Carpal Tunnel Syndrome

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INTRODUCTION

Carpal Tunnel Syndrome is one of a group of common injuries that result from repeated trauma. In the case of CTS, the injury is caused by repeated movements of the wrist over a period of time. Because this syndrome is suffered by workers in almost every profession from housekeeping to rocket science, it is important to know its symptoms, causes, and prevention. Low-level readers may be especially vulnerable because their ability to access information and to articulate problems is limited.

The carpal tunnel is the space in the wrist that is bounded on top by the carpal bones and on bottom by a ligament. Through that tunnel the tendons, blood vessels, and the median nerve pass from the arm to the hand. Repeated motions of the wrist cause tissues in the area to swell and, since the carpal tunnel is a small space, the swollen tissues begin to press on the median nerve, causing it to tingle. The median nerve is the same nerve that causes sharp pain when one hits one's elbow. The pain of CTS is that same terrible pain with the primary difference being that it continues for a long time.

Usually the first symptom of CTS is a severe tingling in either or both of the sufferer's hands at night. This tingling sensation is severe enough to awaken a sleeping person. Many people suffer from this night pain for many years before realizing that it is job related.

The pain is variously described as tingling, my hand is asleep, numbness, or throbbing. Many sufferers discover that hanging the affected hand and arm off the side of the bed helps to relieve the pain. Others try soaking in either hot or cold water, using elastic bandages or other means of immobilizing the hand, and whatever else occurs to them. The discomfort is such that every sufferer makes some effort to cope with it.

This curriculum was developed with the GED students in a workplace education program in a manufacturing plant in Chicago. They were between 33 and 66, male and female, African American and white, and represented several different job categories within the plant. Although all were reading at least at the eighth-grade level, the materials developed could be easily adapted for use with lower-level readers. Language development was the main focus but since many students were interested in math, some cross-curricular work was used as well.

This project was not intended to be a seminar on CTS solely to inform students of the problem and responses. Rather, it was intended to use CTS as a means by which the students could develop the skills they needed to solve health and safety as well as other problems that they might encounter in the workplace.

TEACHERS' GUIDE

PART I – SETTING THE SCENE

In this particular class it was easy to introduce carpal tunnel syndrome (CTS) because one of the students had just returned from wrist surgery for CTS. Since CTS is so common this may well happen in other classrooms, too. Sometimes you may notice a student dropping her pencil and shaking her hand or letting it hang straight down or another student may have an elastic bandage or other restraining device on his wrist. This is an excellent introduction to the subject: Ask the student to explain.

Whether or not a chronic sufferer of CTS is present, most people have either suffered temporarily from it or have known someone who has.

Each student kept a three-ring binder of all our materials and their notes and writings to use as a reference book in the future.

Included is an overhead I traced from the Random House Encyclopedia of Anatomy that I used to introduce the subject and to aid in explaining it. I handed out photocopies of the same sheet and students labeled and colored them for their own reference books.

All writing was begun with "clustering," (see: Writing the Natural Way) an exercise in which the student writes his main idea on the board and then writes down everything that occurs to him relating to it to facilitate creativity.

STUDENT WRITING STEPS

The following writing method was found in the GED class to be successful. It allows students a chance to order their thoughts before writing and to get inspiration from a general discussion of the subject.

The pre-writing discussion makes beginning the writing easier because it opens up the subject.

The clustering helps to focus the student's ideas.

The reading and questioning helps students make their own writing clearer and helps them to "fill in the gaps" --- those pieces of information they know but forget to write because they take for granted that everybody else also knows.

Allowing students to edit their own writing for grammar and spelling allows them to learn grammar and spelling in the context of their own writing, thereby making the rules meaningful to them instead of an abstract idea that bears little relevance to their own lives.

By printing or typing the student's work, you give her a chance to see her writing in a new light. She may realize that something she thought was there isn't. She also has space to make changes – to learn to edit – on the page without having to physically rewrite the whole piece. Many students find writing laborious and welcome a chance to improve their communication skills without so much rewriting. Many also enjoy seeing their words in print.

The editing and rewriting is repeated until the student is satisfied with the writing and decides to enter it in his reference binder.

Pre-Writing Discussion and Clustering Exercise

1. Pre-writing discussion of subject in class.

2. Class free-associates and cluster ideas on marker board.

3. First cluster is examined for
   A. irrelevant ideas (cross out)
   B. themes.

4. New cluster for each theme is drawn.

5. First draft of paper is written.

6. Paper is read aloud to class.

7. Author answers questions about paper and uses the questions as a guide to add clarity in the second draft (students write their questions and give them to the author.

8. Second draft is turned into teacher who prints it out or types it up, triple spaced and returns it to the student for editing. The teacher schedules a grammar class for the day she returns the papers. Using a list of errors found on the papers, she discusses each - one at a time - and gives the students time to look on their own papers to see if they can find and correct the problem.

9. Corrected text is returned to teacher who enters the corrections and gives the students corrected texts to continue editing or, when the student is satisfied, put into their reference binders. The teacher may also use misspelled words from the papers to discuss spelling rules.

INTRODUCTORY CLASS DISCUSSION

On the first day I used the overhead to explain CTS and allowed class time for the students to label and color their Anatomy of the Hand worksheet.

Next I asked the student who had had surgery for CTS to tell the class of her experience. While she spoke I modeled "clustering" (see copy on next page) on the board.

When she was finished, the class questioned her and I continued to add to the cluster.

Some Students added anecdotes of their own about CTS.

After the discussion, the class studied the cluster and found three general categories within it: treatment, cause, and symptoms. They made three new clusters, one for each category.

The class split into two groups to make a list of questions about CTS. One group made a list of questions to determine if a person had CTS. Another group wrote questions to use to look at a work site for CTS potential.

Each group listed their questions on the board and the class discussed them. Some question were found to be too vague, others not related, and some just right. A final set of questions for each category was created on the board.

Each student copied the questions from the board and put them in their reference binders.

The rest of class was spent writing. Each student used the CTS clusters to write a short paper about CTS.

Before leaving class, students brainstormed a list of sources of information about CTS (union, doctor, OSHA, etc.) and said they would commit to accessing these sources.

SAMPLE STUDENT CARPAL TUNNEL STORY

I had bid on and gotten a new job as a die setter. When I used to operate a forklift truck I had noticed that my hands got sore, but that job ended before I got bad. Once I had slammed my right hand in between the elevator doors because of the way the strap was, but there was nothing broken. Once, after banging my hand, while I was die setting, my hand got really numb the next day and the numbness wouldn't stop. I was sent for x-rays then and was told that I may get carpal tunnel syndrome in the future.

My hands were sore every evening after die setting, but I thought I just had to get used to the job. I noticed my wrists tightening, like a rubber band, and then eventually at night my hands would start to tingle when I was trying to sleep. It would wake me up. Then it got to where after working my hands would start to throb and my wrists would burn and I would have to put ice on them to stop the pain. I found out about the ice when I was in one of the doctors' offices, he gave me an ice pack and it like numbed the nerve and settled it down.

One Dr. treated me with warm water whirlpool because that had helped with other injuries in my hands but this time it caused my nerves to throb so bad you could actually see the nerve in my wrists jumping (and I was sent from work to a little clinic) real bad so he sprayed my wrists with liquid nitrogen, but that time it made me much worse. My skin turned a whitish color from the liquid nitrogen spray. He sent me back to work with ice and to go to the nurse a couple of times for ice. I went back to work but my hand was hurting so I went home.

I had already had an operation on one hand for carpal tunnel on my right hand and now my left hand was hurting. The first time I had worn braces, taken cortisone shots and that had helped with my left hand, but my right one was worse. I saw my own physician who said my right hand definitely had carpal because I couldn't hold the phone for 5 minutes before my hand would start throbbing. Two months after I went back to work my carpal tunnel was back. During that year I was off a total of seven months.

I went back to die setting (four weeks after the operation) and both hands started getting sore, especially the left hand. I went back to the Dr. and did light duty at work using only my right hand, that caused my right hand to start getting bad again. I found out the Dr. had done a new style of surgery where he took microscopic cuts and did not cut my whole tendon, so my right wrist got sore again. I had the operation done on both hands this time. That was two surgeries for my right hand and one on my left.

I had taken Naprosine and Vivacon for pain, and some other pills that seemed to help best. Motrin upset my stomach and gave me bad side effects like forgetting things. After the second operation on my hands I went back to work after six weeks. I went back to die setting on full duty and my hands started hurting again. I figured I would just try to bid off the job, which I eventually did.

Now I am working in shipping and my hands are better. Sometimes, though, when we have to do extra work like at the end of the month when they start tingling again. This time the tingling is a little different, on the opposite side of wrist and starts before I even leave work. My doctor said he'd never heard of that. Most of the time, though, I wear braces for support and have just a little soreness. Without the braces, it feels like I have twisted my wrist after a night of work. This job is less money than die setting. I am going

to see a hand specialist for insurance on the 16th of this month and I will tell him about the new tingling.

I am taking computer classes in school and the typing affects my carpal tunnel right away. I don't know if it is cured or what. I don't know what I'll do in the future. The burning feeling goes up my arm now, it doesn't stay in my wrists. When you asked me to write about this, I didn't want to do it because I didn't want to think about the pain. One foreman here gives his people braces to wear at work so they won't ever develop problems. I wish I had had that from the beginning.

SECOND PROJECT

Having learned what carpal tunnel syndrome is, what some of the symptoms are, and what contributes to it, it is time to look at the work students perform to evaluate the jobs for CTS potential. The teacher continues to model clustering on the board during each interview.

1. Students are asked to summarize what they know about the causes of CTS. A Student lists the causes on the board.

2. Each student is assigned another student to write about.

3. One at a time, each student is questioned about his own job. The rest of the students ask the questions using the list on the board and the questions they had developed in the first session. His answers are recorded by the student who will write about him.

   If the questions are too vague or too far off the mark, the teacher can ask the class to reexamine their goal, to evaluate for CTS. The purpose of this exercise is to learn to focus.

4. The student is asked to pantomime his job while the others watch for movement of his wrists and take notes (cluster) about what they see.

5. More questions will be raised by the pantomiming. If he picks up tools, the nature of the tools might be examined. If he uses vibrating equipment, they should ask if the grips are padded, etc..

   Note: If the class is too large, follow these steps with one student as a model then break the class into work groups of three or four people to continue.

6. Students should use their clusters to write an evaluation of the work of the person they were assigned.

USE OF CARPAL TUNNEL SYNDROME IN MATH CLASS

Since the angle of the wrist and the amount of flexing it is subjected to are both important, have the students measure their work sites to make a schematic drawing.

1. Distance from floor to work surface.

2. Layout of work surface , distance between tools, parts, machine buttons, etc..

In class, each student should put the schematic of her own work site on the broad then, facing the drawing, pantomime her job.

If a bright light (such as a trouble light) is placed behind her, her shadow will operate the schematic drawing. Another student can use a straight edge to draw the lines of her wrists and arms at various stages during her work process.

The lines of angles formed by her wrists and arms can be measured! This is excellent practice in use of measuring equipment, working with angles, and a practical use for fractions because it is hands-on, relevant to needs of the students, interactive, and encourages knowledge of math in the practical world. If a student's schematic and pantomime show that he has to pick up a part from the table to his left, transfer it to the machine in front of him, cup his hand around it and wiggle it to seat it properly, add another piece to it (that he's picked up with his right hand), then reach up to depress buttons that are a foot over head, then grab the part and wiggle it to loosen it, pull it out with his right hand as his left is reaching for the next part, then there should be a wrist angle drawn for every single flexing. Each person will probably generate many, many wrist angles.

USING WRIST AND ARM ANGLE DATA

If the class is small, do each person's data on the board. If the class is large, model the first person and then break the class into pairs. Each pair will evaluate each other's job for CTS, using the wrist and arm angle data. They will write their findings.

1. List each the flexing that deviates more than a few degrees from 180.

2. One at a time, list the reasons for the flexing

3. For each flex, consider alternative ways to perform the same task.

4. For those that can't be changed, consider ways to give the operator a break (can the job be shared with another, so they spell each other?)

When there is a written summary of each person's job, its potential for CTS, and possible preventive measures follow the steps of reading aloud, questioning, 1st draft, grammar editing, etc. as described before.

HOW TO EVALUATE TREATMENT FOR CARPAL TUNNEL SYNDROME

There are many ways to treat CTS. Some doctors recommend surgery to open up the tunnel to relieve pressure inside, others use prosthetic devises to hold the wrist straight, and there are many other treatments involving steroids, anti-seizure drugs, etc..

If your students work in a unionized shop, have them invite someone from the union in to discuss CTS with the class. A doctor from an occupational medicine clinic may agree to speak. Information may also be gotten from local OSH groups (CACOSH-Chicago Area Occupational Safety and Health is one example) or from OSHA regional offices.

Workers often decide to take measures themselves. A tour of the job site will turn up people with wads of masking or duct tape wrapped around tools in an effort to pad them, some workers wrap tape around their wrists or wear athletic wrist bands. In addition, many devices can be purchased in local drug stores or from catalogs geared toward the infirm, toward workers, or toward the disabled. Not all of these devises will help the CTS sufferer. Some of them may even make the problem worse.

If any student is using wrist braces or elastic bandages, have the student explain how the prosthetic devices work.

I am including products I found in Modern Wisdom, Dr. Leonard's Health Care Catalog, Improvements, Self Care Catalog, an office supplier, and a newspaper. One student brought the catalogs to me. Her mother, who suffers from arthritis, who has bought some aids to help her get around receives these catalogs. You might ask your students if any receive these or similar catalogs.

I gave photocopies of each product's picture and description and asked the students to write a short evaluation. Using the following worksheet questions to guide them.

WORKSHEET QUESTIONS:

1. What is the name of this product?
2. What does it claim to do?
3. What details in the picture make you believe it will work?
4. What details in the picture make you think it won't do the job?
5. Take a position for/against using this product for CTS. Support your position with details from the picture and copy as well as from information you have learned in this class.

THREE USES OF COMPLETED SUMMARIES

It is not enough to simply learn what may be causing (or has the potential to cause) CTS. Students also need to know how to use it.

I:
Have one student volunteer to pretend to tell his supervisor about his study of his job. Have another student be the supervisor. Use the board to record what they say, writing it like a play script.

Have the students evaluate each skit. This will give you a good idea of the kinds of supervisors your students have to deal with! It will also provide several different scenarios to use as models for the final play.

Let the class discuss each skit and look for places in the action where the student could have changed his approach to get his point across. Not only will this provide writing practice, but is also encourages positive behavior changes that will allow the student to have better control of the outcome in worker-boss confrontations.

The final skit can be performed at a union meeting and/or taken to the greater community via performances in libraries and other public venues. This not only informs the public about a potential problem they face in their own workplaces, but it provides for good union-community relations.

II:
Have each student evaluate those movements in her job that may contribute to CTS.

She should include possible solutions to any problems she mentions. For instance, if she has to use a pair of pliers to reach inside a case to grasp something, she might suggest pliers with a bent handle so that she does not gave to flex her wrist every time she performs that action; if she has to knock something into place with a hammer, she might suggest a fixture that opens to put the part in and then closes around it; if she has to hit operating buttons placed vertically in front of her, she might suggest changing the buttons to a horizontal position so her wrists can remain straight; if she has to pull or push stiff clamps down, she could suggest pneumatically operated clamps.

III:
The final writing assignment (following all of the steps for 1st draft, editing, etc.) should be a written proposal to the company that clearly states the problem and offers suggestions for its alleviation.

It should be left up to the student whether or not to turn his proposal into the company. These classes are to allow the students to learn to find information, to evaluate information, and to make decisions based on his work. The decision must be left to him. The teacher can rest assured that the student has a solid body of information and some good practical experiences to use if her or she chooses to do so.

ADVANCED STUDENT USE OF ALL MATERIALS

One student who was an officer in his union local decided to put together an informational piece on carpal tunnel syndrome to present at a union meeting.

He enlisted the aid of two other students and they used a four part outline to guide their preparations. The first three parts were about CTS and the last part was a proposal to the union to create a health and safety committee that focused on education of the membership. They worked it out on their own and practiced it before the class to critique before asking to be put on the agenda of a local meeting.

Although each student used his or her own notes, I have included in this report a rough outline from notes I took during their dry run presentation before the class. Included in my outline are some suggestions the class made of things to add.

This would have made a fine project for a video tape for any program that has the equipment available to them.

STUDENT CTS PRESENTATION TO UNION LOCAL OUTLINE

I. Definition of CTS
    A. What is the carpal tunnel
        1. located in wrist
        2. between carpal bones & ligament
        3. median nerve goes through tunnel
    B. Repeated motions cause swelling
        1. twisting (turning lids, wringing cloth)
        2. banging (hammer)
        3. gripping (clamps, pliers)
        4. flexing (keyboard, typing, machine buttons)
    C. Symptoms
        1. Usually start after work
        2. Painful
            a. tingling
            b. numbness
            c. throbbing
II. How to prevent CTS
    A. Evaluate job for causes: questions from class
    B. Prepare suggestions for company for changes
    C. Share time on bad job with others
    D. Use brace to immobilize wrist
        1. During work
        2. While sleeping (to rest wrist)
III. What to do if you think you have CTS
    A. Report to company and ask to see doctor
    B. Know rights under Workers' Compensation act
        1. ask union for help
        2. have right to see own doctor
    C. Treatment is varied
        1. surgery to cut ligament to make room
        2. cortisone or steroid shots
        3. braces
        4. ice or heat applications
        5. anti-seizure drugs
IV. Proposal to create health & safety committee

PROSTHETIC DEVICE PROJECT

Those students who used braces or other wrist restraints at work brought their prosthetic devices to class and demonstrated how they worked.

In one department, the foreman provides wrist braces for the workers as a preventative measure. Those braces were made of elastic and fitted like a long glove without fingers. There was a hole for the thumb and a steel insert that fitted into a pocket extending from the arm, across the wrist, ending at the center of the palm. These prevented up and down flexing of the wrists while allowing full use of the fingers and thumb.

Two students demonstrated braces that had adjustable tensions. One had, in addition to the steel insert, Velcro strips to tighten the apparatus around the hand and wrist. The other used laces along the back of the hand and a heavy leather insert instead of the steel. The latter was difficult for the user to get into and out of, someone else had to do the lacing.

The last types of restraint demonstrated were either elastic bandage type or lace-on but did not use any stiffening device to prevent flexing of the wrists.

USE OF PERSONAL EXPERIENCE FOR ROLE PLAY

One woman told the class of going to a clinic complaining of numbness in both hands. The doctor made splints for both of her hands out of plaster and gauze used for casts for broken limbs. The splints worked like cradles and were open on top, holding her from almost her elbow to her fingers (with a hole for her thumbs) on each arm! The splints were held in place with a complicated wrap of a long elastic bandage.

She said that by the time the doctor was through fitting and tying her into the splints, she couldn't even get her coat on. Both arms stuck out like "a little tin soldier." She was too intimidated to demand a better solution and left the clinic. When she got on the bus, she couldn't get her hand into her pants' pocket to get her token out and had to ask another passenger to unwrap one splint so she could pay.

She added, though, that she had used those splints to sleep in for years. She said she used a pair of her son's tube socks instead of elastic bandages to hold the splints in place. The splints held her wrists straight all night and allowed her to get through the night without pain. Also the time in the splints allowed the wrists to rest and probably slowed down the progression of CTS.

The class used her experience at the doctor's office to role play and practice being assertive. They worked on not being afraid to question treatment, to ask for a different treatment, and to demand a full explanation in plain English of what is happening.

For the role play they created a written list of questions to carry to the doctor's office. This can work for any problem students face and they can create different question lists to carry with them.

UNFINISHED PROJECT: ERGONOMIC TOOLS

Ergonomics is the study of safe and efficient work. It is the science of making the job fit the worker instead of requiring the worker to harm her body to fit the job. Ergonomic engineering is cost effective because it enables workers to work more efficiently and longer because of fewer pains and injuries. One study showed that a company gained about $10 in increased production and decreased lost time for every $1 spent in ergonomic refitting.

To learn what tools are available for CTS sufferers, the student who is a skilled tradesman has requested a special catalog of ergonomic tools from a salesman who services his department. This catalog has not yet arrived.

In the meantime, each student is making a list of all the tools they use at work. They are categorizing the tools as HAND, PNEUMATIC, ELECTRIC.

When the catalog arrives, students will look for safer tools to replace the tools they currently use.

This familiarizes students with what's available and where to look for it and provides information to add to their proposals to the company.

They have discussed what they expect to find in the catalog and will compare their expectations with what is there. They believe they will find flexible shaft tools, pliers with padded and/or bent handles, shovels with bent handles, padded pneumatic drills to lessen vibrations, power hammers, clamps that are easier to tighten, torque wrenches, etc. This sort of speculation encourages creative thinking as well as ordering skills.

When their research of the correct tools for their jobs is finished, they will be able to approach the company, not only with a complaint, but with cost-effective solution to it. This greatly increases the chances of getting management to come to a favorable response. Students can practice writing their health and safety oriented grievances and also role play grievance hearings. They will gain confidence for themselves and a greater understanding of the work their union does for them.