This document has been developed to provide health service providers with a sound understanding of Autonomic Dysreflexia in individuals with Spinal Cord Injury at or above T6 level.

Key points

**Autonomic Dysreflexia is a medical emergency**

- AD occurs in people with Spinal Cord Injury (SCI) at T6 and above but has in rare occasions been reported in individuals with SCI as low as T8.

- AD occurs when continuous painful stimulus below the injury level triggers an over exaggerated reflex activity of the sympathetic nervous system which raises blood pressure.

- AD can be triggered by any continuous noxious or irritating stimulus below the level of the SCI. The most common causes are related to bladder or bowel problems.

- Common symptoms include a pounding headache as their blood pressure rises, redness and sweating above the level of your SCI, slow heart rate, goose bumps, nausea, nasal congestion, blurred vision, shortness of breath and anxiety. Some or all of the symptoms may be present.

- Blood pressure can rise to dangerous levels causing secondary complications such as stroke, intracranial hemorrhage, seizures and even death.

- The best treatment for AD is prevention.

- Relieving the cause of the AD will resolve the AD episode.

- If a cause cannot be found or treated, medication is required to lower blood pressure.

- People at risk of AD often carry an ‘AD Kit’ with them - items useful to resolve AD such as catheters and prescribed medication.

All individuals with SCI at T6 and above should carry their autonomic dysreflexia medical emergency card at all times.
What is Autonomic Dysreflexia?

Autonomic Dysreflexia (AD) is a medical emergency. It is an exaggerated nervous system response to a noxious or painful stimulus below the level of spinal cord injury (SCI). This means that the body responds to something painful or harmful by raising the blood pressure, but the brain cannot control this potentially dangerous rise in blood pressure (BP) because messages that normally control that blood pressure rise are blocked by the lesion in the spinal cord.

Pathophysiology

1. Noxious stimuli (e.g. full bladder) is detected and transmitted up the spinal cord to the brain.

2. The signal is interrupted by the spinal cord injury and unable to reach the brain.

3. As the signal travels up the spinal cord it stimulates the sympathetic outflow of the splanchnic bed located between Thoracic nerve 5 and Lumbar nerve 2 causing the release of substances such as dopamine and norepinephrine.

This results in severe vasoconstriction below the injury level presenting with the following symptoms:

- Sudden rise in blood pressure (BP)
- Skin pallor below injury level
- Piloerection (goosebumps) below injury level
4. Baroreceptors in the aortic and carotid vessels detect the elevated BP, relaying it to the brain.

5. The Parasympathetic Nervous System is unable to counteract the Sympathetic Nervous System via the spinal cord due to injury.

It attempts to normalise the BP through the Vagus nerve and sympathetic inhibition above the injury level resulting in:

- Bradycardia (Slow heart rate)
- Vaso-dilation above injury level
- Flushing and sweating to the face
- Visual disturbances due to pupil dilation
- Headache due to increased blood flow to the brain.

Who gets Autonomic dysreflexia?

AD usually only occurs in people with spinal cord lesions above the T6 level or above the major splanchnic outflow located from T6-L2. There have been some rare cases of it occurring as low at T8 have been reported. Because this condition affects only a very small percentage of the population many health workers may never have had to manage the problem.

Symptoms of AD

Some or all of these symptoms may be present

- The sudden rise in blood pressure causes a pounding headache.

> It is important to remember that baseline BP in SCI individuals is lower than general population and therefore what appears to be a normal blood pressure may actually be Dysreflexia in the SCI individuals. Therefore if an individual is demonstrating any of these symptoms this may represent a dysreflexic episode.

- Bradycardia (Slow heart rate)
- Flushing, redness and sweating of the skin above the level of your spinal cord
- Cold, pale skin, goosebumps below the injury level
- Nausea, nasal congestion, blurred vision due to dilatation of pupils, shortness of breath, and anxiety or a sense of apprehension
Causes of Autonomic Dysreflexia

Episodes of AD can be triggered by many causes. Any continuous, painful or irritating stimulus below the level of your injury can cause an episode of AD. The individual may not have sufficient sensation to identify the trigger themselves. The most common cause of AD relates to bladder dysfunction, followed by bowel.

The following events or conditions are some things that can cause episodes of AD. The list is not conclusive as *anything* that causes continuous pain or irritation *below* the level of SCI can cause AD.

**Table 1: Potential causes of AD**

<table>
<thead>
<tr>
<th>Category</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder related</td>
<td>• Bladder distension</td>
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<tr>
<td></td>
<td>• Urinary tract infection</td>
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<td></td>
<td>• Bladder or kidney calculi</td>
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<td></td>
<td>• Gallstones</td>
</tr>
<tr>
<td>Gastric/Bowel related</td>
<td>• Constipation</td>
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<tr>
<td></td>
<td>• Gastric ulcers or gastritis</td>
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<td></td>
<td>• Haemorrhoids</td>
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<td></td>
<td>• Stomach upset</td>
</tr>
<tr>
<td>Skin related</td>
<td>• Pressure ulcers</td>
</tr>
<tr>
<td></td>
<td>• Ingrown toenail</td>
</tr>
<tr>
<td></td>
<td>• Burns or sunburn</td>
</tr>
<tr>
<td></td>
<td>• Blisters</td>
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<tr>
<td></td>
<td>• Insect bites</td>
</tr>
<tr>
<td>Positioning related</td>
<td>• Tight clothing</td>
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<tr>
<td></td>
<td>• Sitting on scrotum</td>
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<tr>
<td>Reproductive system</td>
<td>• Sexual intercourse</td>
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<td></td>
<td>• Ejaculation</td>
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<td></td>
<td>• Menstruation</td>
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<tr>
<td></td>
<td>• Pregnancy, labour and delivery</td>
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<tr>
<td>Musculo- skeletal</td>
<td>• Fractures or other trauma</td>
</tr>
<tr>
<td>Other</td>
<td>• Surgery or procedures</td>
</tr>
<tr>
<td></td>
<td>• Any other continuous painful stimulus</td>
</tr>
</tbody>
</table>

Treatment of Autonomic Dysreflexia

AD will resolve when the cause of pain or irritation is removed. Therefore the cause must be identified and resolved. **This requires immediate action.**

If the cause cannot be found or treated, medication must be administered to control blood pressure.

When AD occurs the first steps are to:

1. Sit patient upright to help lower blood pressure with gravity
2. Loosen tight clothing in case this is causing a painful stimulus.
Ask the patient or carer if there is a suspected cause as often they will be able to identify the origin of the triggering stimulus.

For step by step instructions on the management of AD, refer to the Appendices at the end of this document

Appendix 1. TREATMENT ALGORITHM
Appendix 2. Autonomic Dysreflexia MEDICAL EMERGENCY CARD

In the Community Setting

If AD continues to be uncontrolled or medication is not available within the community setting an ambulance should be called to take the patient to hospital.

Show the individuals Autonomic Dysreflexia MEDICAL EMERGENCY CARD to the paramedics and hospital staff. It is essential to present this card to anyone involved in the individuals care to stress the seriousness and urgency of AD.

It would be advised that people at risk from AD carry a ‘kit’ in case of emergency. This kit can include such items as a urinary catheter, lignocaine gel, gloves, and any medication that has been prescribed for lowering of blood pressure when AD occurs. For further information about this contact could be made with the State Spinal Injury Unit.

Prevention of Autonomic Dysreflexia

Episodes of AD can be prevented through the avoidance of factors which trigger AD. It may be helpful for the patients to keep an AD diary, recording episodes of AD, it’s cause and effective treatment to identify possible areas for improvement in prevention.

Given many episodes of AD are related to the urinary tract, good bladder management is essential as is ongoing review by the spinal Urology team. Avoidance of bladder distension, urinary tract infections, and renal stones is important.

Additionally, other factors which commonly trigger AD include constipation and skin problems, so good bowel management and skin care will reduce the risk of it occurring.
TREATMENT ALGORITHM

Safety Notice: 014/10

Symptoms and signs of Autonomic Dysreflexia
ASK PERSON AND CARER IF A CAUSE IS SUSPECTED
Common causes to exclude first are:
1. Bladder Distension
2. Constipation

Check Blood Pressure (BP)
If BP > 200mmHg above resting level
(Note: BP in a person with tetraplegia or high paraplegia is typically low e.g. 80-100/60mmHg)

NOTE: THIS REQUIRES IMMEDIATE INTERVENTION
Monitor BP & pulse until symptoms have resolved
Loosen any tight clothing/straps
Remove compression stockings/abdominal binder

CHECK FOR BLADDER DISTENSION
How does person empty bladder?

By intermittent self-catheterisation, reflex or "spontaneous" voiding

Check BP before proceeding
If systolic BP > 200mmHg

Is catheter draining satisfactorily?

If no:
- Monitor BP for 4 hours to ensure no recurrence
- If symptomatic hypotension, lay the person down and elevate legs
- If SYMPTOMS RECUR CONTACT A SPINAL PHYSICIAN URGENTLY

IDC's catheter is blocked
If no:
- Insert generous amount of lignocaine 2%
  topical anaesthetic
- Wait 3-5 mins and pass/replace catheter

If the bladder is overstretched, drain 500ml initially,
then 250ml every 10-15 mins to avoid hypotension

NB: Omeprazole/anticholinergic medication
  (eg. Oxybutynin) if the IDC is left in situ

Is BP settling down?

YES

CHECK FOR CONSTITUTION
Insert generous amount of lignocaine 2%
  topical anaesthetic
- Wait 3-5 mins, then perform gentle PR exam

If rectum is full and systolic
BP < 150mmHg, perform manual evacuation

If BP not settling promptly or cause not identified,
administer hydroxyzine
Intravenous medication may be necessary
CONTACT SPINAL PHYSICIAN/REGISTER OR CALL AT YOUR
NEAREST SPINAL INJURIES UNIT FOR SPECIALIST ADVICE

WARNING: DO NOT ADMINISTER ANY
ANTIHYPERTENSIVE MEDICATION.
ALWAYS CHECK FOR RECENT USE OF
MEDICATIONS FOR BURPLE DYSFUNCTION.

DO NOT USE GLYCERIN, INTRAVENOUS...

Did the patient receive any medication
before BP was checked?

If so:
- Wait 40 minutes until the effect has dissipated
  before proceeding

DISCLAIMER
All recommendations are intended for people
with spinal cord injury as a group. Individual
therapeutic decisions must be made by
assessing the recommendations with clinical
judgment informed by a detailed knowledge
of the individual person's unique risks and
medical history, findings on physical examination, as well as the resources available.

This revised algorithm was reviewed and approved by
the Australian and New Zealand Spinal Cord Society (ANZSCOS) in September 2010.

This project was funded by the Motor Accidents Authority of NSW.
Appendix 2. Autonomic Dysreflexia MEDICAL EMERGENCY CARD

If no response, i.e. if the elevated blood pressure does not start to fall within one minute of the above procedures, or the cause cannot be determined, treat as follows:

5. Glyceryl trinitrate.
   NB: DO NOT use glyceryl trinitrate if sildenafil (Viagra), or vardenerfi (Levitra) has been taken in the previous 24 hours or tadalafl (Cialis) in the previous four days.
   Give one spray of glyceryl trinitrate (Nitroglycerin Pumpspray) under the tongue. During administration, the canister should be held upright and the spray should not be inhaled.
   OR
   Place 1/2 a glyceryl trinitrate tablet (Nitroglycerin) under the tongue.
   OR
   Apply 5mg GTN patch according to manufacturer's instructions. It can be removed if the BP drops too low.

The hypotensive response should begin within two to three minutes and may last up to 30 minutes.

A second spray/tablet may be given in 5-10 minutes if the reduction in the blood pressure is inadequate or if the blood pressure rises again.

NOTE: If glyceryl trinitrate is not available or is contraindicated, e.g. within 24 hours of sildenafil use, give one 10 mg nifedipine tablet (not a slow-release tablet) crushed, mixed with water and swallowed.

Avoid sildenafil (Viagra), vardenerfi (Levitra) and tadalafl (Cialis) for 48 hours after a severe episode of autonomic dysreflexia.

All recommendations are for spinal cord injury patients at the sixth thoracic level or above. Individual therapeutic decisions must be made by combining these recommendations with clinical judgement.

This information is endorsed by the Australian & New Zealand Spinal Cord Society, 3/5/2006

What is Autonomic Dysreflexia?

This is a condition of sudden high blood pressure, which may continue to rise and may cause a brain haemorrhage or fits. The normal BP for this group of people is commonly 90/60 (90/60) and lower when sitting. A BP of 130/90 is therefore high for them. If untreated, it can rapidly rise to extreme levels, e.g. 220/140.

Symptoms & Signs

The person may present with all or some of the following:

- Pounding headache, which gets worse as the blood pressure rises
- Blurred vision
- Flushing and blotching of the skin above the level of the spinal cord injury
- Profuse sweating
- Goose bumps
- Chills without fever
- Bradycardia (slow pulse rate)
- Hypertension (high blood pressure)

Common causes

- Bladder irrigation, e.g. bladder irrigation, urological procedure, urine infection
- Bowel irrigation, e.g. dilated rectum, chemically irritant suppositories
- Skin irritation, e.g. pressure sore, ingrown toenail, burns
- Other, e.g. contracting uterus, fractured bones acute intra abdominal disease.

Patients and carers know about this condition and can often suggest the cause.

Treatment

Ask if the patient has just taken a drug to control the autonomic dysreflexia.

Two people are required to control the situation.

1. Sit upright or elevate the head of the bed. Loosen clothes and remove compression stockings and abdominal binder.

2. If the person has an IDC or SPC:
   i) Empty leg bag and estimate volume. To determine whether the bladder is empty, ask if volume is reasonable considering fluid intake and output earlier that day.
   ii) Check that the catheter or tubing is not kinked or flow is not impaired by a blocked inlet to the leg bag or a perforated valve in the leg bag. If the blood pressure > 170/90 systolic, start drug therapy (see point 5).
   iii) If the catheter is blocked, irrigate GENTLY with no more than 30 ml of sterile water. Drain the bladder slowly – 500 ml initially and 250 ml each 15 minutes afterwards to avoid a sudden drop in blood pressure. If this is unsuccessful, recatheterize, using a generous amount of lubricant containing a local anaesthetic, e.g. 2% lignocaine (Xylocaine) jelly.
   iv) If the blood pressure falls after the bladder is emptied, the patient still requires close observation as the bladder can go into severe constrictions causing hypertension or reoccur. Consider giving an oral antihypertensive medication, e.g. Oxybutynin HCL.
   v) Monitor the blood pressure for the next four hours.

3. If the person does not have a permanent catheter:
   i) If the bladder is distended, lubricate the urethra with a generous amount of local anaesthetic jelly, e.g. lignocaine jelly. If empty, apply the bladder. Drain the bladder slowly (see point 2i).
   ii) Gently insert a generous amount of lignocaine jelly into the rectum and gently remove the fosaic mass. Note: if symptoms are aggravated stop immediately.

Management of Autonomic Dysreflexia

A hypertensive crisis in people with Spinal cord injury at or above the sixth thoracic level.

Name: ____________________________
UR No.: ____________________________

This person is susceptible to autonomic dysreflexia, a condition of reflex sympathetic overactivity which can cause extremely high blood pressure. THIS DEMANDS IMMEDIATE ACTION

For further information contact
Sir George Bedbrook Spinal Unit, Royal Perth Rehabilitation Hospital
Perth (08) 9362 7284

Delivering a Healthy WA
Useful resources


New South Wales Health Department. Safety Notice 014/10. Autonomic dysreflexia (Revised). 1 November 2010.


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