

Para-Rowing Coaching Considerations



Level 1/2



Attitudes are the Real Disability

General Principles

In the main, coaching rowing to individuals with a disability requires many of the same skills as coaching able-bodied rowers. The coach should treat rowers as individuals and understand their differences and abilities, to enable the rower to reach their potential.

Guidelines

- 1) Understand that rowers with a disability are 'people-first' and disabled second
- 2) Obtain knowledge about the nature and degree of disability
- 3) Set realistic goals and objectives based on your knowledge of them as individuals
- 4) Ask the rower for information on what they can do, and ways to adapt activities
- 5) Establish skill progression appropriate to individual's ability
- 6) Do not underestimate the individual's ability by focusing on their disability
- 7) Adopt appropriate coach: rower ratios (likely to be smaller groups)
- 8) Understand environmental factors that may affect rower's ability to perform (i.e. temperature)

Athlete Progression

The progression of the athlete after the initial meeting is the same as anyone new to the sport with the addition of an evaluation with recommendations and methods to maximise the rowing stroke given the particular impairment of the individual. Typically, the coach progresses through the following phases, depending on the needs of the rower and the type of program, which may include all or some of steps listed below.

- 1) Movement/ability analysis – carried out during the initial meeting and review of the impairment
- 2) Introduction to the indoor rowing machine (ergometer) and stroke demonstration, including a tactile demonstration, if needed, in the case of visually impaired athletes.
- 3) Rowing tank or Dock Box
- 4) Rowing stationary on dock – using a rowing rig or shell set up out of the water

- 5) Rowing in the boat with a volunteer or coach – coach to rower ratio 1:1
- 6) Rowing in the boat “on a rope” or tethered to the dock
- 7) Boat with other athlete(s) in a boat – coaching launch supervised

Athlete Involvement – Coaching Tips

FOCUS ON SAFETY – COMFORT – ENCOURAGEMENT – FUN

Rowing is the ideal activity for individuals with a disability, providing social networking opportunities, camaraderie, and competition, as well as improves physical and mental health, improves independence, supports academic achievement, and employment advancement.

It is important to keep the athlete involved with his or her athletic process. Be sure some consideration has been involved with matching the athlete with a volunteer/coach who makes him/her comfortable. Check in with the athlete during their session and encourage the athlete to assist with moving equipment whenever possible.

Para-Rowers should be encouraged to participate as full members (with all rights and privileges) of the organisation and board.

Talk about the athlete’s goals and continue to challenge him/her. Provide technical instruction and be prepared to update goals as the athlete shows improvement. Lastly, hold the athlete accountable to improving and find ways to keep them motivated to move to the next level. Adapt your style of coaching to meet the needs of the rower. Allow for more time and provide more direction.

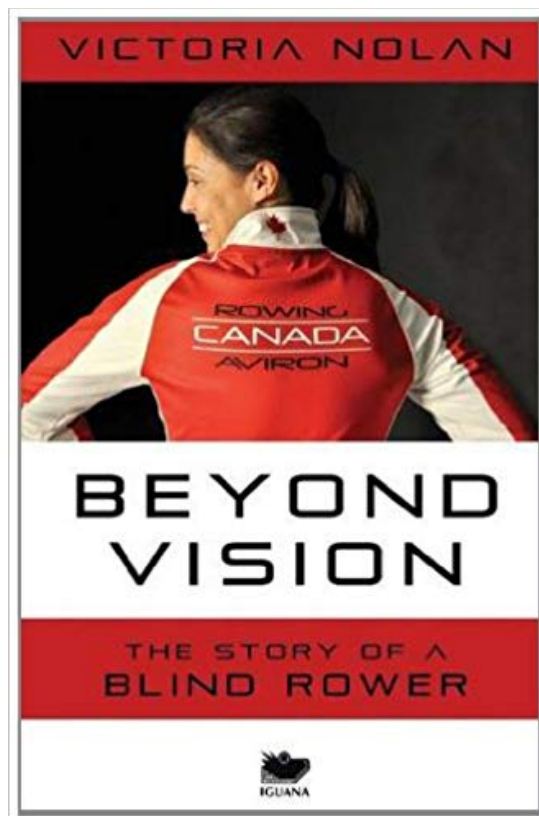
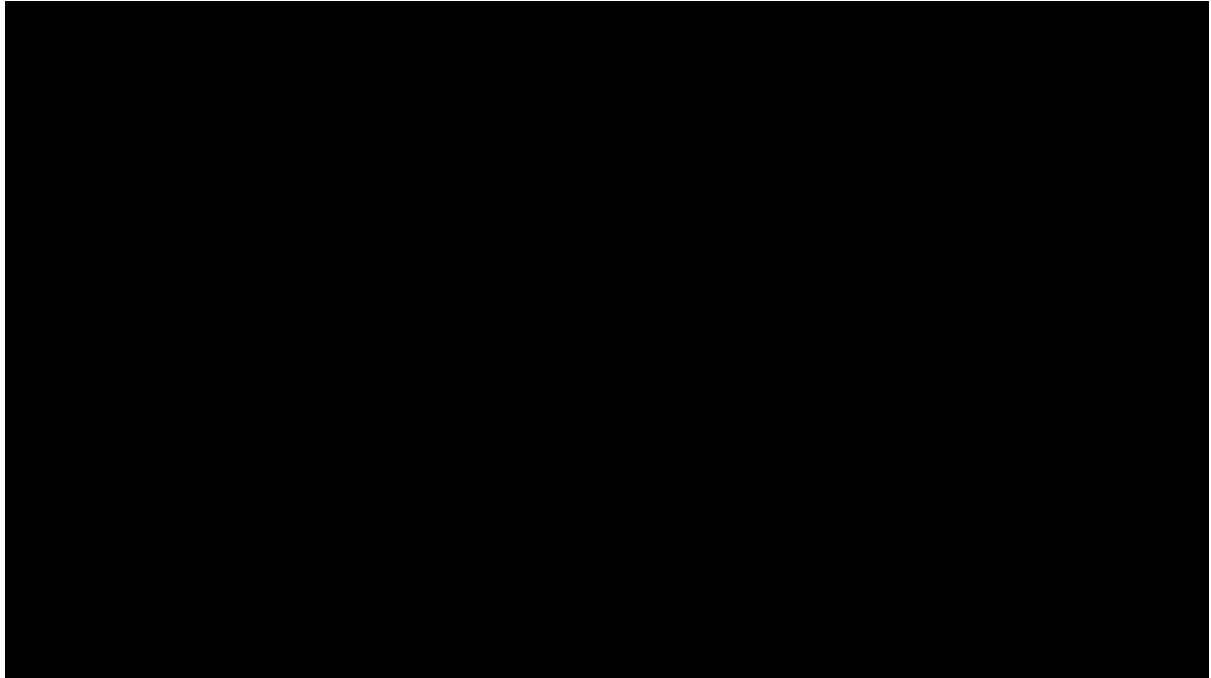
LISTEN MORE AND TALK LESS. Remember, the athlete has been living with His/her disability and is the best resource for working with the disability.

Be open, smile, ask how to help, and show you care.



<http://www.usrowing.org/wp-content/uploads/2016/05/2015-guide-to-adaptive-rowing.pdf>

General Coaching Considerations - Visual Impairment (VIDEO)



Inspiring Super Athlete - Victoria Nolan

Rowing is a sport where someone can take part and compete without major accommodations. In coaching rowers with a visual impairment, there are a few principles that can assist a coach in providing the best possible learning environment.

Motor Sector

Visual impairment can cause certain motor problems such as a difficulty in attitude, integration and body-awareness including balance problems; motor coordination; posture and orientation difficulties.

Apart from the numerous motor and physical qualities that rowing helps to develop in sighted rowers, it is useful to mention that these are also indispensable for the athlete with a visual impairment.

Balance

This is a fundamental element of rowing in a boat (as opposed to land based rowing machines) for an individual with a visual impairment

Exercise

Exactly the same as with the sighted population, improved control over the motor forces, such as strength, speed and flexibility, whilst providing an efficient cardio-vascular form of exercise, which can be used to combat the consequences of visual impairment, which can otherwise include a sedentary existence/lifestyle.

Kinaesthetic Sensation

It can be said that visual impairment does not constitute a serious problem for performing the rowing movement. In practice a sighted rower does not constantly look at his/her blade or crewmembers but relies on an instinctive 'feel' for the boat. An athlete with a visual impairment is therefore not impaired in the discovery of these physical sensations or their refinement.

The Psychological/Social Sector

A disability of any kind can entail isolation and a sedentary existence. Membership of a rowing club provides an opportunity to get out of 'special schools' and other disabling environments to meet other people and measure against them on an equal basis.

As with the sighted population, someone with a visual impairment will learn through their participation in rowing character-building components, friendships and numerous values.

Many of the principles applied when delivering effective coaching will apply to coaching any athlete, and can be summarised as follows:

1. Visually impaired or blind?
2. Begin with an orientation to the rowing environment
3. Use verbal descriptions to supplement demonstrations
4. Integrate those with and without visual impairments into crews
5. Classification
6. Challenge athletes with a VI
7. No two visual Impairments are the same

8. Be innovative
9. Visual Impairment and single sculling

Visually impaired or blind?

It is important to understand that there will be a large range of sight loss amongst participants who are eligible (10% - 100% loss of visual acuity and/or visual fields).

Orientation to the rowing environment

When coaching an athlete with limited or no vision, begin with an orientation to the rowing environment, i.e. ergometer, rowing tank, clubroom, boathouse, pontoon/shoreline. Allow the athlete to become aware of his/her surroundings through exploration with verbal descriptions, noting any potential hazards, such as steps, riggers, and floor obstacles in the boathouse. It is worth remembering that individuals with congenital sight loss are most concerned with what obstacles are within a 0.5m perimeter. This will allow the individual to become as self-sufficient as possible.



Example of a boathouse with potential hazards for a visually impaired rower

Use verbal descriptions to supplement demonstrations

Be as exact and descriptive as possible and ensure that your language is appropriate to the individual. For example, when describing the on-water circulation pattern, rather than saying “from that end to that end”, describe an east/west or north/south clockwise/anticlockwise pattern.

Avoid using terminology or phrases that imply some visual reference where the athlete may not be able to understand, such as “square/feather the blade”. These terms that rely on visual cues are not always helpful to individual with sight loss and can be confusing. Clearly describe the rowing oar together with the articulation to the swivel/oarlock and encourage the person to have a tactile reference.

Explain the action of the blade together with the medium through which the blade moves – water. If a facility such as a rowing tank is available or a ‘bank-tub’ this can be a valuable, safe introduction to the sport providing physical cueing and facilitation of the stroke mechanics.

Integrate those with and without visual impairments into crews

Fully integrate athletes with a visual impairment into ‘mainstream’ crew boats wherever possible, but also permit opportunities for competition and training with other rowers with a visual impairment who may wish to take part in competition.

Classification Understand the FISA and IBSA classification system.

Challenge athletes with a VI

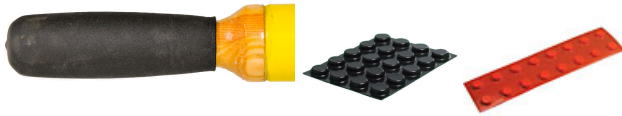
Challenge the athlete with a visual impairment just as you would any other athlete. Involve athletes in all crew activities, including carrying the boat, and working with cox/coach to prepare boat set-up. This is particularly important when athletes with a VI who are integrated into mainstream rowing practice.

No two visual Impairments are the same – acquired or congenital sight loss?

It is important for coaches to understand and distinguish between acquired and congenital sight loss together with the likely implications for effective coaching. A rower who has acquired sight loss but learnt to row or scull with some degree of vision will likely have an advantage over someone with congenital blindness with respect to coordination of body movements and the ability to produce good rowing technique. Many biomechanical studies have been carried out looking at gait analysis of sprinters showing the advantage that an individual with acquired sight loss has over congenital sight loss in stride pattern. Teaching the basic rowing stroke to someone with congenital sight loss will require more consideration on the part of the coach with regards to choice of words, kinaesthetic feel and explanation of the rowing vocabulary.

Innovation

Be innovative as a coach and employ some of the principles that you would use for a sighted rower. Consider placement of drinking straws to the sax-board of the boat, to enable the athlete to brush with their hands, in order to help achieve correct catch height and placement.

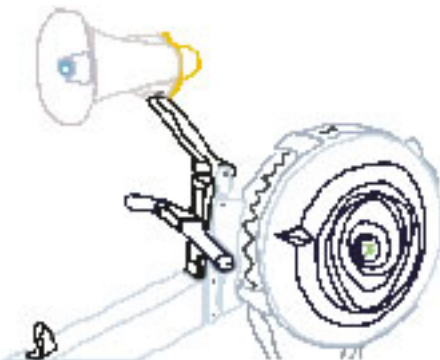


Use of tactile markers on the oar or scull handles to indicate when the blade is "square" to the water. These can be easily removed, once the rower has learnt the skill.

Visual Impairment and single sculling -The athlete with a visual impairment should be encouraged to single scull, provided that a simple 'risk assessment' has been carried out. Safety boat cover should be provided and assistance with steering may be given using a radio link.

Visually Impaired Rowers

ErgChatter



ErgChatter is a free software tool that gives a voice to your PM3 or PM4. Perfect for rowers with visual impairment, ErgChatter announces your performance data at regular intervals as you row.

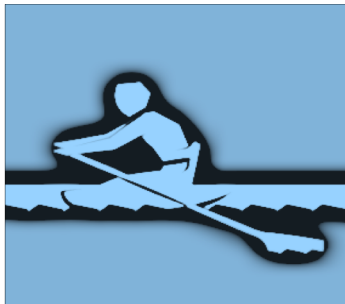
<http://www.concept2.com/service/software/ergchatter>

<http://www.concept2.co.uk/indoor-rowers/adaptive-rowing/rowing-visually-impaired>

The Remote coxswain

The Remote Coxswain is an affordable tool that allows those with sight disabilities to participate in recreational and competitive rowing. This innovative remote-controlled rudder ensures that the boat goes in the right direction, while the custom-fitted paddles let the rower know that they are gripping properly. This hardware can be retrofitted onto any racing shell. <http://www.remotecoxswain.com/product.html>

General Coaching Considerations - Physical Disability



There are common themes throughout discussion of coaching and training rowers with a physical disability. In many ways this is no different than coaching and training able-bodied rowers. Coaching and training of athletes in general, is optimised by the coach approaching each athlete as an individual with specific physical strengths and weaknesses which, as a coach, they must assess, train and monitor to lead to best performance in sport.

- 1) Individual assessment of affected joint or body segment involvement through discussion with the athlete and observation during rowing and training.
- 2) Individualisation of training and equipment, including rigging, to optimise performance
- 3) Monitoring of individual response to training
- 4) Prevention of known possible injury associated to rowing and training in partnership with the athlete

As you read through the following sections you will note overlap of information. For example, issues of spasticity may be found in working with athletes with cerebral palsy, spinal cord injury and multiple sclerosis; skin issues will be of concern for athletes with an amputation and athletes with spinal cord injury; muscle imbalance and altered joint function will be concerns common to all physical disabilities.

These similarities are important to note as they will assist the coach as they work with people with variable physical disabilities. Eventually, this information becomes so familiar to the coach that it is considered no different than the coaching knowledge they have developed in other areas such as exercise physiology and biomechanics of rowing.

Before athletes with a physical disability take part in rowing activity, a pre-activity screening process should be carried out detailing pertinent medical history:

Medical History:

- ☐ Diabetes
- ☐ Heart Disease
- ☐ Cancer
- ☐ Stroke
- ☐ Recent Fracture
- ☐ Asthma
- ☐ Hypertension (high blood pressure)
- ☐ Autonomic Dysreflexia
- ☐ Dehydration
- ☐ Seizures
- ☐ Other

Transfers

Rowers who are wheelchair users may or may not require help when transferring from a wheelchair to boat or land based rowing machine. (This will usually be determined by lesion level in spinal cord injury, higher levels requiring more assistance). Always ask before making assumptions. Some basic guidelines will vary depending on whether you are assisting transfer from a shore or pontoon.



Wheelchair user getting ready to transfer.



A wheelchair user lowering themselves onto the embarkation pontoon

Important:

- Majority of athletes will be able to independently transfer
- Invite coach or team member with athlete to assist as required for safety and athlete comfort
- If classifier or coach are required to assist with transfer, allow athlete to direct transfer

Guidelines

1. Keep the trunk as straight as possible when lifting to minimise strain on the spine.
2. Use the legs when lifting and not the back; feet should face direction of movement.
3. Ask the athlete how they would like to be lifted. They will have been assisted many times in a variety of situations and are best placed to inform a coach how to lift in both a safe and dignified manner.
4. Always keep close to person during transfer.
5. Make sure you are transferring athlete to appropriate seating and skin protection surface, and beware of sharp projections.

The Three Stage Self-Transfer

It is a good idea to think of the transfer in two-three parts, regardless of whether a person is using a wheelchair, has difficulty walking or is visually impaired. Make athletes aware of any areas on the boat which might be a potential for injury during transfer, such as rigger, footplate. Ensure athlete has appropriate cushion/pad on seat and appropriate footwear to prevent pressure sore development.

(Note: use of transfer cushion during transfer).



Park the wheelchair closely to the transfer cushion, parallel to the boat and safely undo any wheelchair strapping



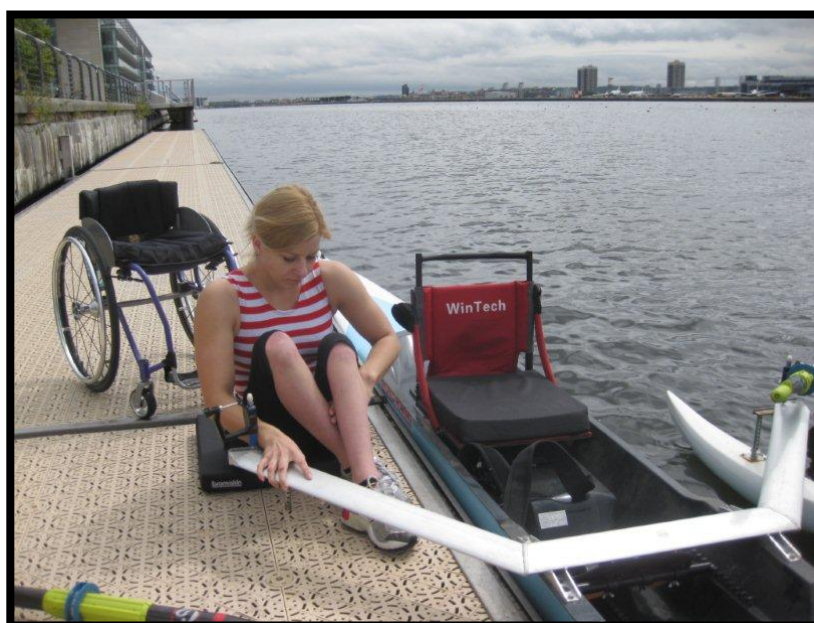
Edge towards the front of the wheelchair, with your feet facing forwards



Slowly and carefully swing your lower body down unto the cushion, using your trailing hand to push off from the wheelchair and then steady your body once you have reached the cushion



Lean forwards to place a hand on the cushion to steady your upper body



Swing your legs round to face the boat



Place the hand nearest the rigger on the pontoon and the other hand on the seat, ready to move your body over to the seat



Move your bottom over to the seat, leaving your feet on the pontoon



Move your feet over into the boat and place them in the foot-stretcher



Strap each foot into the foot-stretcher ensuring they can be released in the event of a capsize



Once your feet are strapped in, position yourself correctly and comfortably on the seat



Do up the strapping on your seat, ensuring that the straps all open from same side and direction

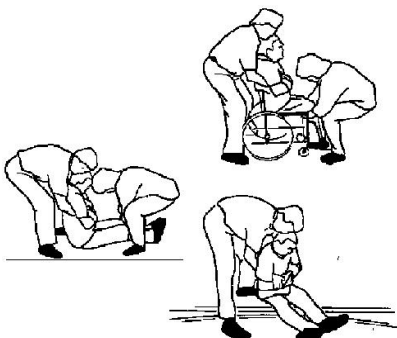


Receive the scull handles from your coach and you are good to go!

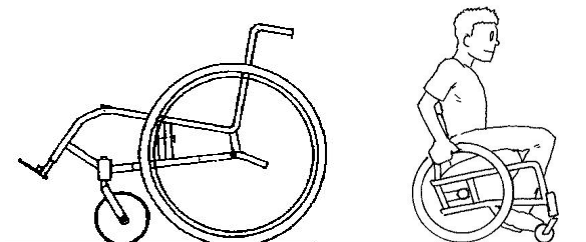
Transferring with Two Helpers

Caution - This transfer technique works well in most situations. However, it may not be suitable for all rowers, particularly if they have weak or painful arms and/or shoulders.

1. The wheelchair user should move to a position alongside and parallel with the boat, leaving sufficient space to sit on the pontoon between the boat and the chair. Put the brakes on.



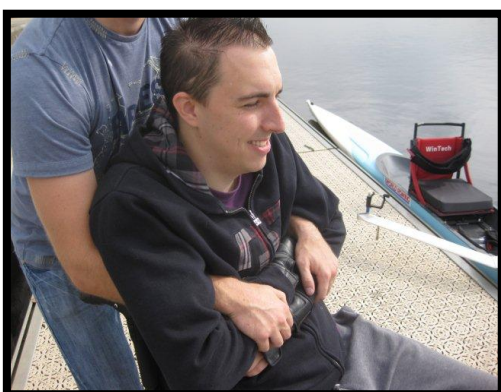
2. Lift the back of the wheelchair, or remove the arm support on the transfer side.



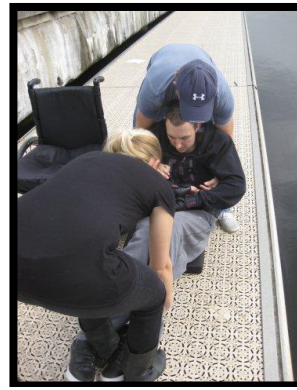
3. The second helper should take the main body weight, while the other helper lifts the legs.



4. The rower grips his/her own wrists across the chest. Helper puts his/her hands under the rower's armpits and grips the rower's forearms. Helper grips under the rower's knees.



5. After a countdown, ('1-2-3 go') lift the rower onto the pontoon.



6. Helper positions herself/himself as close to the side of the boat as possible and lifts the rower's trunk onto the seat.



7. Helper transfers the rower's legs (Some rower's prefer to transfer their legs first).





8. Reverse this procedure to disembark.

Important - To avoid injury to the lower back, helpers should use their stronger leg muscles by bending their knees during any lift

Transfer Cushions (see equipment)

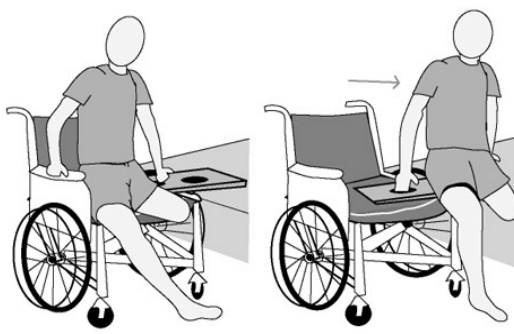


1. Essential for skin protection for those with no sensation due to paralysis
2. Important for the comfort of someone with limited movement, sitting for long periods
3. Useful for someone with lack of trunk stability, or in need of support to maintain a particular position.

Aids to Transfer

If people with disabilities row regularly from a fixed venue, it may be worth considering permanent aids to transfer. Such aids vary from simple to complex:

A sliding board is useful where the transfer gap is wide and the seat is at a similar height to the seat of the chair.



Hoists



A hoist can be installed on a stable dock; however, this may be unsuitable for a floating pontoon. A hoist is particularly useful if mounted on the outside corner of a dock where it can be used for both the front and side.

Cranes for launching boats can be used for transferring people; however, they should be used with extreme caution, with special attention to type of sling used.

Lifting puts helpers at risk of injury. But if mechanical lifting devices are not simple, at hand and practical, they will not be used. The design of lifting devices is worthy of more research. In the meantime, human help remains readily available, flexible and portable.

Ergometer Transfer

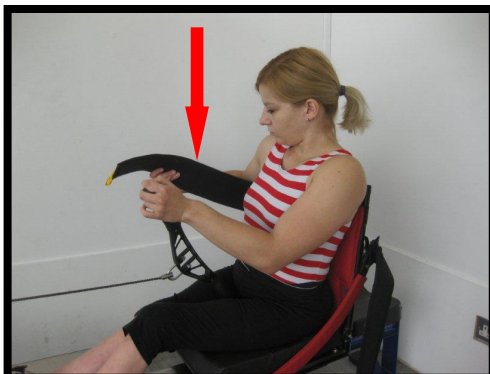


Be sure that the athletes are aware and/or protected from any sharp edges that may injure them during transfer, such as the monorail



Ensure feet are adequately protected to prevent pressure sores/marking

All strapping should be manufactured from a soft material that will not cause chaffing or marking (see British Rowing recommended equipment list)



Appropriate interface cushion between athlete and seat to prevent pressure sores

General Coaching Considerations - Physical Impairment

Reference –

Adaptive Rowing: A Guide – British Rowing

Learn to Row: Adaptive Coach/Instructor Workbook – Rowing Canada Aviron

Guide to Adaptive Rowing – US Rowing

Amputees

During the classification process, rowers with a prosthesis will be examined with and then without their prosthesis to determine their sport class which is based upon best functionality.



For rowers who wear a prosthesis, consideration should be given to:

- Safety
- Comfort
- The potential impact on the mechanics of the rowing stroke
- Injury prevention

It is important for coaches to have some knowledge of the biomechanics of rowing and an understanding of the limitations as well as the adaptations available to enable someone with an amputation to row. This involves coordinating the motion of the prosthetic limb with that of the intact limb (e.g. the ankle joint flexion at the catch position).

The deficits in amputee rowing may become evident during the drive phase with reduced power through the prosthetic limb, which may lead to increased impact forces on this limb, combined with asymmetry in movement. Compensatory mechanisms will need to be employed to overcome these limitations described below.

Modifications

Rowing is relatively non-traumatic to the remaining limb because there is little vertical impact. If irritation does occur, it will most likely be from the trim lines of the socket as the rower goes through the full range of motion to complete a stroke. If rowers with below the knee (BK) amputations find their hamstrings are impinged upon, then the posterior trim lines can be modified, providing this does not compromise the integrity of the prosthesis.

When the prosthesis is only used for rowing, then a removable posterior wall can be fabricated by using a clip with a supracondylar removable wedge. A proximal strap

that runs circumferentially around the proximal socket can be used to help hold the removable wall in place. The entire posterior wall can be lowered if the remaining limb is particularly long. Those with an above the knee (AK) amputation may find the flex from the hip socket is impinged, whilst a rower with below knee (BK) amputation may experience some impact upon the knee's ability to flex. Both AK and BK sockets can be fabricated with a flexible brim, made from thermoplastics or flexible resins, in order to increase the comfort and range of motion while rowing.

GLOSSARY

Posterior: rear or bottom

Thermoplastics: is a polymer that turns to a liquid when heated and freezes to a very glassy state when cooled sufficiently.

Prosthesis: An artificial substitute or replacement of a part of the body such as a leg.

Hamstrings: refers to any one of the three posterior thigh muscles, or to the tendons that make up the borders of the space behind the knee

Rowing Prosthesis (leg)

The rowing prosthesis should have an ankle or foot combination that allows for a range of unrestricted motion in both dorsiflexion and plantarflexion. Over the years, various prototype ankles have been fabricated to accommodate the need for full range of motion in the ankle. The ActivAnkle is perhaps the best example.



ActivAnkle™.



Flexi-Foot system with quick release system mounting for a safe release

It can be unlocked for complete dorsiflexion and plantarflexion during rowing, then locked into a vertical position after rowing for standing and walking. The ActivAnkle can be used on endoskeletal BK and AK systems and may also be modified for exoskeletal systems.

A lower limb prosthesis, that engages directly with the footplate, should implement a quick-release system. Both of these devices can be used on an indoor rowing machine and in a boat, permitting a full range of movement during the stroke.

Rowers with upper limb amputations



Upper extremity amputee - use of articulated carbon sleeve for indoor rowing machine



Modified gripping aid for sweep oar rowing

GLOSSARY

Dorsiflexion: is where the angle between the surface of the foot and the leg decreases, so that the toes are brought closer to the shin.

Plantarflexion: is the movement which increases the approximate 90 degree angle between the front part of the foot and the shin, as when pushing down on a car pedal. The word "plantar" is commonly refers to the bottom of the foot.

Endoskeletal: is an internal support structure. The vertebrate is basically an endoskeleton made up of two types of tissues (bone and cartilage).

Exoskeletal: is an external support structure that protects something, in contrast to the internal skeleton (endoskeleton) of a human.

Coaching – general considerations

Rowers with an amputation experience increased levels of work compared to able-bodied rowers when rowing. The result is that these rowers may tire quicker and develop thermoregulatory issues.

1. Rowers with an amputation tend to perspire more as they have less surface area through which to release heat. Wearing a prosthesis can prevent perspiration evaporating, and so limit the cooling benefits associated with evaporation. (This may be more prevalent among PR3 rowers who have more active muscle mass).
2. Muscular imbalances may be a consequence of surgical intervention and can lead the body to take compensatory measures to overcome the original deficiencies. However compensatory measures can in turn influence the further development of yet more muscular imbalances if they are not monitored.
3. Pain and ‘phantom pain’ also requires consideration when coaching rowers with amputations. Pain influences the rower’s ability to bear weight fully and impairs the ability to row.

Injury Prevention

Introducing preventative measures into the rower’s training program is the preferred method of injury management.

Listed below are some issues that coaches should be aware of:

1. Direct pressure combined with the frictional and shear forces, that occur whilst rowing, do require careful consideration to ensure that the rower has a suitable liner between the socket and the residual limb.
2. Increased perspiration, inadequate stump care, poor hygiene and poor maintenance of the prosthesis all contribute to injury (e.g., skin irritations). To overcome skin irritations the rower should remove the prosthesis after the training session to wipe perspiration from their residual limb and liner.
3. An inadequately fitting socket can produce pressure points on a residual limb. As these points are repeatedly loaded throughout the drive phase, the skin can begin to breakdown. Massage is commonly used as a preventative measure as well as an effective way to manage this type of injury.

It is important to note that these injuries can be avoided. This can be achieved through constant stump monitoring, stump management, as well as the careful maintenance of a prosthetic.

GLOSSARY

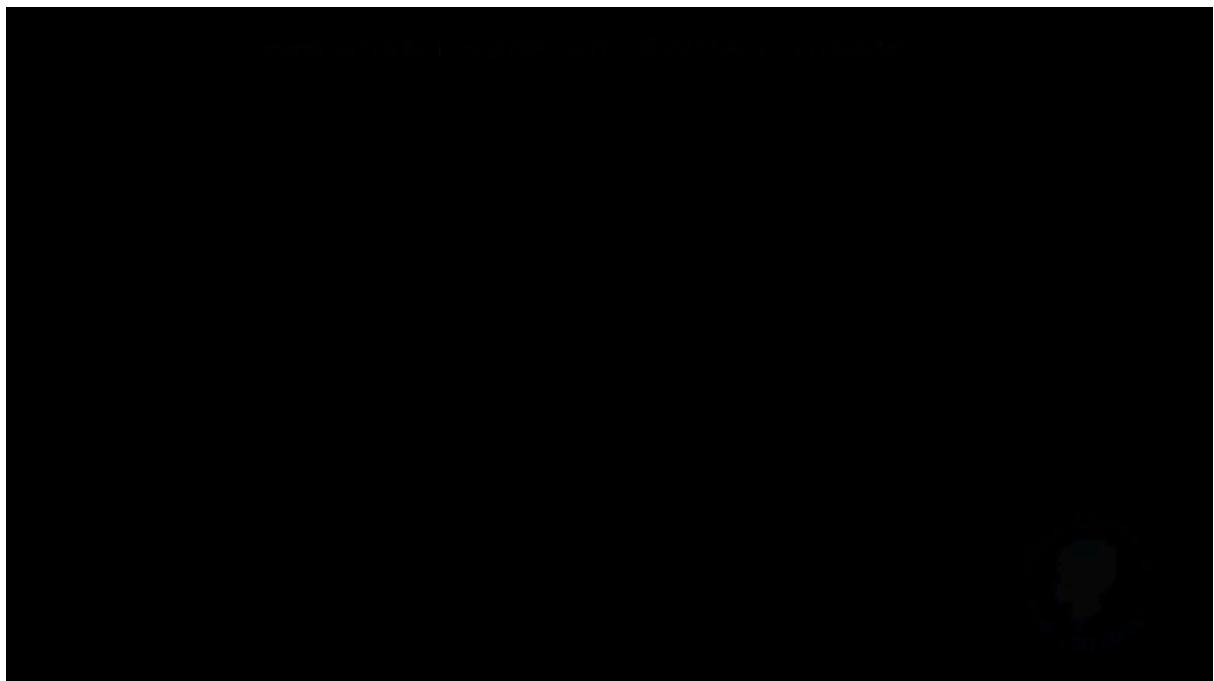
Phantom pain: Phantom pain sensations are described as perceptions that an individual experiences relating to a limb or an organ that is not physically part of the body.

Coaching Rowers with neurological conditions

Rowers with disabilities such as Cerebral Palsy (CP), Acquired Brain Injury (ABI), Stroke and Spinal Cord Injury (SCI) have some difficulties coordinating and controlling their movements. This is because the more severe the condition, the more likely that these athletes will also experience limitations in functional range of motion (ROM).

The coach's aim is to help these athletes achieve greater motor control and greater flexibility.

Cerebral Palsy



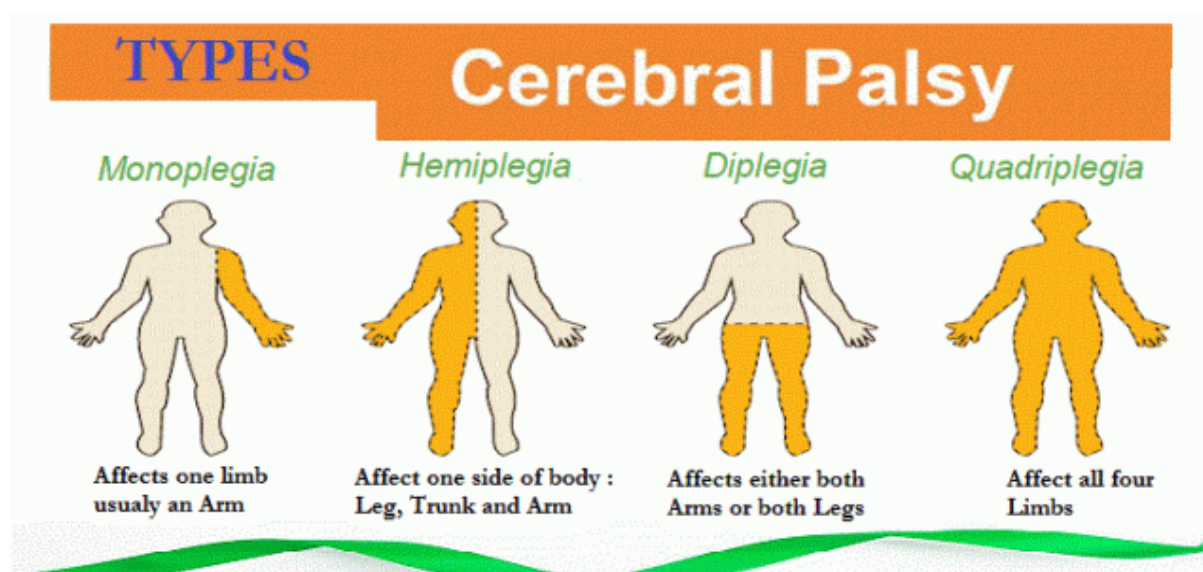
This describes a group of disorders that affect the development of movement and posture, causing activity limitation, and are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain.

Common Terminology of Description

Individuals with CP are diagnosed with a particular 'type' of the disorder based on their movement impairment and the limbs affected.

Common terminology used for hypertonic presentations are:

1. Hemiplegia: The arm, trunk and leg of the same side are affected
2. Diplegia: Both legs are affected (it is likely the lower trunk/pelvic region is also affected)
3. Triplegia: Three limbs and partial trunk are affected, usually two legs and an arm
4. Quadriplegia/tetraplegia: All limbs and trunk affected



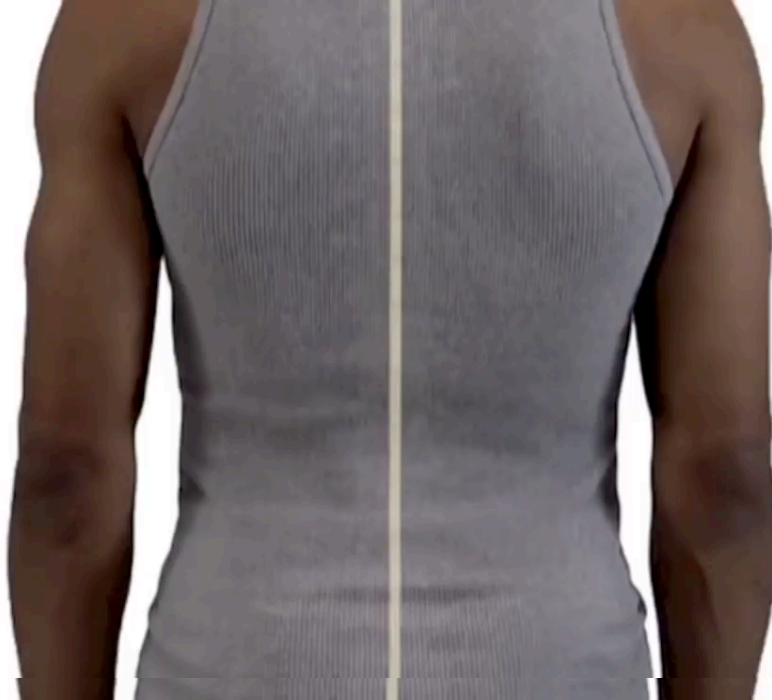
The term hemiplegia is sometimes an inadequate term, as people diagnosed with this type of CP often have some impaired movement on the 'unaffected' side.

The motor disorders of CP are often accompanied by disturbances of sensation, cognition, communication, perception, and/or behaviour and/or by a seizure disorder.

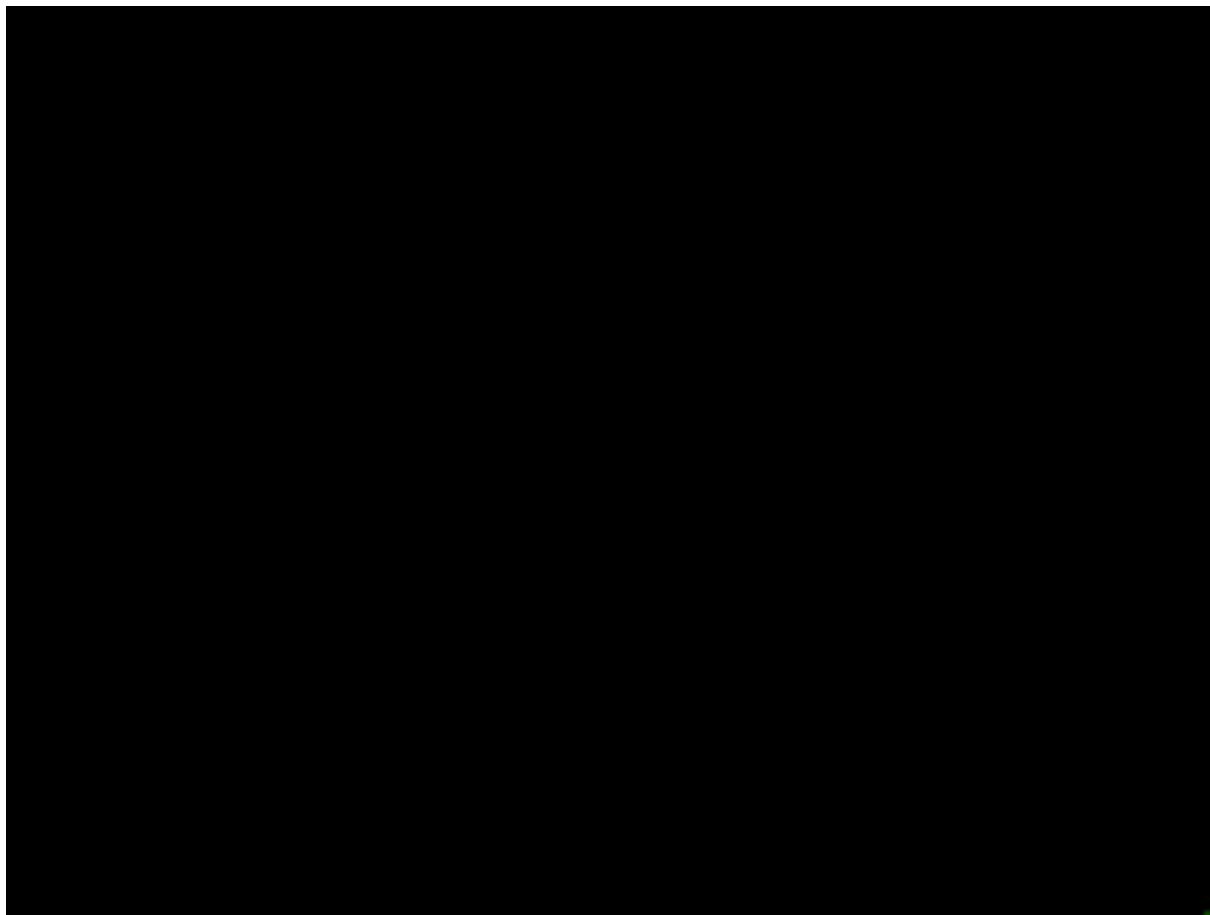
CP can be classified by motor involvement and its distributions or pattern. The most common patterns are with increased muscle tone (spasticity). Coaches should be aware that some components of movement such as balance, coordination, and muscle tone of athletes with CP are affected by their condition, where appropriate training programmes should be designed for them. It is recommended that if athletes with CP experience problems in balance while in standing position during stretching, the coach should allow them to perform this in a seated position, stretching in a seated position or get help from others to assist them.

Spinal Cord Injury (SCI)

The effects of SCI depend on the type and the level of the injury. SCI can be divided into two types - complete and incomplete. A complete injury means that there is no function below the site of the injury; no sensation and no voluntary movement. Both sides of the body are equally affected.

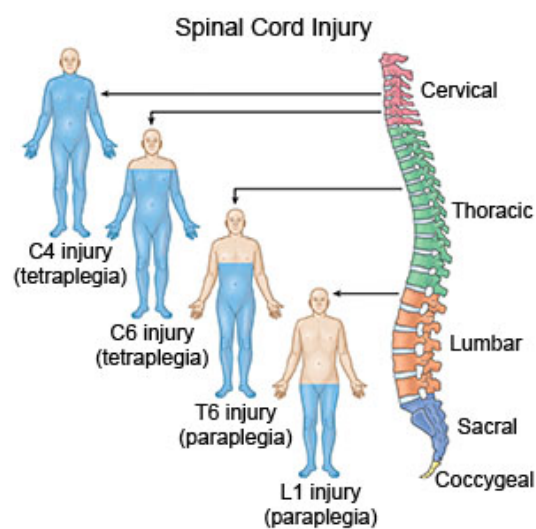


Introduction video - *'What is Spinal Cord Injury'*



Spinal Cord Injury Levels

Coaches should understand the basic aetiology of spinal cord injury and what parts of the body are affected.



An incomplete injury means that there is some function below the primary level of the injury. A person with an incomplete injury may be able to move one limb more than another, may be able to feel parts of the body that cannot be moved, or may have more function on one side of the body than the other.

With the advances in acute treatment of SCI, incomplete injuries are becoming more common. The site of injury helps predict which parts of the body might be affected by paralysis and a loss of function which will be useful information to the coach. Remember that in incomplete injuries there will be some variation in these prognoses:

The spinal cord is rarely severed unless penetrated by a very high velocity impact. More often the cord remains anatomically intact but suffers contusion, infarction or mechanical deformation that interrupts it's local or relay circuitry. As more than 50 % of people with a SCI experience varying degrees of motor, sensory or autonomic sparing at different levels of the spinal cord, they can be classified using the benchmark system of American Spinal Injury Association (ASIA). The accurate description of an injury to a given spinal column segment involves a designation of the spinal region (e.g. cervical, thoracic, lumbar or sacral), a spinal nerve, and the degree to which the injury is neurologically complete or incomplete. The ASIA definitions of complete and incomplete are:

- 1) 'Complete injury' describes the absence of sensory and motor function in the lowest sacral segment
- 2) 'Incomplete injury' describes partial preservation of sensory and/or motor functions below the neurological level and including the lowest sacral segment.

Spinal Cord Injury coaching considerations

1. **Spasticity:** This typically occurs in the muscles below the site of injury and is exacerbated by exposure to cold air, urinary tract infections and physical exercise. It is characterised by high muscle tone or hyperactive stretch reflexes and can be managed with stretching and by avoiding exercises that cause excessive spasticity.
2. **Autonomic Dysreflexia:** This is a sudden rise in blood pressure caused by an exaggerated nervous system response to noxious stimuli below the level of injury, usually due to bladder/bowel over-distension or blocked catheter. Symptoms include profuse sweating, sudden elevation in blood pressure, flushing, shivering, headache, and nausea. Seek medical attention immediately when it occurs.
3. **Orthostatic hypotension:** A drop in blood pressure (greater than 20 mmHg for systolic blood pressure and greater than 10 mmHg for diastolic blood pressure). It occurs in upright postures, especially moving from supine to upright sitting/standing/head-up tilt. Symptoms include nausea, dizziness and lightheadedness. Monitor blood pressure throughout exercise, avoid quick movements, perform orthostatic training, maintain hydration, use compression stockings and an abdominal binder. If orthostatic hypotension occurs, lie in a supine position with the individual's feet elevated.

4. **Thermoregulation:** Irregular body temperatures are often experienced by individuals with SCI. Ensure they wear appropriate clothing, drink plenty of fluids and take precautions. In warm environments, a fan and water spray will aid cooling, and in cold environments wear extra layers.
5. **Pressure sores** (decubitis ulcers): Damage to the skin or underlying tissue can be caused by prolonged sitting, use of old wheelchair cushions, shear forces or as a result of a fall. Check skin regularly and perform wheelchair push-ups.
6. **Transfers:** Be sure to follow appropriate guidelines. (Please refer to the Transfer section of this module).
7. **Balance:** Use physical assistance devices to hold the body in position during upright exercise.

Importance of Exercise

1. It prevents secondary conditions such as cardiovascular disease, diabetes, pressure sores, carpal tunnel syndrome, chronic obstructive pulmonary disease, hypertension, urinary tract infections and respiratory disease.
2. It prevents deconditioning and obesity.
3. It provides psychological and/or recreational benefits.

Exercise limitations - Key considerations

1. Overuse of upper extremities
2. Limited amount of active muscle mass: reduced energy consumption
3. Blood pooling in legs: reduced pre-load of heart: reduced stroke volume
4. Autonomic nervous system: cardiac control, temperature regulation (vasoconstriction/dilation)