

WHAT IS AUTONOMIC DYSREFLEXIA?_____

Autonomic dysreflexia (AD), also known as hyperreflexia, is a condition unique to people with spinal cord injury (SCI). The condition occurs because the pathway for nerve signals is damaged following injury. Although persons with T6 levels of injury and above are at the highest risk for AD, it does rarely occur in persons with lower levels of thoracic injuries.

AD occurs as a response to some type of irritation below the level of injury. The body tries to send signals to the brain to identify and respond to the irritant, but signals are blocked by the SCI.

Without communication between the brain and body, blood vessels begin to narrow and cause a rise in blood pressure. When sensors tell the brain that the blood pressure is getting too high, the brain then tries to lower the blood pressure by sending out three signals to:

Signal 1 - slow the heart rate (A slow heart beat is called bradycardia.)

Signal 2 - enlarge blood vessels above the level of injury to hold more blood. This causes the upper body to look flushed or red and blotchy.

Signal 3 - stop squeezing the blood vessels in the legs and abdomen.

However, signal 3 is blocked by the SCI, so the blood vessels keep squeezing. The blood pressure stays high. It may even keep rising. When the blood pressure gets too high, it can result in a stroke, seizure or death

KNOW YOUR BLOOD PRESSURE_____

Two numbers are given when blood pressure is taken. The top number is the systolic pressure and is an important indicator of AD. The bottom number is



the diastolic pressure. In general, people have a baseline blood pressure that is consistent on a day to day basis. Most people who are at the highest risk for AD have a systolic baseline between 90 and 110. A sign of AD is a rise of 20 to 40 in your baseline systolic blood pressure. If a systolic pressure is greater than 150, it is crucial to seek emergency treatment immediately because it can result in a stroke, seizure or death.

SIGNS AND SYMPTOMS OF AD_____

An individual may have one or more of the following signs or symptoms when experiencing an episode of autonomic dysreflexia. Symptoms may be very slight or even absent, despite a high or even very high blood pressure. Some of the more common symptoms are:

- ◆ Pounding Headache
- ◆ Blurred Vision
- ◆ Flushed Face
- ◆ Nasal Congestion
- ◆ Red Blotches on Upper Body
- ◆ Nausea
- ◆ Cool, Clammy Skin
- ◆ Chills Without Fever
- ◆ Apprehension or Anxiety
- ◆ Sweating Above the Level of Injury
- ◆ Goose Bumps Above the Level of Injury
- ◆ Slow Pulse



WHAT TRIGGERS AD?_____

AD is usually caused by something that might ordinarily be painful, uncomfortable or physically irritating. The irritant can be anywhere below the injury level, but the source of AD is usually in a few common areas.

Bladder issues are the most common causes of AD. It may be bladder overfilling due to a blockage in the urinary drainage device, inadequate bladder emptying, bladder spasms, or possibly stones in the bladder. A urinary tract infection (UTI) can also cause AD.

Bowel issues are the second most common cause of AD. It can be an overfull bowel, constipation, or bowel blockage (impaction). Any stimulus to the rectum, such as digital stimulation, can trigger a reaction, leading to AD. Certain abdominal tests, such as a barium enema or sigmoidoscopy, can also cause AD.

Skin conditions such as irritations, wounds, pressure ulcers, and burns (sunburn) are possible causes. Insect bites and ingrown toenails can be triggers. Other possible causes include hard or sharp items that injure the skin, as well as tight, restrictive or wrinkled clothes.

Additional triggers can vary greatly. Sexual activity and overstimulation can trigger AD. Severe abdominal conditions like gastric ulcers and appendicitis are possible triggers. Broken bones or even extreme changes in temperature can trigger AD. For women, menstrual cramps, pregnancy, labor, and delivery are potential causes.

AD TREATMENT

If you experience an episode of AD, **find and eliminate the cause!** The first and most important step is to get into and stay in a seated position. If lying down is unavoidable, keep your head raised as high as possible. Second, check for causes of the AD, and correct any problem issue. You will notice a rapid drop in blood pressure and relief in signs and symptoms when the cause is corrected.

Bladder issues are the most common causes of AD, so check these potential problems first.

- Is your drainage bag full?
- Is there a kink in the tubing?
- Is the drainage bag raised higher than your bladder?
- Is the catheter clogged or plugged?

After correcting any obvious problems, you should change your catheter if it is not draining within 2-3 minutes. If you self-catheterize, empty your bladder.

Check bowel issues next. Perform a digital stimulation and empty your bowel. Stop the procedure if signs or symptoms first appear while doing digital stimulation and resume after the symptoms subside.

Finally, check other areas of concern. Loosen any tight, restrictive clothing as well as any abdominal bands or straps. Check wheelchair, bed and seat cushions for sharp objects that might be pressed into the skin causing an irritation. Be sure to look in pant pockets for keys or other objects that might be pressing on the skin.

There are certain gender specific causes of AD that need to be noted. Men need to see if there is any pressure on the testicles and/or penis, especially during sexual activity. Condom catheters need to be examined to be sure they are not too tight. Women may need to treat cramps due to contractions of the uterus before and during menstruation. Labor and delivery often will trigger AD so it is wise to be prepared in case of an episode.

AD AND MEDICATIONS

Medications are generally used to treat Autonomic Dysreflexia only if the cause cannot be found and removed or when an episode continues even after removal of the suspected cause.



The medications used to treat high blood pressure (also known as *Hypertension*) fall into two categories of Antihypertensives. *Immediate* medications such as Nitroglycerine Paste and Nifedipine (Procardia) rapidly lower blood pressure by widening the blood vessels to make it easier for blood to flow through them and easier for the heart to pump. *Preventative* medications are used in cases of recurring AD. For example, a person who has a kidney stone may continually have high blood pressure until the stone is removed or passed. Other medical procedures or events such as child delivery can cause AD, as noted earlier. In these and other cases, you doctor may use medications to prevent AD from occurring.

Men taking medications for erectile dysfunction (ED) may have side effects (flushing in the face, headaches, nasal congestion and/or changes in vision) that also resemble signs and symptoms of AD. A blood pressure check is the best way to tell if you are having an episode of AD or side effects of the ED medication. Higher

than normal blood pressure is an indication that you are experiencing an episode of AD, which is cause for you to immediately stop all sexual activity.

PREVENTION

As with most secondary conditions in SCI, prevention is really the key. Since we know what some of the triggers are for Autonomic Dysreflexia, it makes it easier to know what to do to prevent it.

Since an overfull bladder is the most common cause, it's usually best to start there. If Foley/Suprapubic/Condom catheters are being used, be sure to keep the tube free of kinks and empty the collection bag frequently. Also, check inside of the tube frequently for any kind of grit or deposit that may indicate that you have an infection or a stone. This may be a sign that your Foley catheter needs to be changed or irrigated as well. If intermittent catheterization is used, be sure to do it frequently enough to keep the bladder from filling.

The best prevention when it involves bowels is to maintain a regular bowel program. Avoid constipation by eating plenty of fiber (fruits and vegetables) and drink enough water. If hemorrhoids are present, be sure to treat them.

Do pressure reliefs frequently to avoid pressure sores. Check skin carefully every day for sores or other skin problems. Avoid wearing tight or restrictive clothing. Check clothing for sharp or hard objects that can rub or cause pressure (for example, buttons on rear pants pockets). Refrain from long exposure in the sun and use a sunscreen to prevent sunburns. In general, avoid extreme hot or cold temperatures

SILENT AUTONOMIC DYSREFLEXIA

A sign of AD is a rise of 20 to 40 in your baseline systolic blood pressure along with other symptoms discussed earlier. Current research shows that significant elevations in blood pressure can occur without signs and symptoms of AD (asymptomatic). This condition is known as "Silent" Autonomic Dysreflexia.

Cut out along dotted line – Fold down solid line

- **Nitroglycerine Paste** - Apply 0.5 - 1 inch to skin q2hrs above injury level. If systolic BP still >150 after 10 to 15 minutes, can give as much as 2. May wipe off if BP stable. (**reapply if needed**)

- **IV Antihypertensives** - Secondary agents to be utilized in a monitored setting.

Do not use these antihypertensives if sildenafil or any other medications for Erectile Dysfunction have been used in the last 24 hours. In that case use non nitrate containing medication such as prazosin or catopril.

3. Monitor symptoms and BP for at least 2 hrs after the resolution of AD episode. Admit patient if response to treatment is poor and/or AD cause is not identified and eliminated.

QUESTIONS AND FOLLOW-UP:
CALL UAB MIST LINE (1-800-822-6478) TO CONTACT A PHYSIATRIST AT SPAIN REHABILITATION CENTER, OR CONTACT PATIENT'S PRIVATE PHYSICIAN.



MEDICAL ALERT Autonomic Dysreflexia (AD)

A potentially life-threatening condition occurring in persons with spinal cord injuries (SCI) mostly at or above level T6 but can occur at levels below T6 in rare circumstances such as labor and delivery. AD is a reaction to noxious stimuli to intact sensory nerves below injury levels leading to relatively unopposed sympathetic outflow and elevated blood pressure (BP), which is a systolic of 20-40 mm Hg above patient's baseline (commonly in the reference range of 90-110 mm Hg for persons with SCI). Parasympathetic outflow through cranial nerve X (vagus) can cause reflexive bradycardia but cannot compensate for severe vasoconstriction. Patients usually present with bradycardia and dangerous BP elevations (systolic >150). Seizures, stroke, or death may occur if stimuli are not immediately removed. A drop in BP usually occurs with the removal of the stimuli.

To date, "Silent" AD has been studied during the time of urination, digital stimulation of the bowels, and ejaculation during sexuality in men with SCI. It appears that people at risk for AD are also at risk for "Silent" AD. However, it seems that people who have never reported having an episode of AD still experience "Silent" AD.

"Silent" AD has shown to be common during some activities, and it may also prove to be common with other activities. Further research is now needed to determine whether or not "Silent" AD poses the same dangers as AD and preventive medications are needed. If you have concerns, talk with your doctor.

MEDICAL ALERT CARD

Autonomic dysreflexia is a potentially fatal condition if it is not correctly diagnosed and promptly treated. Most physicians have had little or no experience with people with spinal cord injuries, so it is not surprising that the diagnosis is often missed. Therefore, it is important for every person with SCI to know how to recognize and treat the condition. Even when an individual with SCI knows exactly what needs to be done, it may be difficult to convince Emergency Room personnel or physicians who are not familiar with SCI that the situation is urgent.

The medical alert card (above) outlines the dangers and provides recommended emergency treatment for AD. You should cut out this card to keep with you at all times. When you are experiencing AD, give this card to emergency medical personnel and insist that the card

Cut out along dotted line – Fold down solid line

COMMON SIGNS AND SYMPTOMS

- Seizures -Goose Bumps above Injury Level
- Bradycardia-Skin Flushing above Injury Level
- Hypertension -Sweating above Injury Level
- Blurred Vision -Apprehension or Anxiety
- Bronchospasm -Chills Without Fever
- Nasal Congestion -Pounding Headache

EMERGENT AD EXAMINATION

1. Quickly sit patient upright (seated position) and examine to eliminate the noxious stimuli below injury level (checking BP in both arms every 3 minutes and maintaining seated position). Anesthetize noxious stimuli (usually 2% lidocaine jelly) to prevent exacerbation.

Common sources of stimuli include:

- Bladder distention or infection - Check catheter tube for kinks, folds or constrictions. Catheterize bladder, or irrigate or replace

indwelling catheter to insure patency and collect U/A and C/S to assess for infection as the source of AD.

- Bowel impaction - Waiting 5 minutes following anesthetizing, check for impaction (may be high) and remove if found.

- Skin irritation - Remove clothes or objects that are constricting, sharp, pinching or hard. Examine and treat pressure ulcers, scratches, insect bites, ingrown toenails, etc. Adjust room temperature, seat cushion and wheelchair positioning.

2. If noxious stimuli remains unknown, immediately treat elevated systolic BP with medications. Give as indicated using an antihypertensive with rapid onset and short duration.

Examples:

- **Nifedipine** (10 mg capsule immediate release form) - May repeat in 20-30 minutes if needed. Avoid sublingual which can cause abrupt hypotension.

◆ Keep a few tablets of Nifedipine (Procardia) on hand for emergencies (take only as prescribed);

◆ Keep a “Medical Alert” card with you at all times, especially when away from home; and

◆ Be sure that all of your doctors have information about Autonomic Dysreflexia. The poster is designed for doctors to recognize and treat AD.

be given attention.

A more detailed poster is provided on the following page. This should be given to your Primary Care Physician to provide him/her with more information regarding AD and treatment options.

CONCLUSION

You need a plan of action if you experience any signs or symptoms of AD. First, you should get in a seated position. Second, look for the cause and remove the irritation. If the cause is not found or symptoms continue, seek emergency treatment immediately.

Anyone who has a spinal cord injury at or above the level of T-6 should:

- ◆ Understand the signs, symptoms, causes and treatment of dysreflexia;
- ◆ Have equipment for taking blood pressure available and know how to use it;
- ◆ If a systolic pressure is greater than 150, it is crucial to seek emergency treatment immediately because it can result in a stroke, seizure or death.

RESOURCES

eMedicine

Autonomic Dysreflexia in Spinal Cord Injury

<http://emedicine.medscape.com/article/322809-overview>

National Spinal Cord Injury Association

Autonomic Dysreflexia

<http://www.spinalcord.org/>

[news.php?dep=17&page=94&list=1178](http://www.spinalcord.org/news.php?dep=17&page=94&list=1178)

Paralyzed Veterans of America

Autonomic Dysreflexia: What You Should Know

<http://www.pva.org/site/News2?page=NewsArticle&id=7747>

SCI-Info-Pages

Autonomic Dysreflexia

<http://www.sci-info-pages.com/ad.html>

The National Spinal Cord Injury Association

Autonomic Dysreflexia

<http://www.spinalcord.org/>

[news.php?dep=17&page=94&list=1178](http://www.spinalcord.org/news.php?dep=17&page=94&list=1178)

University of Washington Medical Center

Autonomic Dysreflexia Report and Video

<http://sci.washington.edu/info/forums/reports/>

[autonomic_dysreflexia.asp](http://sci.washington.edu/info/forums/reports/autonomic_dysreflexia.asp)

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AUTONOMIC DYSREFLEXIA

is a life threatening emergency

Autonomic dysreflexia (AD) is a potentially life-threatening condition that occurs in individuals with a spinal cord injury at level T6 or above. Patients usually present with elevated blood pressure and bradycardia. Noxious stimuli to intact sensory nerves below the injury lead to relatively unopposed sympathetic outflow and dangerous blood pressure elevations. Parasympathetic outflow through cranial nerve X (vagus) can cause reflexive bradycardia but can't compensate for severe vasoconstriction.

COMMON SIGNS AND SYMPTOMS MAY INCLUDE:

- HYPERTENSION
- BRADYCARDIA
- POUNDING HEADACHE
- NASAL CONGESTION
- BRONCHOSPASM
- BLURRED VISION
- SEIZURES
- CHILLS WITHOUT FEVER
- SWEATING ABOVE LEVEL OF INJURY
- SKIN FLUSHING ABOVE LEVEL OF INJURY
- GOOSE BUMPS ABOVE LEVEL OF INJURY
- APPREHENSION OR ANXIETY

Follow the examination tree below to eliminate any noxious stimuli below level of injury. A drop in blood pressure will occur with the removal of the stimuli. Seizures, stroke, or death may occur if stimuli are not immediately removed.

EXAMINATION TREE:

Sit up and take blood pressure in both arms (repeat blood pressure every 3 minutes and between steps.) Important note – Normal systolic BP for an individual with an SCI above T6 can be in the 90-110mm Hg range. If blood pressure elevated, give medications as indicated. Use an antihypertensive with rapid onset and short duration while the causes of AD are being investigated.

Look for Noxious Stimuli below level of injury

Check Bladder for Distention ⇔ Catheterize bladder using 2% lidocaine jelly. If indwelling catheter already in place, inspect for kinks, folds, constrictions, or obstructions. Irrigate or replace the catheter to insure patency – RELIEF? – collect U/A and C/S (irritation may be due to infection). Assess for any urologic obstruction such as kidney or bladder stones.

Check Bowel ⇔ Anesthetize using Lidocaine jelly 2% (wait 5 minutes) prior to checking for impaction. Remove impaction and recheck blood pressure – RELIEF? – Evaluate for high impaction.

Check Skin ⇔ Remove constricting clothing – RELIEF? – Examine for pressure ulcers – Does repositioning lower blood pressure? – Examine for insect bites – Treat – RELIEF? – Examine seat cushion and wheelchair for sharp or hard objects – Evaluate environmental temperature – Do symptoms change as environmental and patient's temperature change? – Evaluate recent surgical sites – Treat symptoms – RELIEF? – Observe for ingrown toenails – Anesthetize, debride, treat for infection – RELIEF?

Evaluate for Gastrocolic Irritation ⇔ Tube feeding given recently? – Too rapid? – Treat – RELIEF? – Too cold? – Treat – RELIEF? – Too large a volume? – Treat – RELIEF?

Gender specific ⇔ Males: Genitalia pinched? – Correct – RELIEF? – Condom catheter too tight? – Remove catheter – RELIEF? – Reflexogenic erection? – Remove condom catheter and clothing – RELIEF?
Females: Menstrual cramping? – Treat – RELIEF? – Uterine contractions? – Treat – Evaluate follow-up – Vaginitis? – Treat symptoms and infection

TREATMENT REMINDERS

1. Sit patient up.
2. Check BP often and treat elevated systolic blood pressure (>150) until cause is found and eliminated.
3. Medications commonly used for elevated BP are:
 - Nitroglycerine Paste. Apply 1-2 inches to skin q2hrs above the level of injury. May wipe off if BP stable and reapply if needed.
 - Nifedipine 10 mg capsule (immediate release form). May repeat in 20-30 minutes if needed. Avoid sublingual which can cause abrupt hypotension.
 - IV Antihypertensives. These are secondary agents to be utilized in a monitored setting.
4. Treat symptomatic hypotension by laying down the individual and elevating the legs.
5. Anesthetize noxious stimuli prior to removal to prevent exacerbation of AD.
6. Monitor symptoms and BP for at least 2 hrs after the resolution of an AD episode.
7. Admit the patient if response to treatment is poor or cause has not been identified. AD can lead to seizures, stroke, or death.

UAB SPAIN
REHABILITATION CENTER

Medical Rehabilitation Research & Training Center
on Secondary Conditions of Spinal Cord Injury

UAB Model Spinal Cord Injury Care System

Follow-up: Call UAB MIST line (1-800-822-6478) to contact UAB Rehabilitation Medicine physician at Spain Rehabilitation Center, or contact patient's private physician for questions and follow-up.

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