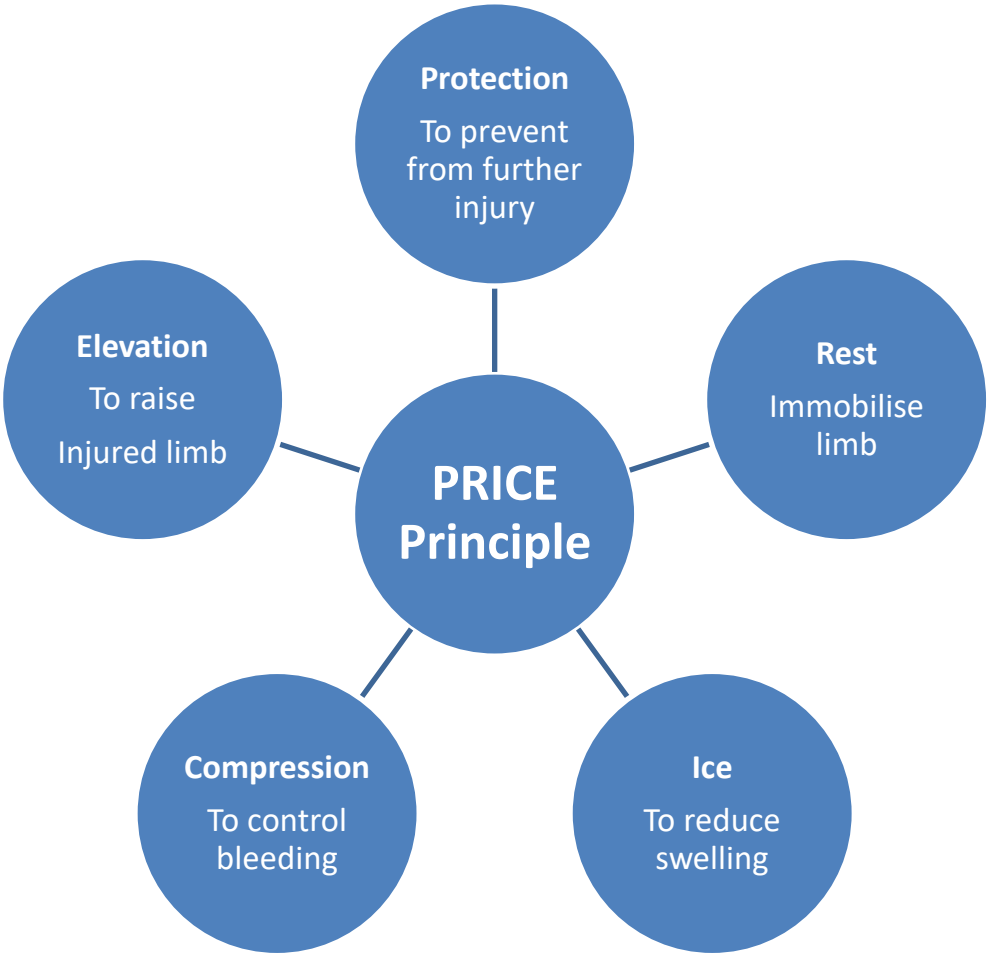
Physical Education (HKDSE)

Part VI: Sports Injuries, Treatment and Precautions



Physical Education Section
Curriculum Development Institute
Education Bureau
The Government of the Hong Kong Special Administrative Region

2026

(last updated in Aug 2026

Contents	Page
Learning objectives	2
Glossary	3
Essential concepts and theories	
A. Factors leading to sports injuries	5
B. Common sports injuries	8
C. Treatment	16
D. Prevention of sports injuries	19
Examples of enquiry activities	23
References for teachers	29
References for students	30
Related websites	31

Learning objectives

This part helps students understand the safety measures in physical activities, sports injuries and prevention methods. It is linked with the structure of the human body and movement analysis (Part II and Part III) as well as exercise and training methods (Part V). It also heightens students' awareness of common sports injuries and helps them learn to apply the knowledge to treatment and preventive measures. It also contributes to the understanding of recreation management, programme organisation and legal issues in PE, sport and recreation (Part IX).

Expected learning outcomes: Students will be able to

1. explain the factors leading to sports injuries with appropriate examples;
2. describe in detail the symptoms, causes and treatment of common sports injuries;
3. take safety measures to reduce the risk of sports injuries; and
4. show confidence in the initial care of injuries in sporting situations.

Glossary

	Term	Description
1.	Abrasion 擦傷	A scrape; minimal bleeding, possibly with intense pain.
2.	Avulsion fracture 撕裂性骨折 / 扯裂性骨折	A small portion of bone, with ligament or tendon attached, is pulled away from the main bone segment, causing a fracture.
3.	Capillary 微血管	The smallest type of blood vessel. Capillary walls are very thin, allowing for the exchange of materials.
4.	Cardiopulmonary resuscitation (CPR) 心肺復甦法	A method of artificial breathing and blood circulation to be applied when the natural heart action and breathing have stopped. Artificial rescue breaths and chest compressions are used to help reactivate the supply of blood and oxygen.
5.	Contusion 撞傷	An injury caused by an impact or pressure without apparent wound but with a bruise of internal bleeding as a result of a blow.
6.	Epiphyseal plate 骨骺板	The cartilage (disc of hyaline cartilage) between the epiphysis and the shaft of a long bone which is the site of growth in length.
7.	Inflammatory response 炎性反應	The immune system's normal response to injury or abnormal stimulation caused by a physical, chemical or biological substance. It is the immune response to tissue injuries or unusual stimulation.
8.	Ligament 韌帶	A band of fibrous tissue that connects bone to bone or cartilage to bone, supporting or strengthening a joint.
9.	Local tissue damage 局部組織損傷	Tissue damage is close to the area where the original injury occurred.

	Term	Description
10.	Muscle fibre 肌纖維 / 肌肉纖維	A muscle fibre is a single cell of a muscle. Muscle fibres contain many myofibrils, the contractile units of muscles. Muscle fibres are very long. A single fibre can reach a length of 35 cm.
11.	Muscle tissue 肌肉組織	It is made of muscle cells that are capable of contraction. Muscle tissue is the most abundant type of tissue in most animals.
12.	Peripheral structure 外圍結構	This is a structure located on the surface or near the outer part of the body.
13.	Residual swelling 持續腫脹	Sustained swelling that may continue after recovery from an injury. It can last for many months.
14.	Splint 固定物 / 托	A rigid support made of metal, plaster or plastic and used to immobilise an injured or inflamed part of the body.
15.	Stress fracture 疲勞性骨折 / 壓力性骨折	A weak spot or a small crack in bone caused by continual overuse.
16.	Tendon 腱 / 肌腱	A fibrous cord by which a muscle is attached to a bone.
17.	Torsion 扭力	The strain produced by twisting and this causes the tearing-off of the ligament and synovial cavity.

Essential Concepts and Theories

A. Factors leading to sports injuries

Potential risks are inherent in different physical activities by their nature. The body parts may be injured and most of these involve the muscular-skeletal system, such as bones, joints and soft tissues (examples include muscles, tendons, capsules, bursae and ligaments). If one is familiar with these factors, there is a greater chance of injury prevention or lessening the degree of injury.

i) **Environmental factors** – They are the potential risk factors inducing injuries during physical activities. Injuries may occur if one is unaware of the environmental factors which include weather, facilities and equipment.

- **Weather** - High temperature and humidity will hinder heat dissipation. This may induce heat cramps, heat exhaustion and heatstroke. Cold condition is associated with hypothermia. Raining or very high relative humidity can lead to a lack of movement control. Furthermore, the chance of suffering from stress induced by air pollution is higher for people with respiratory or cardiovascular diseases. In such circumstances, we should refer to the Air Quality Health Index and relevant guidelines provided by the Environmental Protection Department to decide whether or not to continue outdoor physical activities.

- **Facilities and equipment –** The facilities and equipment for various sport are different, we should ensure that enough space is available for conducting these activities. We should also consider the material and the hardness of the floor surface as well as the sequence of the physical activities to be held. This will reduce the chance of sports injuries. To safeguard participants' safety, sports facilities and equipment, such as goalposts and gymnastic apparatus, should be regularly checked and well maintained in a good condition to ensure that they meet the necessary safety requirements.

  - **Sports grounds -** For any sport, the availability of a proper environment for athletes is vital to help reduce the chance of injuries. Many sports injuries occur on the playing fields. Regular maintenance helps keep them safe for use. The outdoor grass pitches, for example, should be mowed, watered and cleared of all foreign substances such as rocks, tin cans, etc. The surroundings of the playing fields should not in any way heighten the possibility of an injury. Obstructions such as stakes, railings, etc should be either removed or placed far enough away from the playing

area. The indoor wooden floors should always be free of obstacles and not too slick. To avoid ankle injuries, the curb on an athletics track should neither be too high nor too low.

- **Equipment** - All equipment should be checked before use, like gymnastic apparatus. The equipment installed in an open area should be inspected and maintained regularly to prevent sports injuries. Proper clothing should be worn for physical activities. For a long-distance run, participants should wear breathable clothes. Besides, they should not wear shoes with improper fitting, or shoes made of inadequate impact-absorbing or excessively stiff materials.

ii) Protective equipment and devices - Protective devices may reduce the risk of injury. Items such as helmets, safety goggles, mouthpieces, padding, shin / face-guards, etc., are all designed to reduce the chance of injury. It is essential that all equipment is specifically designed for the needs of the players. In order to decrease the chance of injury, the equipment such as knee guards and ankle guards for stabilising and supporting the body parts is needed.

iii) Level of skill – Participants who do not have adequate specific skills or knowledge face a greater chance of injury. This is especially true in contact sport like football or individual sport such as gymnastics and boxing. These participants should be aware of how to prevent injuries.

iv) Level of fitness - The knowledge, skills and fitness are important to prevent sports injuries. For example, sports injuries will be more likely to occur when the players' fitness level drops in contact sport like football and rugby. In gymnastic competitions, those without sufficient muscle endurance to withstand a routine are most susceptible to injuries. A low level of flexibility will also cause muscle strain more easily.

v) Physical limitations - Participants should have the required physical capabilities, such as height, weight, strength and technique to take part in the activity. Players with a high arch or flat feet should wear suitable insoles to protect their feet. Eyesight can also be a contributing factor to the cause of injury. Poor eyesight can result in misjudgements and mistiming of actions in sport. For example, a player without proper contact lenses or glasses during competitions may make errors and this will increase the chance of sports injuries.

vi) **Nature of the sport -** Some sport like boxing poses a greater threat of injury. Participants must be cautious of the potential risks and adopt preventive measures. Other sport, like rock climbing, requires certain levels of physical fitness and technical expertise.

vii) **Level of contact -** The level of contact in some sport, such as rugby and wrestling, has significant bearing on the likelihood of injury. The higher the level of contact is, the greater the likelihood of injury is. The preventive measures such as helmets and gloves are to minimise the chance of injury instead of avoiding them. Other non-contact sport, such as tennis, do not have the same level of such risk.

viii) **Matching of players -** There are great discrepancies among players in age, body type, etc. A fair competition takes place when the players are of equal capacity and ability. This is particularly important for students. Most school competitions are categorised by age so that students of a similar age will compete together to minimise the risk of injury. Competitions of many contact sport such as boxing, judo and wrestling are categorised by body weight for the same purpose.

B. Common sports injuries

We may suffer from various types of injuries when participating in sports activities. Participants of contact sport such as football and rugby will have a chance of sustaining injuries, for example, bleeding, contusion, abrasion, etc. Similarly, participants of continuous aerobic exercises such as marathon running and cycling etc. will be more likely to encounter injuries like muscle fatigue, heat exhaustion or even heat stroke, particularly in the hot and humid weather of Hong Kong. Students should understand that any sport involves a risk of injury. Knowledge of the causes and treatment of common sports injuries enables students to take preventive measures and have a rapid recovery after injury, leading to a quicker return to sports participation.

i) **Bleeding –** This is caused by the rupture of blood vessels. External haemorrhage occurs when the skin and deeper tissues are cut, punctured or scraped. However, internal haemorrhage occurs when bleeding is from internal organs without any breakage to the skin. Depending on the depth and severity of the wound, bleeding can be a significant injury, and needs to be stopped as soon as possible. It is also important to clean the wound and prevent it from becoming infected, as this can slow down the recovery process.

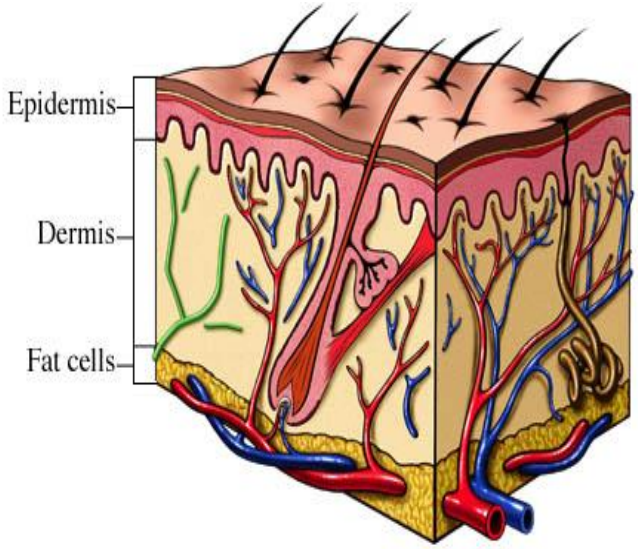
Fig. 6.1 Stop the bleeding as soon as possible. Apply pressure to the wound with a sterile tissue or bandage

ii) **Abrasion -** This is the rubbing or scraping off of the skin or a mucous membrane. This may be of any grade of severity from a simple scraping away of a layer of skin to very extensive damage. An area with firm underlying tissue, such as the shin or iliac crest, is the most susceptible to damage. When an abrasion occurs, an injury to deeper structures has been ruled out, and the most immediate concern is the prevention of infection.

iii) Contusion – injury to soft tissue (Musculoskeletal injuries)

A contusion, which is a soft tissue injury, occurs when tissues have been injured by being hit by a blunt object, usually as a result of direct trauma, without any breakage to the skin. This generally is a result of capillaries rupture causing bleeding and an inflammatory reaction as well as some local swelling. Pain will be felt when the lesion is pressed and malfunction of muscular contraction occurs.

Normal skin:



Bruise (contusion):

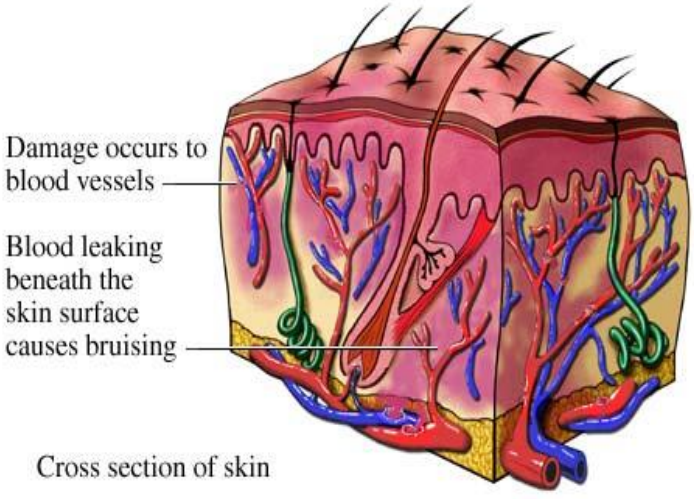


Fig. 6.2 A before-and-after diagram of a contusion of the skin

iv) Dislocation – injury to joint (Musculoskeletal injuries)

This is the displacement of a bone from a joint by a violent movement at the joint. This may be associated with damage to the ligaments, muscles or bones surrounding the joint. Swelling around the joint, joint deformation, severe pain and an inability of movement may occur. Joint stability can be regained by physical rehabilitation or surgical tightening of the surrounding muscles or ligaments. Inadequate treatment may lead to recurrent dislocation when the joint repeatedly dislocates.

Shoulder dislocation

Dislocation of thumb

Anterior temporal mandibular dislocation

Posterior dislocation of hip

Fig. 6.3 Four common sites of dislocation - a condition in which a bone is forced out of its normal position in the joint cavity

v) Fracture – injury to bone

When a bone is hit, compressed or twisted, a break occurs. Bone fractures can be classified into many types, depending on the condition of the overlying skin.

- **Closed fracture -** This type of fracture has a reduced risk of infection as it does not protrude through the skin, but it often causes a noticeable deformity. Closed fractures can be classified by the mechanism of how the injury was sustained.

  - **Direct trauma:** A direct blow to the bone causing it to break.

  - **Avulsion fracture:** A small portion of bone, with ligament or tendon attached, is pulled away from the main bone segment. This occurs when a sprained ligament pulls off a piece of bone, for example, in the ankle or finger. An avulsion fracture can be "open" if the overlying skin is broken.

  - **Stress fracture:** This may happen when excessive pressure is placed on a bone over an extended period of time and as a result the bone becomes weaker and eventually succumbs to the pressure and breaks.

  In addition, special precautions should be taken to protect young athletes. An epiphyseal or growth plate fracture often occurs when athletes are 18 or younger. The injury to the cartilage at the ends of bones can affect bone growth in the long term.

- **Open fracture -** This happens when a broken bone pierces the skin, exposing the bone and muscle tissue. These kinds of fractures are uncommon in a sports environment. There is a high risk of infection of the exposed fractured bone and emergency surgery is needed to clean up the wound.

vi) Pulled / Strained muscle – injury to muscle

When a muscle is forcefully or excessively shortened or stretched, it can become strained or "pulled", which is a tearing or even a rupture of the muscle fibres or tendons. This will cause an inflammatory response with swelling and disruption to the adjacent fibres. There is a sense of pain and tenderness and a bruise occurs later. Muscle strains are classified into three grades: grade I (minor), grade II (moderate) and grade III (severe).

vii) Sprain – injury to ligaments

This is a stretch or tearing injury to a ligament caused by compression, twisting or torsion. As with strains, there are three grades, depending on severity. Minor sprains cause minimal to no swelling and do not affect the ability of mobility, whereas severe sprains can result in complete tears with extreme pain and widespread swelling. Sprained ligaments can take anywhere from six to twelve weeks to fully heal.

viii) Heat and Cold Injuries – Environmental injuries

Heat injuries - Heat-related injuries occur typically in conditions where exercise is taking place in conditions where the body is struggling to cool down naturally due to the air temperature and humidity. The three most common heat-related illnesses are heat cramps, heat exhaustion and heat-stroke.

- **Heat cramps -** These are caused by dehydration, electrolyte loss, decreased blood flow to the muscles and fatigue. Individuals generally show symptoms of heat cramps after periods of heavy and prolonged sweating. Often these can result in spasms of the quadriceps, hamstrings or calves. An athlete should not resume the activity unless the spasms have stopped or he can continue without pain (See Table 6.1).

- **Heat exhaustion -** This is the most common form of heat illness. It is a "functional" illness and not associated with any organ damage. It is a shock-like condition caused by dehydration and a suffering individual will experience headaches, nausea, dizziness and chills. An athlete should not resume the activity without a doctor's permission after an examination *(See Table 6.1).*

- **Heatstroke -** This is a life-threatening condition in which the body temperature rises to a dangerously high level. It is distinguished from heat exhaustion by the presence of tissue injury. Heatstroke usually results from a malfunction of the brain's temperature control centre, which causes dehydration, fever or the disruption of the body's temperature regulation. Common signs of heatstroke can be observed as a rapid pulse and breathing rate, vomiting, confusion, etc. An athlete should return to the activity only with a doctor's permission *(See Table 6.1).*

	Increasing severity →		
Heat Illness	Heat cramps	Heat Exhaustion	Heatstroke
Warning signs ↓	Muscle cramps	Weakness	Confusion
		Pale and clammy skin	Hot and dry skin
	Fatigue		Strong & rapid pulse
	Profuse sweating		Cessation of sweating
	Thirst		
		Fatigue or dizziness	
		Chills or goose bumps	
		Headache & nausea	

Table 6.1 The differences and similarities of heat cramps, heat exhaustion and heatstroke

Cold injuries - These injuries occur due to a lowering of the core body temperature.

- **Frostbite -** When exposed to a particularly cold environment, the blood flow to the peripheral structures will be cut off to preserve core body temperature, resulting in frostbite, a medical condition in which cold weather seriously damages skin tissues. This injury mainly affects the feet, hands, ears and nose and is quite rare in sporting situations. There are three stages of frostbite ranging from initial numbness to dry black blistering of the skin.
- **Hypothermia -** This is a condition that occurs when the temperature of the body drops below 95°F (35°C), and is caused by exposure to an extremely wet, windy and cold environment. Symptoms of this condition include an altered level of consciousness and depressed vital signs of life. Should this happen to any athlete, they should not return to sport without being checked and getting the doctor's permission.

- **Wind chill –** Air movement will carry heat away from your body so you will feel colder on a windy day than what the thermometer indicates. This effect, termed "wind chill", will be more significant with increasing wind speed. In some countries like the U.S. and Canada, the "wind chill temperature" is reported along with the actual temperature measured. The "wind chill temperature" was developed based on scientific research involving human volunteers and computer modelling, as well as medical understanding of how the body loses heat when exposed to cold *(See Fig. 6.4)*. For example, if the air temperature is 4°C and the wind is blowing at 30 km/h, your face will feel as cold as -1°C on a calm day without any wind.

Temperature (^{O}C)

Wind Speed (km/h)	10	8	6	4	2	0
10	9	6	4	1	-1	-3
20	7	5	2	0	-3	-5
30	7	4	1	-1	-4	-6
40	6	3	1	-2	-5	-7
50	5	3	0	-3	-5	-8

Fig. 6.4 A chart for calculating the wind chill temperature using the wind speed and temperature

(Source: "Wind Chill Effect" (Hong Kong Observatory, 2011))

https://www.hko.gov.hk/en/education/weather/hot-and-cold-weather/00047-the-wind-chill-effect.html

ix) Overuse injuries - These are caused by repetitive force transmitted to bones, joints and muscles over time, for example tennis elbow and golfer's elbow. Overuse injuries are usually the result of over-ambitious training programmes. In this case, the body is attempting to do too much too soon, when it is not ready for the load. Sometimes, an overuse injury occurs when the body is unable to handle the workload to which it has adapted due to mechanical fatigue. Bones, for example, get weaker if excessive force is exerted on the body during this re-adaptation phase. Stress fractures and other overuse injuries are likely to occur. Athletes could prevent many overuse injuries from occurring by increasing flexibility, as well as developing adequate strength, power and endurance in all muscle groups.

Injury Type	Causes	Treatment
Bleeding	Bleeding occurs when the skin and deeper tissues are cut, punctured or scraped.	Clean the wound, compression, elevation
Abrasion	This is the rubbing or scraping off of the skin.	Clean and dress wound to prevent infection.
Contusion	A contusion occurs when tissues have been injured, usually as a result of direct trauma, without any breakage of the skin.	Control pain, bleeding and inflammation, keep the muscle in a gentle stretch position and apply the PRICE principles.
Dislocation	A fall or a blow to the body causing the displacement of a bone from a joint.	Medicine reduces the pain and helps relax muscles. Surgery is required in many cases.
Fracture	This happens when a bone is hit, compressed or twisted, resulting from a break.	It depends on the fracture type. If the bone is lined up correctly, it can be protected in a cast. Surgery is sometimes needed to realign the bone fragments with screws, nails, etc.
Pulled / strained muscle	This happens when a muscle is forcefully or excessively shortened or stretched and becomes strained or “pulled”.	Apply PRICE principles. Gradual return to exercise is essential.
Sprain	A sprain is a stretching or tearing injury to a ligament caused by compression, twisting or torsion.	Apply PRICE principles. More severe cases (complete tears) may need surgery.
Heat and cold injuries	Caused by over-exposure to extreme hot or cold conditions while taking part in physical activities.	Take all prescribed medicine. Do not expose affected area to adverse conditions until told to do so by a doctor.
Overuse injuries	Overuse injuries refer to specific injuries sustained from a repetitive action.	Rest, take medicine and do rehabilitation exercises. A gradual return to exercise is advised.

Table 6.2 The main causes and treatments of common sports injuries

C. Treatment

General principles of first aid - It is of paramount importance that every sports injury should be treated as soon as possible, regardless of how minor it seems to be. Attention should be paid to the safety of environment. The provision of adequate first aid supplies such as bandages, gauzes, sterile pads, tape, etc is important. Students will often find themselves in accidents during excursions and outdoor recreation activities. When immediate medical care is not available for the accidents outside school, apply one's knowledge and skills to provide first aid to the injured before the arrival of the medical assistance to prevent wound deterioration.

i) PRICE principles *(See Fig. 6.5 & Fig 6.6)*

- **Protection –** It aims to protect the injured from further injury by preventing him/her from being moved and keeping other athletes and hazards away from him/her.

- **Rest -** Any injured limb should be immobilised either by applying a splint or stabilisers. Any return to exercise should be slow and gradual if the injured is able to move the affected area without pain.

- **Ice -** Pain and swelling caused by bleeding and fluid loss can be minimised by the application of ice during the first 72 hours after the occurrence of an injury. This can be applied in the form of an ice-pack, gel, ice-water, etc. and should not be used for longer than 10 to 20 minutes in any one hour.

- **Compression -** This helps control initial bleeding and reduce residual swelling. This is very useful when applied to the injured limbs, especially the feet, ankles, knees, thighs, hands or elbows. The compression commonly comes in the form of an elastic wrap.

- **Elevation -** The elevation of an injured limb above the level of the heart can help minimise initial tissue bleeding when it is used in conjunction with ice and compression.

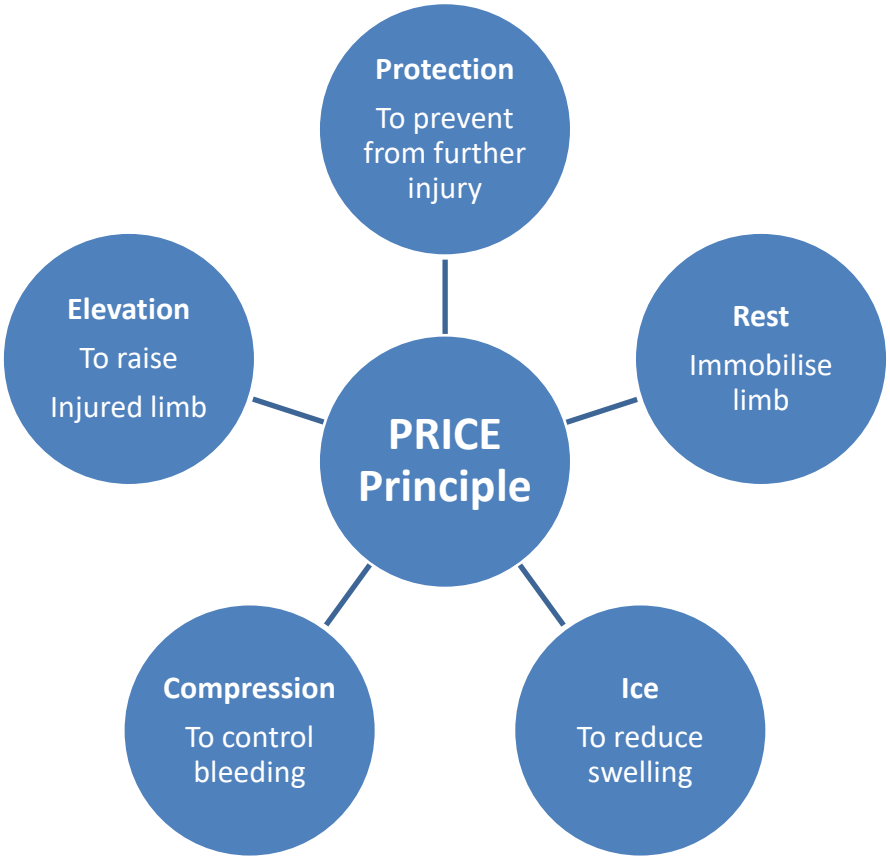


Fig. 6.5 The basics of the PRICE Principles

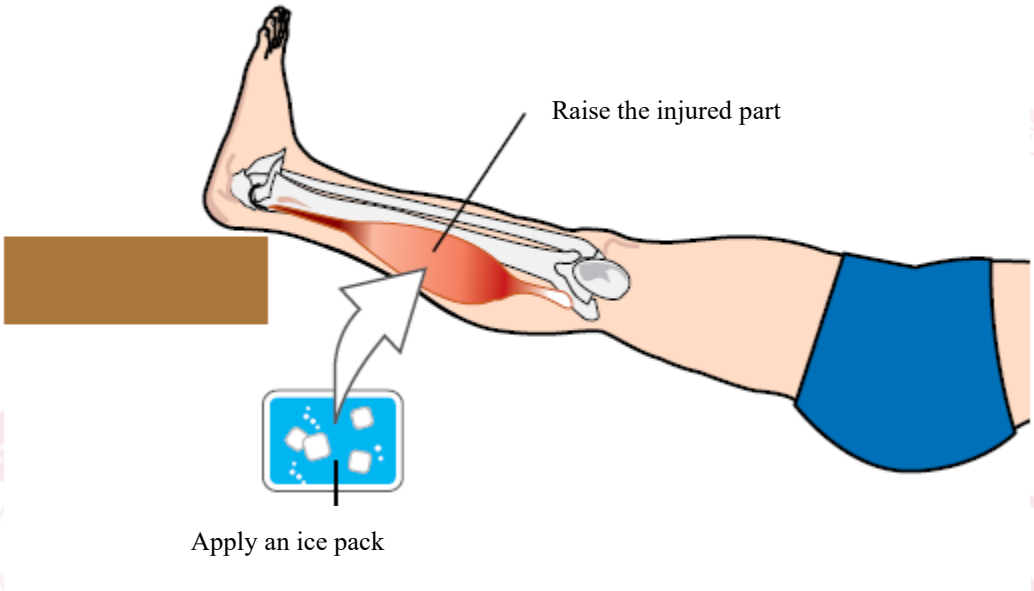


Fig. 6.6 Application of the PRICE Principles to a calf injury

ii) Cardiopulmonary resuscitation (CPR)

It is an emergency first aid procedure for a victim during cardiac arrest. It can be performed by trained personnel and is normally conducted on a non-breathing unconscious person. CPR consists of chest compressions and rescue breaths (i.e. artificial blood circulation and lung ventilation) and is intended to maintain a flow of oxygenated blood to the brain and the heart. Therefore, successful CPR aims to sustain the life of the injured, prevent permanent brain damage, and offer the injured a glimmer of hope to survive *(See Fig. 6.7)*.

Fig. 6.7 CPR helps to maintain a flow of oxygenated blood to the brain

iii) Automatic External Defibrillator (AED)

The Automatic External Defibrillator (AED) automatically detects the patient's heart rhythm and analyses whether the patient can be treated with an electric shock. When the patient suffers from Ventricular Fibrillation or Ventricular Tachycardia, the AED will apply an electric shock to the patient and the heartbeat will be restored.

Fig. 6.8 Automatic External Defibrillator (AED)

D. Prevention of sports injuries

i) Risk assessment – There should be careful consideration of the potential risks before taking part in physical activities, including environmental risks, player-related risks and sport-related risks. In addition, it would be wise to note the following:

- "**Physical Activity Readiness Questionnaire**" - It is commonly referred to as PAR-Q, a questionnaire developed by the Canadian Society for Exercise Physiology to help the general public to decide whether or not they should check with their doctors before participation in physical activities. The PAR-Q contains seven questions, mainly on the cardiovascular and musculoskeletal systems. If the answer to one or more of the questions is "Yes", it is recommended that a doctor should be consulted before an individual participates in physical activities. The PAR-Q has been widely used in Europe and America and is becoming common in Hong Kong as well. At present, the Leisure and Cultural Services Department requires completion of the PAR-Q by those who wish to enrol as participants in physical activities.

- **Qualifications of activity coaches / managers** – The activities that are led by unqualified personnel pose potentially higher risk to participants. This is why the Education Bureau recommends that teachers without proper training in the teaching of physical education should not be assigned to teach the subject. By the same token, all sports coaches hired by schools and the Leisure and Cultural Services Department must hold a "Level 1 or above" coaching certificate issued by a relevant national sports association in the activities they coach.

- **Equipment and facilities** – Using substandard equipment or facilities will definitely increase the risk involved in physical activities. For example, nets are installed at some public beaches managed by the Leisure and Cultural Services Department to guard against sharks, people who go swimming at these beaches carries a lower risk.

- **Potentially dangerous activities** – We need to consider whether or not an activity may bring about serious or fatal injuries. In general, activities that pose extremely high challenges to one's physical fitness, involve frequent collisions (with objects or other people), are adventurous in nature or conducted in water etc. are potentially more dangerous. We must carefully assess our physical and psychological state as well as our skill and knowledge levels, when considering whether or not to take part in such activities.

ii) Safety measures – We should note the following when participating in physical activities:

- Maintain a high level of awareness of preventing sports injuries and strive to ensure our own safety and that of other people.
- Plan for slow and gradual progress; learn the correct techniques; have sufficient rest; and strengthen the injury-prone or relatively weak body parts.
- Dress appropriately; tie up long hair and trim fingernails; if we need to wear spectacles during physical activities, we must secure the spectacles which should be made of non-breakable materials; and do not wear jewellery or watches during activities.
- Thoroughly "warm up" before engaging in physical activities; do not engage in activities that are beyond our physical capabilities; pay attention to our physical condition; and report any symptom of illness and seek help as soon as possible.
- Look for safe venues with adequate space for physical activities. Protective materials should be installed over glass windows and doors, lights, pillars, fans, sharp edges, etc. that are in close vicinity to the activity area. Be aware of the potential hazards of the activities and the environment and do not use those facilities which do not meet the safety requirements.
- Move and handle the equipment in the proper manner; check the environment and equipment carefully to make sure that they are safe for use and report any defect immediately.
- Pay attention to weather reports to determine whether activities should be carried out as scheduled.
    - ✧ **Air Quality Health Index (AQHI)** – When the “Health Risk Category” (HRC) reaches “High” level (AQHI: Band 7), people who are sensitive to air pollution (e.g. children, the elderly, people with heart or respiratory illnesses) are advised to reduce outdoor physical exertion, and to reduce the time of their stay outdoors, especially in areas with heavy traffic. When HRC reaches “Very High” level (AQHI: Band 8-10), the general public is advised to reduce outdoor physical exertion, and to reduce the time of their stay outdoors, especially in areas with heavy traffic. When the HRC reaches “Serious” level (AQHI: Band 10+), the general public is advised to reduce to the minimum outdoor physical exertion, and to reduce to the minimum the time of their stay outdoors, especially in areas with heavy traffic.

For more details, please visit the "Health Advice page" of the AQHI at Environmental Protection Department
http://www.aqhi.gov.hk/en/health-advice/sub-health-advice.html.

- ✧ **Ultraviolet radiation (UV)** - When the UV index is 6 or above, take appropriate measures to protect the skin, such as applying sunscreen, wearing a wide-brimmed hat, UV-blocking sunglasses and long-sleeved loose clothing.
- ✧ **Hot and humid conditions** - One should acclimatise oneself to hot and humid conditions gradually; wear light clothing made of cotton or porous material; drink cool plain water whenever necessary to replenish fluid loss; arrange short rests at frequent intervals for prolonged physical activities; and be aware of the symptoms of heat-related illnesses and take any necessary action such as resting in a cool shaded place, drinking water and seeking medical assistance if needed.

iii) Warm-up and cool-down – Warm-up and cool-down exercises help individuals to adjust the cardiovascular, respiratory and nervous systems to adapt to the changing demands of the forthcoming strenuous exercise and the ensuing recovery phase, from rest to exercise and from exercise to rest respectively.

- The effects of warm-up:
  - Increases the heart rate and causes capillaries to dilate, which enables oxygen in the blood to travel faster, implying that the muscles become fatigued more slowly.
  - Increases the secretion of synovial fluid that lubricates the joints and this reduces their friction.
  - Decreases the viscosity within the muscles; this lets the muscle fibres have greater extensibility and elasticity as well as stronger contraction.

- The effects of cool-down:
  - Helps remove lactic acid which can cause cramps and stiffness.
  - Allows the heart rate to return to the resting rate.
  -

- Recommended activities for warm-up and cool-down:
  - Depending on the exercise intensity, participants' age and risk for heart disease, the duration of warm-up and cool-down may range from 5 to 15 minutes.
  - General warm-up includes light activities such as jogging, joint mobility exercise, static stretching, etc.
  - Specific warm-up involves movements similar to those used in the ensuing exercise, including drills and games that are performed at low to moderate intensity, i.e., not greater than 50% of the full workload.
  - Cool-down exercises are similar to the warm-up exercises.

Examples of Enquiry Activities

Themes		Activities
1	Prevention of sports injuries	Information collection and analysis： ● Students in groups of 3 to 5 discuss the following issues： - Common sports injuries *(See additional information(1))* - Protective devices *(See additional information(2))* - Safety measures at sports venues *(See additional information(3))* - Warm-up and cool-down activities *(See additional information(4))* ● Each group should collate their results and make a presentation to other classmates Reflections： ● Students should write a short essay (in about 500 words) about their reflections on their personal sports injuries and set related safety guidelines for of the related sport.
2	First aid practice	Practicum： ● In groups of 3, students role play sports injuries and first aid. For every practice, one student is the patient, one is the first aider and the last one is the observer *(See additional information(5)).*

Additional Information on Enquiry Activities (1):

Analysis of injuries from different sport

Objective: To encourage students to think critically about sports injuries and analyse their causes.

Description: The teacher plays video clips of local or overseas sports events. The students suggest the possible types of injuries that the participants may sustain taking into consideration the nature of the sport, physical status of the participants, environmental factors, protective clothing, etc. The teacher provides feedback and supplements students' answers.

Implementation:

- In a classroom setting, the teacher plays video clips of sport such as American football, hockey, tennis, alpine skiing, boxing, etc. These clips can be easily downloaded from websites.
- Class discussion should take place after each clip, focusing on the potential of sustaining an injury whilst participating in the sport.
- Particular reference should be made to the types and potential causes of the injuries. The following table may be useful for the discussion:

Injuries from different sport

Sport	Potential injuries	Causes of injuries
Football	Fracture of leg	● the risk of injury is higher for contact sport ● lack of protection ● other reasons
Marathon	Strained muscles	● overuse of muscles

Additional information on Enquiry Activities (2):

Analysis of protective devices used in sport

Objective: To raise students' awareness of safety issues in sport.

Description: Each student points out three different sports events and the related protective devices. Students should also explain in detail the function of each protective device and the main type / types of injury / injuries involved in injury prevention.

Implementation:

- This activity can be carried out in class or as a home assignment.
- Students discuss the above topics after learning the topics on sports injury prevention.
- Students are encouraged to think from different angles to identify typical activities, and to give examples of devices for protecting various body parts (such as the upper and lower limbs, lumbar and cranial regions).

The following worksheet may be used for this activity:

Protective devices used in physical activities

Physical Activities	Protective Devices	Purpose(s)
1. Swimming	Goggles	Protect the eyes from harmful chemicals, bacteria or micro-organisms in the water.
2.		
3.		
4.		

Additional information on Enquiry Activities (3):

Analysis of safety measures at sports venues

Objective: To enable students to understand how safety measures can reduce the risk of injury.

Description: The teacher takes students to tour around sports / recreational area of the school or the community. Then, the students point out the functions of all the safety facilities in the venue. Particular attention is to be paid to the environmental factors, facilities, equipment and protective devices.

Implementation:

- The teacher may use a direct instruction approach to raise students' awareness of safety at a sports venue.
- Then the teacher takes the class to tour around the sports grounds and encourages them to locate various safety facilities.
- The teacher gives assistance when necessary and encourages students to discuss the functions of the safety facilities.

The following worksheet may be used during the activity:

Safety facilities of sports venues

Venue 1: Basketball Court

Safety facilities	Purposes

Venue 2: Covered playground

Safety facilities	Purposes

Venue 3: _____

Safety facilities	Purposes

Additional information on Enquiry Activities (4): Warm-up / cool-down exercises

Objective: To acquaint students with the conduct of warm-up and cool-down exercises and their benefits.

Description: The teacher leads the class to do warm-up and cool-down exercises, highlighting the importance of these exercises to injury prevention.

Implementation:

- Prior to the activity, the teacher explains the reasons behind and the benefits of warm-up and cool-down.
- The teacher answers questions from students.

The following table may be used in the activity:

Warm-up / cool-down exercises and injury prevention

	Warm-up exercises	**Cool-down exercises**
How can sports injuries be prevented by these exercises?		
Benefits		
Examples		
Key factors of injury prevention		

Additional information on Enquiry Activities (5):

Role-play on first aid

Objective: To provide students with the learning experience of dealing with first aid for themselves or other people before medical assistance arrives.

Description: In pairs, students do the role plays of sports injuries in real-life situations. The teacher assigns the students different roles in the role play. One student will be the injured who needs first aid treatment. The other will apply first aid treatment to the injured until medical support is available.

Implementation:

- The role play may take place in a classroom or other suitable venues.
- The teacher groups students into pairs and gives instructions for different types of injury treatment.
- The teacher provides feedback to the role-plays. While one pair of students is engaging in the role-play, the rest of the class observe and comment on the correctness of the first aid procedure.

The following worksheet may be used for observation:

Role-play of first aid

Situation: A student fell from a bicycle during a road race. He is in great pain with a shoulder injury and one of his arms is bleeding seriously.

Treatments:

Injured body parts	Treatment procedures	Causes
Arm bleeding seriously		

References for Teachers

Anderson, M.K. (2003). *Fundamentals of sports injury management.* Philadelphia: Lippincott Williams & Wilkins.

Bird, S., Neil, B., & Newton, P. (Eds.). (1997). *Sports injuries: Causes, diagnosis, treatment and prevention.* Cheltenham, UK: Stanley Thornes.

Crossman, J. (2001). *Coping with sports injuries: Psychological strategies for rehabilitation.* NY: Oxford University Press.

FU, F. (2009). *Sport for all and health.* HK: Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, HKBU.

Hyde, T.E., & Gengenbach, M.S. (2007). *Conservative management of sports injuries.* Sudbury, MA: Jones and Bartlett.

Maffulli, N., Chan, K.M., Macdonald, R., Malina, R.M., & Parker, T. (Eds). (2001). *Sports Medicine for specific ages and abilities.* NY: Churchill Livingstone.

Peterson, L., & Renstrom, P. (2001). *Sports injuries: Their prevention and treatment* (3rd ed.). London: Martin Dunitz.

Sherry, E., & Wilson, S.F. (Eds.). (1998). *Oxford handbook of sports medicine.* Oxford: Oxford University Press.

Shultz, S.J., Houglum, P.A., & Perrin, D.H. (2000). *Assessment of athletic injuries.* Champaign, IL: Human Kinetics.

伍林（譯）(1996)《運動創傷的防治》。台北：台灣商務印書館。

曲綿域、田得祥 (1999)《運動創傷檢查法》。北京：北京醫科大學出版社。

陳志華 (2003)《骨科運動醫學》。台北：力大中文圖書。

陳啟明（主編）(1995)《運動醫學與科學》。香港：中文大學出版社。

黃雅君、王香生(2006)〈循證醫學在運動醫學與科學研究中的應用與啟示〉,《中國運動醫學雜誌》，25(5)，616-619。

盧亮宇、王予杉 (2007) 〈膝骨關節炎疼痛機制及治療研究現狀〉,《中國運動醫學雜誌》 ，26(4)，512-516。

References for Students

Bird, S., Neil, B. & Newton, P. (Eds.). (1997). *Sports injuries: Causes, diagnosis, treatment and prevention.* Cheltenham, UK: Stanley Thornes.

Flegel, M. J. (1997). *Sport first aid. Champaign*, IL: Human Kinetics.

FU, F. (2009). *Sport for all and health.* HK: Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, HKBU.

Garrick, J.G., & Radetsky, P. (2000). *Anybody's sports medicine book: The complete guide to quick recovery from injuries*. Berkeley, CA: Ten Speed Press.

Roberts, W.O. (Ed.). (2004). *Bull's handbook of sports injuries* (2nd ed.). NY: McGraw-Hill.

伍林 (譯) (1996)《運動創傷的防治》。台北市：台灣商務印書館。

陳志華 (2003)《骨科運動醫學》。台北：力大中文圖書。

陳啓明 (主編) (1995)《運動醫學與科學》。香港：中文大學出版社。

Related Websites

1. American College of Sports Medicine (ACSM)
   https://www.acsm.org

2. Environmental Protection Department
   - Health Advice
     https://www.aqhi.gov.hk/en/health-advice/sub-health-advice.html

3. HKPE.NET (in Chinese only)
   http://www.hkpe.net/hkdsepe/
   - Medical Aspects of Running (in Chinese only)
     http://www.tswong.net/hkpe/running/medical_aspects.htm

4. Hong Kong Observatory
   - Educational Resources
     http://www.hko.gov.hk/en/education/edu.htm

5. Hong Kong Sports Institute
   https://www.hksi.org.hk/
   - Education Pamphlets - Sports Medicine Education Series
     https://www.hksi.org.hk/news-publications/scientific-publications/education-pamphlets/sports-medicine-education-series/ankle-sprain/

6. The Government of HKSAR Auxiliary Medical Service
   https://www.ams.gov.hk/en/
   - First Aid Topics and Knowledge
     https://www.ams.gov.hk/en/resource-centre/firstaid.html

7. MedlinePlus
   https://medlineplus.gov/
   - Sports Injuries
     https://medlineplus.gov/sportsinjuries.html
   - Sports Safety
     https://medlineplus.gov/sportssafety.html

8. National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
   https://www.niams.nih.gov
   - Sport Injuries
     https://www.niams.nih.gov/health-topics/sports-injuries

9. The British Association of Sport and Exercise Sciences (BASES)
   https://www.bases.org.uk

10. The Virtual Sports Injury Clinic
    https://www.sportsinjuryclinic.net/