SHOULDER-NECK STRAIN SYNDROME (SNSS)
SHOULDER-NECK-STRAIN-SYNDROME (SNSS)

Shoulder-and-neck-strain-syndrome (SNSS) is the most common MSD (musculo-skeletal disorder) of the upper body. It is also the most common CTD (cumulative trauma disorder) encountered by the occupational medicine physician.

SNSS symptoms range from a “tight neck” with or without headaches to severely incapacitating neck, shoulder, arm, wrist and hand pain / weakness. At its worst, it can culminate in a complex regional sympathetic dystrophy (CRPS or RSD). Although the pain comes from pinched nerve trunks or muscle cramping in the front-side of the neck, SNSS symptoms mimic carpal tunnel syndrome, wrist and forearm tendonitis, epicondylitis, rotator cuff injury, cervical strain, thoracic strain, non-cardiac chest pain, and cervical disc injury.

The Shoulder-and-neck-strain-syndrome (SNSS) is incredibly common. Once understood, it can be one of the easiest CTDs / MSDs to identify, diagnose, alleviate and cure.

The pain of SNSS can be felt:

1. **locally**, in the neck and upper shoulders where the muscle spasm areas are located;
2. **both** the neck and upper shoulders, as well as in the shoulder joint area, arm, or hand… even though the originating muscle spasm / strain is only in the neck; and,
3. **solely** in the head, shoulder, arm and / or hand without symptoms in the neck, although the source of the pain is in the neck muscles.

Pain sensations are produced by nerves that are pinched and by cramping muscles that are strained or ischemic.

Small parts of over-fatigued neck muscles spasm into cramped, hardened knots that become ischemic creating local and referred pain. Nerves of the cervical and brachial plexus are compressed and bruised between scalene muscles, pectoral muscles, first rib, clavicle, coracoid process, and local surrounding ligamentous structures.
SNSS pain is best characterized and treated as a neuro-myo spastic condition (nerve & muscle spasm / irritation). SNSS pain travels along the sensory and sympathetic nerve circuits that originate from spinal nerves C-5 through T-1. They form the cervical-brachial plexus and contribute to the sympathetic plexuses. The brain erroneously pinpoints the pain to the site that is serviced by nerve structures pinched or to sites that share sympathetic innervations with the nerve receptors in muscles that become ischemic.

Anatomy of the thoracic outlet area where SNSS pain originates:

Specific and anatomical names that describe symptoms of SNSS (see below, left) are: A = scaleneus anticus syndrome (SAS); B = costo-clavicular syndrome (CCS); and, C = hyper-adduction syndrome (HAS). Broader terms include: weak thoracic outlet syndrome (TOS), multiple-crush syndrome, etc.
Symptoms

Frequent comments by those with SNSS from muscles in spasm or from pinched and bruised nerves in their neck are: "My arm goes numb at night; I have to shake it to wake it up." "I sleep all over the bed and toss and turn all night." "My arm goes numb while...driving (writing, using a wrench, sweeping, using the mouse, etc.)" "I wake up with a headache." "I get a headache (every morning, or) later in the day." "I think I have carpal tunnel."

Carpal tunnel syndrome (CTS), pronator teres syndrome, epicondylitis, forearm strain, rotator cuff injury, or cervical disc disease have many of the same symptoms as SNSS. The differing conditions may mimic, overlap, aggravate, and/or precipitate each other. Understanding the likenesses and differences is important for whichever diagnosis and for removal of the causes.

Who is vulnerable?

SNSS is as common as low back strain. People particularly vulnerable to SNSS are: short women working at a desk or counter; those who've had whiplash injury of the neck; long-waisted, short-armed individuals; those who work or sleep with a cold draft on the neck; and, those with chronic allergies or rhinitis. Occupational occurrences are common in dental hygienists; mail carriers; low-exercise, office workers; file clerks; hairdressers and barbers; computer operators wearing bi- or tri-focal glasses; keyboard operators working without forearm support, etc. SNSS is frequent in the person who does repetitive tasks without changing positions; and it is infrequent in the limber athlete or yoga practitioner. It can be started or worsened by whiplash injury to the neck. Like any nerve-muscle spasm Injury, It can be made worse by psychological stress.

Diagnosis:

History: Is there numbness, pain? When? What aggravates it? What makes it better?

Observation is the start point for the examination. Look for:

a) Are there persistent sniffels or a need to breathe through the mouth?
b) Is there protective posturing of the the shoulder, arm, or wrist?
c) Are they carrying a backpack, a large purse, or a large bosom?
d) Are they repeatedly on the telephone, balancing it on the shoulder?
e) Are they frequently leaning sideways, supporting the upper torso on one elbow?
f) Are there anatomical predisposers: long-waist, or short-arm, -leg or -hemi-pelvis?
g) Are they wearing trifocals?
h) Are there facial asymmetries?
  - A slight droop to the upper eyelid? A rise in the lower eyelid? A lowering of one cheek?

Examination:

Always examine both sides whenever there is any complaint in the neck, upper back, chest, shoulder, arm, elbow, forearm, wrist or hand. Examine both sides together palpating the less symptomatic side first, then both sides together. What follows is a minimum exam.
1. Start with a fairly quick overview, gentle palpation of:
   1) the upper shoulder muscles, particularly the trapezius and the levator scapulae; then,
   2) the anterior neck, esp. the sternocleidomastoid, the inter-scalene area, the costo-clavicular angle, below the clavicle over the 2nd rib; then,
   3) the posterior cervical and thoracic spine (costo-vertebral) joints; then,
   4) the sternum (costo-chondral joints) and associated muscles; then,
   5) the supra-spinatus and the scapular muscles; then,
   6) the shoulder - coracoid, AC joint, acromion, biceps tendon, along with ROM; then,
   7) the upper arm, particularly of the triceps muscles; then,
   8) the elbows, ulnar notch, epicondyles, and the supinator and brachioradialis muscles.
   9) the forearm with particular attention to the pronator teres (medial) and the radial tunnel (lateral); then,
   10) the mid forearm extensor and flexor muscles; and then,
   11) the wrist with the carpal tunnel (Phalen's) and the thumb (Finkelstein's).
   12) Finish by repeating and focusing on positive areas.

Tests, a little more specific and confirmatory of SNSS:

Alleviation of symptoms (pain meds, immobilization, physical medicine…) is not adequate treatment. Adequate treatment requires identification and removal or modification of the causative factors (behaviors and ergonomics in activities of daily living and at work, anatomical imbalances, environment, sleep position, etc.). Next is reversal of the anatomical dysfunction. This is, finally, followed by alleviation of pain with medication or injection.

Multiple/ cumulative causes. Rarely is there a single factor in the causation of SNSS. Cumulative, multi-sourced, repetitive trauma is the rule with rare exceptions. Correction of one obvious precipitant factor may help toward recovery, but it rarely eliminates the problem into the future. Without identification and elimination of the multitude of causative factors, SNSS and other CTDs and MSDs will recur.

Associated conditions. Reminder: SNSS often co-exists with, aggravates, or may be precipitated by other independent MSDs of the upper extremity, as well as, by anatomical variations: uncorrected leg- or hemi-pelvis lengths, scoliosis, unaccomodated short-arm short-leg anatomy. If evaluation focus is limited to only the most obvious symptoms (i.e., wrist pain, hand numbness), the diagnosis and the resolution are delayed or even missed.
Treatment (Fix):

Treatment for SNSS is straightforward. Start with detective work. Follow with modification of behaviors and of the human-environment interface (ergonomics). Alleviation of symptoms (drugs) plays a non-essential supporting role. Physical medicine can be a very useful facilitator of recovery -- after the behavioral and environmental modifications are started.

Surgery is rarely indicated. Medications serve to minimize and mask the symptoms. Inciting behaviors and human mechanics at work and at home must be identified and eliminated. Partial identification and partial elimination does not suffice. The faulty mechanics that contribute to SNSS occur in multiple ways throughout the 24 hours/ day and seven-days/ week.

There are 168 hours in a week (7 x 24). In that 168 hour week:

- 168 hours are spent breathing
- 48 ± 10 hours are spent sleeping: in bed or down
- 120 ± 10 hours are spent are out of bed, balancing torso, head, neck and arms
- 45 ± 15 hours are spent standing/ walking
- 45 ± 15 hours are spent sitting
- 10 ± 5 hours are spent driving/ riding In transportation
- 5 ± 5 hours are spent grooming
- 5 ± 5 hours are spent exercising, fitness/ sports

Human engineering (ergonomic) considerations must be examined when investigating the contributing causes to SNSS. The most common contributors are:

Breathing, allergies> Any increased resistance to air flow activates and fatigues the scalene muscles, which are the secondary muscles of respiration. [The usual cause for nasal obstruction is allergy and infection. Other causes are asthma, bronchial irritation with unhealthy air, abdominal constriction (whether by obesity, tight clothing or stilted posturing), and with mechanical airway obstruction (as with sleep apnea)].

When there is airway obstruction (allergy), the scalene muscles are particularly stressed. Breathing problems, allergy obstruction and the work of breathing are all magnified at night. Over worked scalene muscles bruise the cervical plexus nerves.

Fix> Take particular care to keep the airway clear from allergic swelling to decrease stresses on the scalenes and to allow sleep-time recovery. Remove known allergens -- particularly cats. For allergic rhinitis-sinusitis, nasal-steroids and non-sedating antihistamines with or without slow-release pseudoephedrine are safe and the first remedies of choice. CPAP may also be indicated.

Sleep position> Is probably the very most important behavioral condition that affects the vulnerability to and the onset and resolution of SNSS. The neck (scalene) muscles are prone to twist and bruise nerves (the cervico-brachial plexus) if the head is jammed to one side or if an arm is pulled up and kept overhead at night. This occurs during side sleeping (with pillow under shoulder) or with stomach sleeping or back sleeping with the arms overhead.
Nighttime recovery from daytime strain is hindered by dysfunctional sleep positions. The most injurious sleep position is stomach-sleeping. Twisted side-sleeping with no head support or with a pillow pulled under the shoulder is second. With back-sleeping there is resultant muscle cramping or nerve injury when the elbows are held overhead or placed flat down on the bed. Pinching the nerves and twisting of muscles at night may cause symptoms of numbness and tingling that wake the person up. SNSS symptoms are often worse in the morning.

Fix> Without correct sleep position, SNSS rarely resolves. Learn and use safe sleep position: on the side with a supporting head pillow and squared-off shoulders, or on the back with pillow under the knees and elbows below chest height and supported above bed level.

Chairs, sitting - position, balance> Sitting (or standing) tilted or twisted is a major contributor to SNSS. This occurs when the spine is curved and forms “S” or “C” configurations must be balanced by static muscle spasm. This distorts structures and causes injury. Pay attention to:

a) Unequal hip height. (This may be from a structural short or tilted hemi-pelvis, found in 60+% of people, or induced with a hard object –wallet- in a back pocket.

b) The absence or non-fitting of arms on a chair creates need to for twisting to give provides ongoing support of the upper body.

c) Ill-fitting arm-elbow supports. Fixed arm supports are usually wide spaced – 21”- and “standard” height -“8 ½”-, which means that they won’t fit 80% of the population, i.e., anyone who is not very wide or anyone (40%) who is relatively long waisted or short-armed. (Airplane armrests are 8” and lower.)

d) The automobile “cock-pit” rarely fits or supports both elbows-forearms at proper height – this needs correction.

e) Couches or overstuffed chairs promote prolonged sitting with twisted back and neck.

f) Home chair fit is as important or more so than work and transport seating.

Fix> Place elbow-forearm supports on the lap and supporting the elbows on airplane rides, in autos, in any seated position that doesn’t fit like a custom cockpit.

“Balance the bottom.” Place a folded towel or something soft and supportive under the short hip. Support the elbows-forearms whenever sitting for more than ten minutes at a time.
Keep wallets and everything else out of back pockets. Use chairs with working 6-way adjustable arms. Tailor chair arms and the cockpit of the automobile individually. Use cushions, supports... whatever to insure that the spine and neck muscles do not carry the extra burden of static twisted positions.

Standing position> Shoulder-neck muscle strain occurs when:

a) The shoulders are held up in a shrugged position to elevate the elbows for work at a desk, table, counter, computer, cash register or sink.

b) The work surface is low, stretching and straining neck, shoulder and upper back muscles.

c) Prolonged standing is necessary for people with standing loss of arch height (70+% of the population have symptomatic flexible pes planus). This causes hip and back pain which needs accommodation by twisting and leaning.

d) Unequal effective leg-length (+/- an unequal hemi-pelvis height) is present in 60+%. This results in an accommodative scoliosis (curved spine) with standing and myofascial pain in the low back (quadratus lumbarum) and hip (gluteal) muscles. Leg-length/ hemi-pelvis inequality results in twisted static standing & sitting.

Fix> a) and b) Use adjustable work surfaces (add or subtract accommodative platforms on the floor or the table) to adapt for different standing jobs and individual anatomy.

Work Surface - writing surface Position>
There must be forearm-elbow support so that the neck and upper back muscles do not have to support a prolonged static load.

Fix> A work surface must be at or slightly below relaxed elbow level. The shoulders should be “stored” in an un-strained position. Six way adjustable armrests should be standard for prolonged deskwork unless there is a built-in elbow-height counter to rest on. If chair elevation is used to accomplish the appropriate elbow-arm position, a footrest may be needed to keep the relaxed knees at least as high as the pelvis to prevent back strain.
1.

**Telephone Usage**> Cradling a telephone receiver between the shoulder and ear while writing, reading, driving, typing or rifling through files is a very common source of neck and shoulder muscle spasm.

**Fix**> Use a telephone headset (or speaker phone) both at work and at home.

**Keyboard and Mouse Level**> Placement of the computer keyboard on top of a standard desk or on a platform that requires the arms to be held in static elevation. The pointing device, unfortunately usually a mouse (an ergonomically archaic Implement), is at an elevated reach.

**Fix**> Correct keyboard level is at or below a relaxed, supported arm-elbow level. The pointing device -- preferably a mouse alternative, i.e., trackball -- must not require elevated reaching. Wrist rests for the keyboard and trackball help. A reverse-cant, contour keyboard with detachable number pad is often least injurious. Placement of the number pad crossed in front of the keyboard is a good ergonomic position.

**Driving position**> Arms held near the top of the steering wheel (position at two o'clock and ten o'clock) require quickly fatigue neck and shoulder muscles and often pinch neck nerves.

**Fix**> Drive with hands in an unstrained position -- (palms facing inward near the bottom of the steering wheel --five o'clock and seven o'clock). Wrap the steering wheel to increase friction and decrease vibration. Make the car “cockpit fit” with tailored forearm-elbow support.

**Stick-shift vehicle, (& mototcycle throttle)**> A stick shift vehicle is a major cause and aggravor of SNSS. The twisting and torque, as well as the vibration, of the forearm-wrist are transmitted into the neck. The unsupported arm position and the vibration magnify the strain and injurious situation. Right side SNSS, carpal tunnel, epicondylitis, shoulder injury, fibromyalgia do not usually resolve while the individual still drives a stick shift.
1. Stock shift vehicles (and motorcycles) may be fun and entertaining; however, the “cost” for keeping a stick-shift vehicle or motorcycle when there is a shoulder injury or an MSD of the neck, upper extremities, back or lower extremities is immense. Find another mode of daily transportation ASAP.

Fix> Writing Instruments, Tools: static grip strength > Thin writing implements with poor grip friction and smooth-handled tools require significant pressure to hold and operate. The strain -- transmitted up into wrist, forearm, shoulders and neck -- causes SNSS. Low friction grips require greater gripping strength and magnify vibration injury.

Fix> Use a widened, high-friction grip writing instrument equipped with an easy ink flow. Use balanced tools with high-friction handles (i.e., rubber friction-tape), shaped and padded to decrease grip-hold intensity.

Shoulder straps, loads, posture> A shoulder or shoulders held shrugged to carry/ balance purse, backpack, brief case, bra strap, etc. keeps the neck muscles in prolonged contraction and pinches nerves. The same happens with stiff postures such as a military brace, “head straight, shoulders back.” Very forward leaning slumb does the same.

Fix> Avoid shoulder straps. When used, they should be wide and not slip and cross the body. With a backpack use both straps, hip support and cross-chest straps with back packs. Carry a light purse or brief case -- and not on the shoulder. Try a "T" bra or sports bra to keep straps from slipping. Avoid “stilted” posturing (that’s what women’s shoulder pads are for).

Is Shoulder-and-Neck-Strain-Syndrome a Work-Related Disease?

SNSS is often partially work-related, sometimes mostly work-related. Usually it takes work and non-work activities to precipitate; Also, it takes change in both to get better. Most Continuous trauma disorders (CTDs) have multiple causes.

Addendum:

Prolonged forced static and twisted postures of the arm-shoulder-neck are key to causation. There is no magic pill, surgery or remedy for Shoulder-and-Neck-Strain-Syndrome Resolution requires behavioral and postural modification. Appropriate ergonomics must be employed standing and sitting, at work and at home, at play and during sleep.

Adequate prevention and treatment requires:
--- Identify all the motions, activities and postures that precipitate and aggravate SNSS during work and non-work hours. Remove the causes of fatigue in the neck and shoulder muscles through ergonomic, common-sense modifications of the work and non-work environments.
--- Exercises to avoid: Avoid impact-loading exercises to include jogging, jumping rope, step aerobics, and high-impact aerobics. Avoid power lifting, repetitive over-head or behind-the-back weight machines, unstructured weight lifting - no straight bar. Do stretching routines.

--- Exercises to do: Scalene stretches (below –hold for 40 seconds by the clock), learn diaphragmatic breathing to relax the neck muscles, yoga, swimming, water aerobics, non-contact martial arts, level walking on non-concrete surfaces with comfortable absorbent shoes, long warm-up and long cool-down for any strenuous exercise.

--- Medications: Aspirin and Tylenol are about as effective as the non-steroidal anti-inflammatory drugs (Motrin, ibuprofen, Aleve, Naproxyn, Vioxx, Celebrex, etc.) in decreasing the discomfort of SNSS. However, their effectiveness is usually disappointing.

--- Several Rx anti-neuro-myo-spastic agents (Neurontin 100 to 300 mm – occasionally, Baclofen 5 to 15 mg) on an as needed schedule have value in decreasing the pain level and diminishing spasm. They may cause initial sedation but are useful in low dosages for day relief or a little higher dosage for sleep. Individuals have different tolerances for the sedative effect; each needs to work out their own best routine. The safety range for neurontin is quite wide.
These communications are general. They in no way represent any professional recommendations for treatment. There is no treating relationship between this author and the reader, nor is any intended. This is for educational purposes. Medical care should be directed by a knowledgeable health care professional.

This author neither endorses nor has any relationship with any product or pharmacologic agent mentioned. Any comments are his current thoughts, based upon his current knowledge and opinions. These are always quite subject to revision or change. --jsgillick

Behavioral modifications toward sensible and non-injurious activities of daily living should be dictated by what makes sense and is sensible. --jsgillick