

AS LEVEL

FACT FILE

Sports Science

Subject content link:

Unit AS 1 : Fitness and Training for Sport

- First Aid

FACT FILE

sports
science
and the active leisure industry

Unit AS 1 : Fitness and Training for Sport

Learning Outcomes

Students should be able to:

- Demonstrate knowledge and understanding of first aid including injuries such as abrasions, Blisters, concussion, cramp, fractures, ligament injuries, shin splints, sprains and muscle tears and;
- identify the symptoms, explain the causes and describe the most appropriate action to take as a first aider for common injuries and medical emergencies.

Course Content

"First Aid is the help given to an athlete who has been hurt or taken ill".

First Aid

A knowledge of First Aid can help the individual recognise dangers and help in an emergency; such as if an athlete has had an accident, has become ill or a 999 call is required.

The Aims of First Aid

P Preserve Life

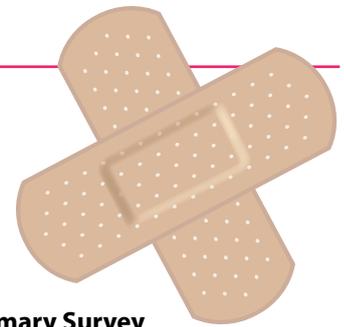
Not only the casualty's life, but your own life too.

P Prevent the situation from worsening

The skilled first aider must take action to prevent the whole situation from becoming worse (e.g. removing dangers such as traffic or fumes) as well as acting to prevent the casualty's condition from deteriorating.

P Promote recovery

The actions of a first aider should, after preventing the situation from becoming worse, help the casualty to recover from their illness or injury.



Priorities of Treatment – Primary Survey

Every one needs a constant supply of oxygen to survive. If the oxygen doesn't get through, brain cells will start to die within 3 to 4 minutes. The priorities of treatment are therefore aimed at ensuring oxygen gets into the blood, ensuring that the blood is circulating around the body and preventing the loss of that blood.

The Primary survey is a fast and systematic way to find and treat any life-threatening conditions in a priority order.

- D** Danger
- R** Response
- A** Airway
- B** Breathing
- C** Circulation

When life threatening circulation problems have been ruled out or treated, the Primary Survey is complete. It is advisable to perform a Secondary Survey to look for other conditions and to ask the casualty questions to get information about their potential injuries.

Secondary Survey	
History	What happened? What is the casualty's medical history?
Signs	Look for swelling, deformity, pale skin
Symptoms	If the casualty is conscious ask questions to get information.

Important Questions to ask the Casualty	
S	Symptoms: how do they feel?
A	Allergies: do they have any?
M	Medication: are they on any?
P	Past medical history?
L	Last meal: when and what?
E	Event history: what happened?

Injuries in sport occur for a variety of reasons, for example, an accident, not warming up properly before exercising, using inadequate equipment, poor technique or the athlete overtraining. For many athletes sports injuries are unfortunately inevitable. However, rest and recovery should be planned into the training and competitive programme as a preventative measure.

Sports injuries are:

- most commonly associated with the musculo-skeletal system (muscle, bones, joints, ligaments, tendons).
- Commonly classified as acute (injuries that happen in a moment) or chronic (injuries characterised by a slow, sustained development of symptoms, arising to a painful inflammatory condition).
- Mild, moderate or severe.
- characterised by pain, swelling, tenderness, weaknesses and the inability to use or place weight on the injured area.

The exact nature of injuries evident in competitive sports arise from two main sources:

INTRINSIC FACTORS	EXTRINSIC FACTORS
Age	Training method (eg poor technique)
Gender	Training volume/ overtraining
Body weight and composition	Inappropriate or unfamiliar playing surfaces
Muscle strengths & weaknesses, general fitness	Inappropriate equipment or malfunction
Poor flexibility	Use of inappropriate clothing/footwear
Orthopaedic and skeletal features	Environmental conditions

To avoid injury, the coach needs to plan training sessions which take into account the intrinsic factors of the performer, as well as the extrinsic factors. The key element in contributing to sporting injury is the lack of preparation on behalf of both the coach and the athlete. Effective preparation is essential for the avoidance of injury in sport.

All sports carry an element of risk of injury; it is the role of the sports coach to:

- assess risk
- protect athletes from injury and reduce the likelihood of risk
- deal with injuries and accidents when they occur.

Types of Injury and their Treatment

First aid is important to treat and help heal both minor and major injuries.

Minor Injuries



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Abrasions – abrasions are wounds caused by superficial damage to the skin, no deeper than the epidermis. An abrasion is minor injury that can happen when an athlete falls and the top layers of skin are damaged. They can be easily treated by cleaning with antiseptic and rinsed under running water. The cut should then be covered with a non-stick sterile dressing. If abrasions are not treated they can become infected e.g. if a basketball player has an abrasion on their hand and it becomes infected they might not be able to hold the ball properly indicating that an untreated abrasion can lead to poor performance.

References:

www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Skin_cuts_and_abrasions

Cuts – cuts occur when the skin is punctured or broken through contact with another person or a sharp / hard object or surface. These are a common type of injury and in most cases do not pose a threat to health.

Cuts can be different sizes and depths and can bleed profusely. Treatment for external bleeding:

- S** sit or lay place casualty in a position appropriate to the location of the wound and the extent of the bleeding.
- E** examine look for foreign objects and note how the wound is bleeding.
- E** elevate ensure the wound is above the level of the heart, using gravity to reduce the blood flow to the injury.
- P** pressure apply direct or indirect pressure to stem bleeding.



Serious cuts may require stitching or other treatment to hold the skin on either side of the wound together and to allow it to heal. Such wounds need to be carefully cleaned to prevent any possibility of infection.

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Blisters – a blister is a small pocket of fluid that forms in the upper layers of the skin which forms as a result of the outer layer becoming damaged. The fluid gathers under

the damaged skin to allow the tissue underneath to heal. Blisters are caused by friction, heat or medical conditions. Fluid blisters do not require any treatment apart from being covered with a plaster to prevent infection. Blood blisters are best left to heal naturally although if burst, they should be cleaned out, kept dry and covered with a sterile dressing to prevent infection. Painful blood blisters should have an ice pack applied to reduce pain. Blisters can prevent an athlete from performing at their maximum potential e.g. if an Irish dancer had blisters on their feet and they danced without them being treated, the dancer may not perform to their potential.

Reference:

www.nhs.uk/Conditions/Blisters/Pages/Treatment.as



Bruising – A bruise or contusion is typically a result of an injury to the blood vessels in the skin. In everyday activities, impacts can cause capillaries to break and the escaping blood gathers in the soft tissue under the skin. This often leads to bluish or purple discolouration of the skin at and below the site of injury. Disease e.g. scurvy, medication e.g. aspirin and aging can

also increase the likelihood of bruising. The injured party should begin PRICE treatment immediately. Delaying this treatment could mean more pain and swelling and a longer recovery period.

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Fitness and Training for Sport

Muscle Cramps and Spasms – a muscle spasm is caused by a muscle contracting too hard and if this spasm does



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not relax it becomes a muscle cramp. Muscles which cramp most frequently are the calf (gastrocnemius) and hamstrings. These can last seconds or even minutes and can leave muscle tissue feeling very tender. Causes of cramp are varied and include poor hydration, repeated bouts of high intensity activity leading to a build-up of lactic acid or certain forms of medication. Relief of symptoms can be achieved by stretching, massaging or gently exercising the muscles. If an athlete is competing and they suffer a cramp, it may stop them from continuing and may affect their performance and the final result.

Reference:

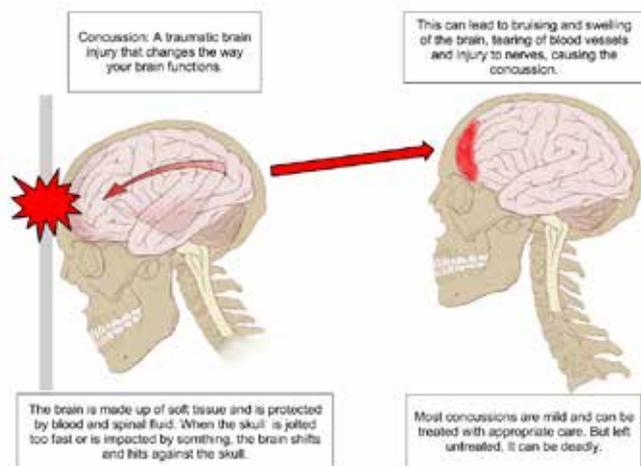
www.patient.co.uk/health/cramps-in-the-leg

Major Injuries

Concussion: Concussion is a sudden but short lived brain injury. It results from a blow to the head where the forces involved are transmitted to the brain; resulting in a temporary impairment of brain function.

Concussion is a potentially very serious injury that may affect the athletes playing career and repeated concussions may cause permanent brain damage. The protocol for dealing with concussion and some of the symptoms of concussion are outlined below.

Treatment Protocol for Concussion Injuries	
STOP	training or playing immediately
INFORM	your team medic, coach, parent, teammates
REST	until your symptoms of concussion have resolved completely
RETURN	when you have been cleared to do so by a medical practitioner as per NGB guidelines



http://upload.wikimedia.org/wikipedia/commons/6/67/Concussion_Anatomy.png

VISIBLE SIGNS OF CONCUSSION:	SYMPTOMS OF SUSPECTED CONCUSSION
Loss of consciousness	Loss of consciousness
Lying motionless on ground or slow to get up	Nausea, vomiting or drowsiness
Unsteady on feet or balance problems.	Headache, dizziness and confusion
Dazed, blank or vacant look	Amnesia or difficulty remembering
Confused/Not aware of plays or events	Blurred vision or sensitivity to light
Clutching head	Feeling 'not right'

See the following for further information on the recognition and treatment of concussion: www.irishrugby.ie/medical, www.irbplayerwelfare.com or <http://www.gaa.ie/medical-and-player-welfare/resources/>

Fractures and Dislocations

Fracture – a fracture is a break in a bone resulting from sudden impacts, collisions or stress.

Dislocation – a dislocation is when the bones in a joint become separated, usually caused by sudden impacts such as in a fall or collision.



Fracture of Radius and Ulna



Dislocation of the Ankle

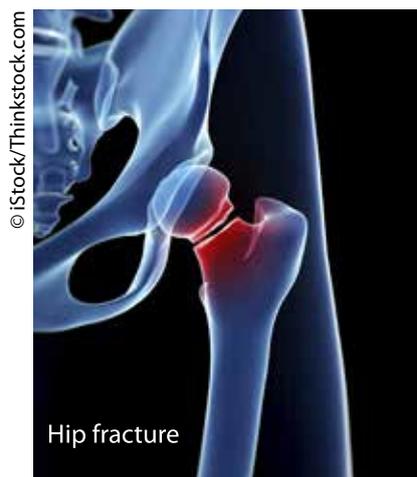
Symptoms of fractures and dislocations.

- Pain
- Loss of power
- Unnatural movement
- Swelling or bruising
- Deformity
- Irregularity
- Crepitus
- Tenderness

Treatment of fractures and dislocations.

- Immobilisation
- X-ray
- Manipulation to reposition bone(s)
- Surgery
- Pins and/or plates for support
- Plaster cast or splints
- Pain relief
- Physiotherapy

Example: Hip Fracture - *"a hip fracture is a crack in the top of the thigh bone close to the hip joint."*



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A fracture can be a hairline crack in a bone, a partial fracture or a complete break.

The main symptom of a fracture is pain. This can be quite severe and may make the athlete feel sick or light-headed. The pain would usually worsen if the athlete tried to move the

affected area, or weight-bear.

Possible signs and symptoms of a fracture	
Pain	At the site of the fracture. Strong pain killers, nerve damage or alcohol may mask the pain.
Loss of Power	e.g not being able to lift anything with a fractured arm
Unnatural movement	This type of fracture is classed as 'unstable' and care should be taken to prevent the fracture from moving.
Swelling or bruising	Around the site of the fracture
Deformity	e.g. If a leg is bent in the wrong place, it is broken!
Irregularity	Lumps or depressions along the surface of the bone, where the broken ends of the bone overlap
Crepitus	The feeling and sound of bone grating on bone, occurs when the broken ends rub on each other
Tenderness	At the site of the injury

Reference:

www.nhs.uk/Conditions/hip-fracture/Pages/introduction.aspx
www.eorthopod.com/sites/default/files/images/hip_fracture_intro01.jpg

Sprains and Strains

A sprain is defined as an injury to a ligament at a joint (joint and muscle injury). A sprain is a stretch and/or tear to a ligament and is often caused by a trauma that move a joint out of position, over-stretching or rupturing the supporting ligaments. Sprains often affect the ankles, knees or wrists. An athlete could sprain an ankle when changing direction quickly or landing badly. These injuries are often recognised by the onset of immediate localised swelling, pain, and/or discolouration.

A strain is an injury to either a muscle or a tendon generally caused by overuse, force or stretching. Depending on the severity of the injury, a strain may be a simple overstretching of the muscle or tendon, or it can result in a partial or complete tear. An athlete could have a pulled hamstring, they could experience a sharp pain, swelling, bruising or muscle spasm.

Muscle strains can be classified into three categories.

First-degree strains commonly exhibit the following symptoms:

- few muscle fibres are torn
- mild pain
- little swelling
- some muscle stiffness

second-degree strains commonly exhibit the following symptoms:

- minimal to moderate tearing of the muscle fibres
- moderate to severe pain
- swelling and stiffness

third-degree strains commonly exhibit the following symptoms:

- total rupture of the muscle
- severe pain
- severe swelling

Contact sports e.g. football, hockey, boxing and wrestling put athletes at a higher risk for strains. Strains are also common overuse injuries seen in long distance running, swimming and other endurance sports.

Treatment of sprains and strains

- P** protection the athlete may be splinted taped or braced to prevent further injury.
- R** rest from all activities that cause pain or limping, rest the injury.
- I** ice ice the affected area as soon as possible, e.g. 15-20 minutes, 3-5 times/day.
- C** compression apply a firm (not constrictive) bandage to the injured area.
- E** elevation elevate the injury, this will help to reduce swelling.

Causes of sports injuries

Impact	between participants, this can occur in many sports, ice hockey, Gaelic football, rugby. Such impacts can cause injuries from haematoma and joint sprains.
Playing surfaces	environmental factors such as weather and ground conditions are potential risk factors for injuries, including the hardness of the ground e.g. the Grand Slam tennis tournaments are played on hard courts (Australian Open, US Open), clay (Roland Garros) and grass (Wimbledon). On clay there is a higher incidence of muscle strains/spasms. Modern advances in turf technology have helped to reduce the incidents of knee and ankle injuries.
Equipment and Rules	equipment used in sport can cause injury, especially if it is used incorrectly. Both equipment and rules of the game should be amended if they are in any way likely to contribute to causing an injury. Governing bodies have made changes to protect the safety of players.
Repetitive Strain	repeated low level impacts can cause chronic injury if long-term prevention measures are not put in place. E.g. strains to gastrocnemius or soleus for sprinters or high jumpers.
Excess movement joint strain	single actions to various joints where the normal range of movement is exceeded. E.g. back or knee injuries caused by a single deep squat.
Accident	This can happen at any time, in any sporting situation. E.g. tibia break occurring during a rugby tackle

Common Sporting Injuries

5 Most Frequent Injury Types / Locations in Selected Sports		
Sport	Injury	Injury Rate per 1000 Hours Playing Time
Rugby	Concussion Thigh haematoma Hamstring strain Calf muscle injury Knee - MCL injury	69
Gaelic Football	Hamstring strain Knee Ankle Groin / Pelvis Trunk	62
Football	Hamstring strain Ankle sprain Knee cartilage tear Hernia Cruciate ligament	35
Swimming	Shoulder tendonitis Medial ligament Lower back Cramp	
Golf	Back pain Elbow tendonitis Rotator cuff strain Carpal nerves Knee pain	

Sport Specific Example: Running

Common injuries that affect runner include:

- Runners knee
- Achilles Tendonitis
- Hamstring injuries
- Blisters
- Shin splint
- Cramps

Runner's knee is also known as Patellofemoral Pain Syndrome (PFPS) and symptoms include pain behind the knee cap and towards the back of the knee. Cause include misalignment of the knee cap caused by weak quadriceps. Weak hamstring and calf muscles can also cause problems at the knee. Overuse can lead to worn cartilage in the knee joint reducing shock absorption and high-arched feet provide less cushioning, and flat feet or knees that turn in or out excessively can pull the patella sideways. Running on

softer ground, strengthening leg muscles and orthotics can all have a positive effect on this condition.

Achilles Tendonitis is an inflammation of the Achilles tendon. This is the large tendon that attaches the gastrocnemius to the back of the heel. Achilles tendonitis causes pain and stiffness in the area of the tendon, especially in the morning and with activity. It is usually caused by repetitive stress to the tendon.

Stress fracture is a small crack in a bone that causes pain and discomfort. It typically affects runners in the shin and feet. It is often caused by the athlete working too hard before the body gets used to the new activity. Pain gets worse with activity and improves with rest. Rest is important, as continued stress on the bone can lead to more serious injury.

Blisters These are fluid-filled sacks on the surface of the skin. They are caused by friction between shoes/socks and skin, heat or medical conditions. Blisters are caused as a result of friction, heat or medical conditions. To help prevent blisters, athletes could, for example, break in new training shoes gradually, wear socks with a double layer, apply petroleum jelly on areas prone to blisters.

Shin splints are caused by strenuous exercise particularly running. This is pain that happens in the front or inside of the lower leg along the tibia. Shin splints are common after the athlete changes the workload, e.g. running longer distances, or increasing the number of days they are running, too quickly.

Plantar fasciitis is an inflammation of the plantar fascia, which is the thick band of tissue in the bottom of the foot that extends from the heel to the toes. Athletes with tight gastrocnemius muscles and a high arch are more prone to plantar fasciitis. Treatment for this should include involve calf stretches, rest and icing the bottom of the foot.



Additional Work/Tasks

1. Research injuries common to a specific sport, discuss your findings with your class.
2. In small groups discuss the types of injuries you or your colleagues have sustained and the treatment that was received while playing different sports.

References:

www.brianmac.co.uk

www.nhs.uk/conditions/sports-injuries

www.sja.org.uk

www.emedicinehealth.com

www.sportsmedicine.about.com

www.rfu.com : professional rugby injury surveillance project.

BTEC National Sport, Development, Coaching and Fitness

Stafford-Brown J, Rea, S. 2010. 2nd Ed.

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