moderate	31≤WBGT<33°C	30 mins : 15 mins
High	≥33° C	15-30 mins: 30 mins

10 First Aid Treatment

- 10.1 First aid for heat illness comprises 2 key steps:
 - a. Determine victim's level of consciousness such as using the AVPU scale (Alert, Verbal response, response to Pain and Unresponsive)

Alert	 Victim is fully awake with spontaneous eyes opening.
	 Appears aware of and responsive to the environment.
	Follows commands, eyes tract people and objects.
Verbal	Eyes do not open spontaneously but victim responds
response	appropriately when spoken to e.g. limbs/eyes
	movement, grunt or moan.
Response to	 Victim does not respond to verbal stimuli but moves
Pain	or groans in response to painful stimuli e.g. pinching
	skin, ear lobe or nail bed.
Unresponsive	Victim does not respond to any stimuli.

After using the AVPU scale, the proposed emergency response/first aid treatment is listed below:



b. On-site treatment using the 7R approach for heat stress is as follows:

Recognise symptoms	Recognise symptoms of heat stress and report early
Rest Victim	Get victim to sit or lie down in a cool shaded area
	with good ventilation.
Remove clothing	Loosen or remove excess clothing s appropriate
	(while preserving the modesty).
Reduce temperature	Reduce body temperature as fast as possible by
	applying ice packs, wet towels, or cool water. Other
	measures include fanning the victim to promote
	evaporative cooling, use of cooling blankets and using
	cold water immersion.
Rehydrate	Rehydrate by providing fluids if victim is conscious.
Resuscitate	If the victim is unconscious, call for help immediately
	and commence resuscitation.
Rush to hospital	Call for an ambulance and convey victim to hospital.

11 AT-RISK GROUPS

- 11.1 Although anyone at any time can suffer from heat-related illness, some people are at greater risk than others:
 - Infants and young children whose body systems have not fully developed,
 - Older adults whose body systems are ageing and have decreased heart functions and body reserves,
 - People with disabilities or overweight,
 - People who overexert during exercise,

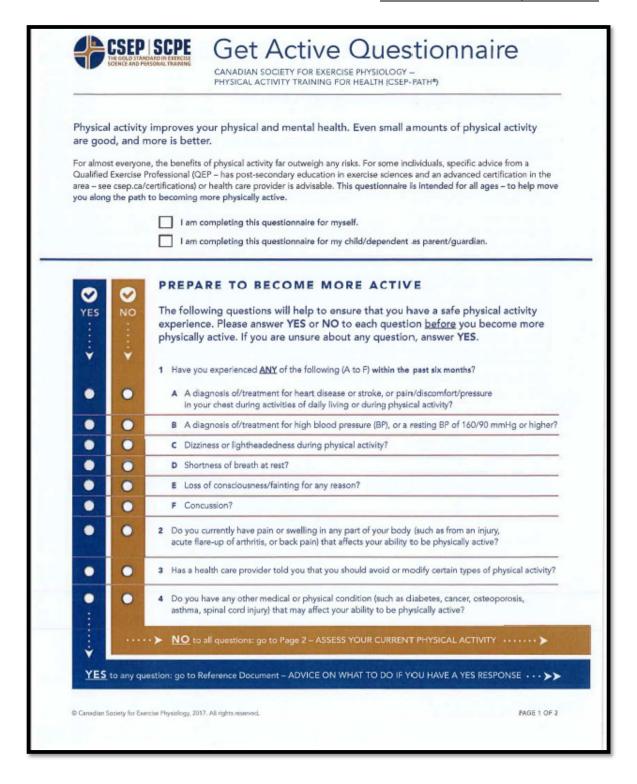
- Individuals with pre-existing medical conditions especially with heart disease or high blood pressure, or who take certain medications, such as for depression, insomnia, or poor circulation that decreases their immunity and
- Pregnant women as their bodies must work harder to cool down both herself and the developing baby.
- 11.2 Wear appropriate clothing: lightweight and loose-fitting.
- 11.3 Schedule outdoor activities carefully: Engage in outdoor activities when weather is coolest like morning and evening hours. Rest often in shady areas for body to recover.
- 11.4 Pace oneself: Defer exercises during severe hot weather. If one is not accustomed to exercising in a hot environment, start slowly and pick up the pace gradually. If exertion in the heat makes the heart pound and leaves one gasping for breath, STOP all activities. Get into a cool area or into the shade, and rest, especially if symptoms such as light headedness, confusion, feelings of weakness or fainting appear.
- 11.5 Apply sunscreen: Sunburn affects a body's ability to cool down and can make one dehydrated. When exercising outdoors, protect oneself from the sun by wearing a wide-brimmed hat, sunglasses, and put on sunscreen of SPF 15 or higher 30 minutes prior to going outdoors. Continue to reapply it according to the package directions. It is preferable to look for sunscreens that feature "broad spectrum" or "UVA/UVB protection" on the labels.
- 11.6 Keep in mind: Electric fans may provide comfort, but during severe hot weather, these fans will not prevent heat-related illness. Take a cool shower or bath or move to an air-conditioned place to cool off. Refrain from using the stove and oven to maintain a cooler temperature indoors.
- 11.7 Avoid Hot and Heavy Meals: They add heat to one's body.
- 11.8 Stay hydrated: Drink more fluids, regardless of how active one is. Do not wait until thirsty to drink. If the doctor limits fluid intake, consult them on the quantity to drink during hot weather. Refrain from very sugary or alcoholic drinks as it causes one to lose more body fluid.
- 11.9 Replace salt and minerals: Heavy sweating removes salt and minerals from the body that need to be replaced. A sports drink can replace the salt and minerals you lose in sweat. If on a low-salt diet, suffers from diabetes, high blood pressure, or other chronic conditions, consult the doctor before drinking a sports beverage or taking salt tablets.
- 11.10 Stayed informed: Check for updates on heat alerts and safety tips. Identify any cooling shelters within the vicinity of the exercise area. Learn the signs and symptoms of heat-related injury and how to treat them.
- 11.11 Use a Buddy System: When exercising in the heat, monitor the condition of your buddy and likewise the buddy will do the same for you. Heat-induced illness can cause a person to become confused or lose consciousness.

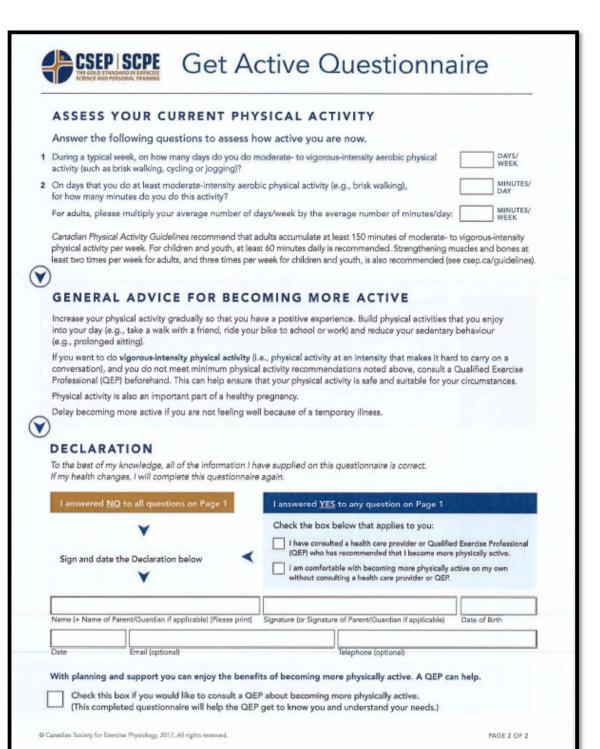
11.12 Visit adults at risk at least twice a day and closely watch them for signs of heat exhaustion or heat stroke. Infants and young children, of course, need much more frequent watching.

12 CONCLUSION

12.1 Safety is everyone's responsibility. During the hot months, all must place deliberate emphasis to prevent heat-related injuries through the measures stated above. Exercise discretion and consider implementing additional safety measures if deemed necessary.

Annex A – Get Active Questionnaire







Get Active Questionnaire – Reference Document ADVICE ON WHAT TO DO IF YOU HAVE A **YES** RESPONSE

Use this reference document if you answered \underline{YES} to any question and you have not consulted a health care provider or Qualified Exercise Professional (QEP) about becoming more physically active.

•	A diagnosis of/treatment for heart disease or stroke, or pain/ discomfort/pressure in your chest during activities of daily living or during physical activity? YES	Physical activity is likely to be beneficial. If you have been treated for heart disease but have not completed a cardiac rehabilitation program within the past 6 months, consult a doctor — a supervised cardiac rehabilitation program is strongly recommended. If you are resuming physical activity after more than 6 months of inactivity, begin slowly with light- to moderate-intensity physical activity. If you have pain/discomfort/pressure in your chest and it is new for you, talk to a doctor. Describe the symptom and what activities bring it on.
3	A diagnosis of/treatment for high blood pressure (BP), or a resting BP of 1,60,90 mmHg or higher? YES	Physical activity is likely to be beneficial if you have been diagnosed and treated for high blood pressure (BP). If you are unsure of your resting BP, consult a health care provider or a Qualified Exercise Professional (QEP) to have it measured. If you are taking BP medication and your BP is under good control, regular physical activity is recommended as it may help to lower your BP. Your doctor should be aware of your physical activity level so your medication needs can be monitored. If your BP is 160/90 or higher, you should receive medical clearance and consult a QEP about safe and appropriate physical activity.
	Dizziness or lightheadedness during physical activity YES	There are several possible reasons for feeling this way and many are not worrisome. Before becoming more active, consult a health care provider to identify reasons and minimize risk. Until then, refrain from increasing the intensity of your physical activity.
,	Shortness of breath at rest YES	If you have asthma and this is relieved with medication, light to moderate physical activity is safe. If your shortness of breath is not relieved with medication, consult a doctor.
	Loss of consciousness/ fainting for any reason	Before becoming more active, consult a doctor to identify reasons and minimize risk. Once you are medically cleared, consult a Qualified Exercise Professional (QEP) about types of physical activity suitable for your condition.
	Concussion YES	A concussion is an injury to the brain that requires time to recover. Increasing physical activity while still experiencing symptoms may worsen your symptoms, lengthen your recovery, and increase your risk for another concussion. A health care provider will let you know when you can start becoming more physically active, and a Qualified Exercise Professional (QEP) can help get you started.



Get Active Questionnaire – Reference Document ADVICE ON WHAT TO DO IF YOU HAVE A YES RESPONSE

Use this reference document if you answered <u>YES</u> to any question and you have not consulted a health care provider or Qualified Exercise Professional (QEP) about becoming more physically active.

2 Do you currently have pain or swelling in any part of your body (such as from an injury, acute flare-up of arthritis, or back pain) that affects your ability to be physically active?

YES

If this swelling or pain is new, consult a health care provider. Otherwise, keep joints healthy and reduce pain by moving your joints slowly and gently through the entire pain-free range of motion. If you have hip, knee or ankle pain, choose low-impact activities such as swimming or cycling. As the pain subsides, gradually resume your normal physical activities starting at a level lower than before the flare-up. Consult a Qualified Exercise Professional (QEP) in follow-up to help you become more active and prevent or minimize future pain.

3 Has a health care provider told you that you should avoid or modify certain types of physical activity?

YES

Listen to the advice of your health care provider. A Qualified Exercise Professional (QEP) will ask you about any considerations and provide specific advice for physical activity that is safe and that takes your lifestyle and health care provider's advice into account.

4 Do you have any other medical or physical condition (such as diabetes, cancer, osteoporosis, asthma, spinal cord injury) that may affect your ability to be physically active?

YES

Some people may worry if they have a medical or physical condition that physical activity might be unsafe. In fact, regular physical activity can help to manage and improve many conditions. Physical activity can also reduce the risk of complications. A Qualified Exercise Professional (QEP) can help with specific advice for physical activity that is safe and that takes your medical history and lifestyle into account.

After reading the ADVICE for your YES response, go to Page 2 of the Get Active Questionnaire – ASSESS YOUR CURRENT PHYSICAL ACTIVITY

WANT ADDITIONAL INFORMATION ON BECOMING MORE PHYSICALLY ACTIVE?

csep.ca/certifications

csep.ca/guidelines

CSEP Certified members can help you with your physical activity goals.

Canadian Physical Activity Guidelines for all ages.

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