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# An Occupational Therapy Guide for Entry-Level Therapists not Specializing in the Treatment of Upper Extremity Dysfunction: Three Common Cumulative Trauma Injuries

Ryan Edwards

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AN OCCUPATIONAL THERAPY GUIDE FOR ENTRY-LEVEL THERAPISTS NOT  
SPECIALIZING IN THE TREATMENT OF UPPER EXTREMITY DYSFUNCTION:  
THREE COMMON CUMULATIVE TRAUMA INJURIES

by

Ryan Edwards

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A Scholarly Project

Submitted to the Occupational Therapy Department

of the

University of North Dakota

In partial fulfillment of the requirements

for the degree of

Master's of Occupational Therapy

Grand Forks, North Dakota  
August 1, 2008

This Scholarly Project Paper, submitted by Ryan Edwards in partial fulfillment of the requirement for the Degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

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Faculty Advisor

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Date

PERMISSION

Title                   An Occupational Therapy Guide for Entry-Level Therapists Not  
Specializing in the Treatment of Upper Extremity Dysfunction:  
Three Common Cumulative Trauma Injuries

Department           Occupational Therapy

Degree                 Master's of Occupational Therapy

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## ABSTRACT

According to Kasch, Greenberg, and Muenzen (2003), occupational therapists (OTs) who are initiating entry into upper extremity orthopaedic therapy specialization do not have the knowledge and skills of experienced therapists; a concerning viewpoint considering the fairly high rate of cumulative trauma injuries each year in the United States. Carpal metacarpal osteoarthritis occurs in “approximately 8% of all adults” (Hunter, Schneider, Mackin & Callahan, 1990, p. 886), whereas ulnar neuropathy at the elbow occurs in “10 to 15 percent of adults” (Trumble, 2000, p. 327). “Tennis elbow occurs in approximately one third of the tennis population because of the requirements of sustained power gripping and repetitive use of the wrist extensors” (Hunter, Mackin, Callahan, 1995 p. 1816) and there is an overall reporting by the World Health Organization (2008) that one in seven Americans will sustain a musculoskeletal injury. While many occupational therapists subscribe to specialize in this area of patient treatment, there are multitudes of OTs who are required to treat patients with upper extremity orthopaedic injuries in non-specialized clinics. This poses a problem as many entry-level therapists or practicing OTs have limited experience in the areas of upper extremity orthopaedic dysfunction. While entry-level occupational therapy programs often provide overviews of specialty areas, which include upper extremity orthopaedics, an already crowded curriculum provides restrictive time limits and prevents in-depth coverage of these areas. In addition to the limitations of entry-level occupational therapy



orthopaedic exposure, there is a dearth of occupational therapy literature for the entry-level occupational therapist audience. Additionally, literature that does exist is often costly and unaffordable for small clinics in which therapists treat a small number of patients with upper extremity orthopaedic dysfunction. The intention of this product is to provide a cost-effective, comprehensive overview of three common cumulative trauma injuries for the entry-level occupational therapist who is not specializing in the care of patients with upper extremity orthopaedic dysfunction.

To write this entry-level protocol for therapists not specializing in the treatment of upper extremity dysfunction, a search for references was conducted. References that were utilized were derived from a variety of literary sources which included the Journal of Hand Therapy and The American Journal of Occupational Therapy. Pre-existing hand therapy protocols were also used.

This product includes definitions, prevalence, evaluation, and treatment methods of the three most common cumulative hand injuries: lateral epicondylitis, CMC osteoarthritis and ulnar neuropathy. The information provided within the product may be beneficial for use by entry-level occupational therapists who are not experienced with treating patients with upper extremity dysfunction. The handbook will provide entry-level occupational therapists with ideas on which evaluations are commonly used on certain diagnosis. The handbook will also cover the types of treatment interventions used with specific diagnosis along with corresponding timelines when these treatment methods are the most effective.

## CHAPTER I

### INTRODUCTION

#### Statement of the Problem

“Cumulative trauma disorders (CTDs) of the upper body have been identified as one of the fastest growing workplace hazards” (McCauley-Bell, Crumpton, & Wang, 1999 ¶ 2). However, upper extremity cumulative trauma orthopaedic injuries do not occur only at work. O’Neil, Forsythe & Stanish (2001) reported that upper extremity cumulative trauma orthopaedic injuries can occur to anyone who performs repetitive movements which may include tasks that are completed on the job or participating in recreational activities, such as golf or tennis. There is an overall reporting by the World Health Organization (2008) that one in seven Americans will sustain a musculoskeletal injury.

As the prevalence of persons with upper extremity cumulative trauma orthopaedic injuries has grown, so has the demand for skilled therapy. Now, more than ever, entry-level occupational therapists are likely to encounter clients with cumulative trauma disorders. This places pressure on entry-level occupational therapists who are not specializing in the treatment of patients with upper extremity orthopaedic diagnoses. Entry-level therapists must determine the most effective methods of evaluation and treatment for these patients to optimize patient recovery and facilitate their clients’ return to functional occupation. This responsibility may be problematic for entry-level

therapists secondary to their limited knowledge and experience in treating patients with cumulative trauma upper extremity disorders.

Kasch, Greenberg, and Muenzen (2003) reported that occupational therapists who are initiating their entry in to the specialization of upper extremity orthopaedics do not have the knowledge and skills of experienced therapists. A similar phenomenon exists for entry-level therapists who do not specialize in the treatment of upper extremity orthopaedics but are required to treat patients with upper extremity cumulative trauma orthopaedic injuries. One reason for this phenomenon is that entry-level occupational therapists receive a limited amount of training in specialized areas such as upper extremity orthopaedics, including the treatment of upper extremity cumulative trauma orthopaedic injuries during their formal education. Another reason that entry-level therapists may have limited knowledge and skills in the area of upper extremity cumulative orthopaedic injuries is that some may rarely treat patients with certain diagnoses. For example, therapists who work in rural areas may treat patients with a variety of diagnosis rather than specializing in the treatment of patients with a narrow group of diagnoses. Along with this lack of knowledge, entry-level occupational therapists not specializing in the treatment of upper extremity orthopaedics may have a dearth of materials available for them to use to help guide treatment of upper extremity cumulative trauma orthopaedic injuries.

### *Significance of the Problem*

#### *Scholarly Project Purpose and Overview*

The purpose of this project is to provide entry-level therapists who do not specialize in the treatment of upper extremity orthopaedics a treatment guide that focuses

on the three most common upper extremity cumulative trauma orthopaedic injuries. This treatment guide focuses on the cumulative trauma orthopaedic injuries of carpal metacarpal (CMC) osteoarthritis, lateral epicondylitis, and ulnar neuropathies. Each of the three injuries has a definition of the injury, which may be understood by experienced therapist as well as entry-level therapist. The prevalence of each injury in relation to the general population is also reviewed which allows therapists to efficiently relay that information back to their patients. Each injury also has a list of the most common evaluation methods used so that therapists can document progress made over the course of treatment. A list of treatment methods is also provided within the chapters. Treatment methods include modalities commonly used to help treat the diagnosis, stretching procedures, therapeutic activities and therapeutic exercises. Each treatment method also has a list of periods in which the treatment procedure is the most effective. The efficacy of each treatment procedure was also reviewed which will allow readers to determine what treatment method his or her patient will benefit from most, based upon prior research of treatment methods.

The adult learning theory was utilized as the model of practice for this entry-level treatment guide for upper extremity cumulative trauma orthopaedic injuries. This model is based upon the idea that adult learners use a more self-directed approach Knowles, Holton and Swanson (2005). Entry-level therapists will have to be self-directed learners to comprehend and use the information that they have learned from this treatment guide. Knowles et al. (2005) wrote that the adult learning theory is based upon the idea that when new information is learned, adults will relate the new information to information that has that has already been learned thereby creating a deeper understanding of the

concepts as well as a better understanding of how to apply it. Therapists who use this treatment guide should already have an introductory understanding of upper extremity cumulative orthopaedic injuries. However, through reading this treatment guide therapists will develop a deeper understanding of all aspects of the three cumulative trauma orthopaedic injuries in this project. Knowles et al. (2005) also identified motivation as a major aspect of the adult learning theory. It is anticipated that entry-level therapists who do not specialize in upper extremity orthopaedics, but do occasionally treat patients with upper extremity orthopaedic injuries, will want to learn new treatment methods in order to provide the best treatment methods possible to their patients. Entry-level therapists working in rural areas will be motivated to learn new treatment methods for upper extremity cumulative trauma orthopaedic injuries so he or she can provide patients with the same level of treatment that they would receive if they went to a specialized clinic. Professional advancement will occur by entry-level therapists mastering the treatment of certain diagnosis (such as the ones covered in this manual) and by advancing their clinical skills as therapists.

The phrase “upper extremity orthopaedics” within this scholarly project refers to injuries sustained to the arm or hand. The term upper extremity orthopaedic therapy will be used in place of the term hand therapy in this manual. Cumulative injuries refer to injuries that have occurred as a result of repetitive movements. An upper extremity cumulative orthopaedic injury refers to cumulative injuries sustained to either the arm or hand.

Chapter II consists of a literature review which describes the difficulties entry-level therapists have with the treatment of upper extremity orthopaedics as well as the

skills required in order to become experienced therapists. Chapter III consists of the methodology section, which previews the processes that were completed during the course of this scholarly project's completion. Chapter III also highlights key points and trends that are important to the understanding of this project. Chapter IV includes the largest and, arguably, the most important portion of this project, the product. The product not only includes evaluation methods and treatment methods for patients with upper extremity cumulative trauma orthopaedic injuries but also how and when the product should be used in clinical practice, the intended audience, as well as methods of how to present the information to patients. Chapter V includes a summary of the product, plans on how to implement the product, methods of measuring effectiveness of the product and the need for further development of this product.

## CHAPTER II

### LITERATURE REVIEW

#### Key Areas Covered

Chapter II includes an overview of the prevalence of cumulative trauma injuries in addition to an explanation of the specialized nature of the treatment of patients with cumulative trauma injuries in occupational therapy. The requirements required to be certified in the treatment of upper extremity orthopaedics is reviewed. A description of occupational therapy curricula is also examined as well as difficulties associated with being an entry-level therapist who treats patients with cumulative trauma injuries. The availability of resources entry-level therapists have to use in order to guide treatment is also examined.

#### *Prevalence of Cumulative Trauma Injuries*

Repetitive strain injuries such as cumulative trauma injuries have been estimated to affect “1.8 million workers per year” (Bierma & Hembree, 2008, ¶ 22) with an estimated cost of between “17 and 20 billion dollars a year” (Bierma & Hembree, 2008, ¶ 22). Not only do cumulative trauma injuries increase the absentee rate of male and female workers, they also have an effect on the occupations that people engage in when at home. These occupations can be as basic as taking a shower or combing one’s hair. There is also an overall reporting by the World Health Organization (2008) one in seven Americans will sustain a musculoskeletal injury. This rate of occurrence of

musculoskeletal injuries has been slightly decreasing in recent years, however, the National Institute for Occupational Safety and Health (2004) reported that those who are diagnosed with a musculoskeletal injury missed an average 10 days of work as a result of the injury. Each year carpal metacarpal osteoarthritis affects eight percent of the adult population according to Hunter et al. (1990), whereas ulnar neuropathy at the elbow occurs in “10 to 15 percent of adults” (Trumble, 2000, p. 327). Lateral epicondylitis, more commonly known as tennis elbow, has been reported by Hunter et al. (1995) to occur in one-third of all those who regularly participate in tennis. Hunter et al. (1995) credited the high rate of injury towards the amount of strength needed to grip the tennis racquet and the constant use of the wrist extensors when hitting the ball. As a result of the high rate of injury to the upper extremity the specialized area of upper extremity orthopaedics has evolved from within occupational therapy. This specialized area of occupational therapy requires a great deal of skill, training and hard work if a therapist is to get certified in the treatment of upper extremity orthopaedics.

#### *Specialized Practice Area of Occupational Therapy*

A specialized area of occupational therapy is upper extremity orthopaedic therapy, also known as hand therapy. Within this scholarly project upper extremity orthopaedic therapy will be used in place of hand therapy. The treatment of upper extremity orthopaedics is a relatively new, specialized area within occupational therapy. Kasch et al. (2003) reported that until 1989 there was not a certification credential in the treatment of upper extremity orthopaedic injuries. One of the most common orthopaedic injuries is cumulative trauma injuries (as mentioned above). “Cumulative trauma



disorders (CTDs) of the upper body have been identified as one of the fastest growing workplace hazards” (McCauley-Bell et al., 1999, ¶ 2). Despite the prevalence of CTD, entry-level therapists graduate from occupational therapy (OT) school with limited exposure to the treatment of patients with these diagnoses. As a result, occupational therapists may have limited confidence in treating patients with cumulative trauma disorders. This is not only due to receiving a brief introduction on treatment methods in specialized areas, such as upper extremity cumulative trauma orthopaedic injuries while in school, but also because entry-level graduates who work in non-specialized clinics are only occasionally required to treat patients with upper extremity cumulative trauma orthopaedic injuries. Entry-level occupational therapists are not the only practitioners who may demonstrate increased hesitancy or limited knowledge in treating clients with CTDs.

### *Occupation and Function*

Entry-level occupational therapy graduates may only receive an introduction in the treatment of specialized areas; however, entry-level graduates do receive an extensive amount of training in connecting treatment interventions to the occupations that the patients enjoy. Treatment interventions also benefit the patient’s physical as well as psychosocial well being due to being occupation based and familiar occupations to the patient. This allows for treatment sessions to be more effective and enjoyable for the patients. The word occupation has a number of different meanings in everyday life. The occupational therapist Hasselkus (2002) wrote that occupation refers to the things that provide meaning and importance to us within our everyday lives. “Occupational therapists also hold the fundamental belief that the engagement in occupation is a vital

component of health and well-being” (Lee & Miller, 2003, p. 274). Christansen (1999) reported that those occupations in which individuals engage, can be seen as a set of goals, which they perceive as being important and strive to achieve. This assumption is one of the core ideas that guide occupational therapists who believe that through carrying out and succeeding at occupations, individuals develop a sense of accomplishment and a feeling of fulfillment. When individuals are unable to accomplish occupations in which they were previously independent, a decrease in the patients’ self worth might occur. This is sometimes the case for patients who acquire an injury and are unable to function as they did prior to their injury. An example of this would be if a patient developed an upper extremity cumulative orthopaedic injury, such as an ulnar nerve injury. As a result of the injury the patient had severe pain in his or her right dominant hand which caused the patient to be unable to participate in his or her favorite occupation, golfing. The loss of occupational independence for the client has ramifications for treatment planning. The therapist not only must focus on facilitating remediation of the injury itself, but also must consider the subsequent psychological influence the injury has on the person’s ability to successfully complete meaningful occupations. Simply stated, when patient’s injury affects his or her occupational independence, it is extremely important for the occupational therapist to make the treatment sessions as client-centered and occupation-based as possible. When the occupational therapist structures an occupation-based the treatment session, it will “provide a way of linking motives or needs to specific goal-directed behaviors” (Christiansen, Backman, Little & Nguyen, 1998, p. 92). By producing goal directed behaviors, patients should have an increased level in function as well as an increased level of interest. Jarus, Shavit, and Ratzon (2000) found that by

converting an old treatment method into a game that could be played using a joystick on the computer, the level of interest of the patient significantly improved. The treatment intervention still produced the same results as the biomechanical treatment method, which included in edema management, grip strengthening and range of motion exercises, however, the occupation-based method produced a more goal-directed, patient response. In addition to the extensive amount of training in connecting treatment interventions to occupations that patients enjoy, occupational therapy students also learn an immeasurable amount of knowledge in other areas of treatment.

### *Occupational Therapy Curricula*

The curricula in entry-level occupational therapy programs in the U.S. are designed to provide occupational therapists with a broad range of knowledge to treat patients with a variety of diagnoses. During their education, occupational therapy students gain knowledge in treating patients in pediatric, physical disabilities, and mental health settings. This experience furthered through the completion of a level II fieldwork experience. “The goal of level II fieldwork is to develop competent, entry-level generalist occupational therapists” (Accreditation Council for Occupational Therapy Education, 1999, p. 581). The curriculum for fieldwork completion varies from institution to institution and by accreditation requirements. However the Accreditation Council for Occupational Therapy Education (1999) states that masters degree level occupational therapy students must complete their level II fieldworks within a set amount of time that has been pre-established by their institution. Minimum requirements for completion of master’s level occupational therapy programs in the U.S. includes two level II fieldwork placements. These placements consist of a student’s completion of

two, three-month clinical rotations. A student might complete his or her two fieldwork placements in pediatrics, mental health or physical disabilities, or a combination of settings, such as one in mental health and one in physical disabilities. Prior to a student attending level II fieldwork, he or she must choose a facility and the type of treatment area in which he or she would like to work. The Accreditation Council for Occupational Therapy Education (1999) reports that students be exposed to a variety of different patient diagnosis and age spans in a variety of settings. A student may want to work in an inpatient setting in which patient's injuries and illnesses are acute, or an outpatient facility, where patients' injuries are commonly less acute. During level II fieldwork experiences students are able to apply skills that they have learned in the classroom and apply them in clinical practice experiences. Students also have the option to complete an upper extremity orthopaedic practice fieldwork once they have completed their level II fieldworks. These optional fieldworks have similar requirements along with timeframes as level II fieldworks and are usually only completed by students interested in specializing in upper extremity orthopaedic therapy. One treatment area in which students' may receive limited experience is upper extremity cumulative trauma orthopedic settings. This is due to upper extremity orthopaedics being a specialized area of occupational therapy and most occupational therapy programs only including introductory information intended to provide students with foundation knowledge. The presentation of entry-level information is due largely to an already crowded curriculum that places restrictive time limits and prevents in-depth coverage of these specialized areas of occupational therapy. One method of gaining valuable experience in the treatment of upper extremity cumulative orthopaedic injured patients is by obtaining an

upper extremity orthopaedic practice fellowship, more commonly known as a hand therapy fellowship. An upper extremity orthopaedic practice fellowship will allow a student to receive hands on experience as well as mentoring in the specialty area of upper extremity cumulative trauma orthopaedic injuries. According to the American Society of Hand Therapists (2006), there are two universities in the U.S. that offer degree/certificate programs in the area of upper extremity orthopaedics: Drexel University in Philadelphia and Texas Woman's University. There are also four non-degree fellowship programs listed on the American Society of Hand Therapist (2006) website. Each upper extremity orthopaedic practice fellowship differs in pre-requisites as well as length of attendance. Upper extremity orthopaedic practice fellowship programs provide entry-level occupational therapists with an opportunity to work in clinics that specialize in the treatment of patients who have upper extremity cumulative trauma orthopaedic injuries. During upper extremity orthopaedic fellowship experiences, the majority of patients the students see have upper extremity cumulative trauma orthopaedic injuries. As entry-level therapists complete his or her fellowship in upper extremity orthopaedic settings, his or her knowledge of treatment techniques for these clients is likely enhanced at a greater rate than if the therapist treated one upper extremity orthopaedic patient a week. Participating in an upper extremity orthopaedic practice fellowship also improves a new graduate's chance of finding a job in the specialized area of upper extremity orthopaedics as the student builds his or her experience in this treatment setting. Despite the benefits of completing an optional orthopaedic fieldwork or fellowship, it takes many years of specializing in upper extremity orthopaedics to develop a deep understanding and thorough competence in this treatment area.

*Entry-level Therapists Treatment of Upper Extremity Cumulative Orthopaedic Injuries*

According to Kasch et al. (2003), occupational therapists who are initiating entry into the specialization of upper extremity cumulative orthopaedics do not have the knowledge and skills of an experienced therapist. This is due to the specialized nature of upper extremity orthopaedics, training, and years of experience that is required to be a competent specialist of upper extremity orthopaedics. Entry-level occupational therapists who begin practicing in upper extremity orthopaedic injuries often enter this area of practice with limited experience in assessing and treating patients with upper extremity cumulative trauma orthopaedic injuries. Therapists working with upper extremity cumulative trauma orthopaedic injuries are at a disadvantage not only because of a lack of experience, but also because of the dearth of literature that is written for entry-level graduates practicing in upper extremity cumulative trauma orthopaedic injuries. Perkins and Tryssenaar (2001) reported that the entry-level therapists feel that they do not receive enough training and education in specialty areas. This is a result of already crowded occupational therapy curriculums intended to prepare the general practitioner; a course of study that lends little time to thoroughly addressing specialty areas of practice and treatment. Entry-level graduates may have a difficult time because of their lack of experience and the level of specialty required in order to treat this patient group. Entry-level therapists working with this patient group may have only treatment literature, knowledge from their education, which may be limited, and more experienced therapists on which to rely. However, finding a therapist who has experience in the treatment of upper extremity cumulative trauma orthopaedic injuries may not be an option for some entry-level practitioners, especially in rural areas and areas where upper extremity

orthopaedic injuries are not common. Occupational therapists working in hospitals and clinics that do not specialize in upper extremity orthopaedics generally do not get the chance to treat as many upper extremity cumulative trauma orthopaedic injuries as therapists who work in clinics that specialize in the treatment of upper extremity orthopaedic injuries. As a result of some occupational therapists working in non-specialized hospitals and clinics, these therapists may not have the same experience levels as therapists who work in clinics that specialize in upper extremity cumulative trauma orthopaedic injuries.

#### *Knowledge of Evaluation Methods*

According to the Christine M. Kleinert Institute (2007), the type of treatment intervention that is used should be based upon the findings of the evaluations. This statement emphasizes how important it is to conduct evaluations that are relevant and appropriate to the patient's specific type of upper extremity cumulative orthopaedic injury. Conducting evaluations also allow for progress to be measurable which help determine if the treatment interventions are being effective. Entry-level occupational therapists who choose to begin a career in upper extremity orthopaedic practice enter the profession with a limited amount of knowledge of evaluation methods that are available to use when treating patients with upper extremity cumulative trauma orthopaedic injuries. This is because "cumulative trauma disorders are multifaceted and have less predictable outcomes than trauma cases" (Waylett-Rendall & Niemeyer, 2004, p. 51). While there are some evaluations that are presented within the occupational therapy curriculum that can be used on upper extremity cumulative trauma orthopaedic injuries, such as those intended to measure coordination, edema, sensitivity, and strength, there are

also more specific evaluations designed to evaluate specific upper extremity cumulative trauma orthopaedic injuries. Specific evaluations used for the treatment of upper extremity cumulative trauma orthopaedic injuries are generally not presented while in school. However this may not be true for every occupational therapy program. The Accreditation Council for Occupational Therapy Education (1999) states that occupational therapy programs should “include, but are not limited to, specified screening assessments” (Accreditation Council for Occupational Therapy Education, 1999, p. 579). This is due to the high level of specialization required to treat patients with upper extremity cumulative trauma orthopaedic injuries, along with occupational therapy programs having already crowded curriculums. In addition to novice therapists’ potentially brief understanding of the types of evaluations associated with upper extremity cumulative trauma orthopaedic injuries, Christine M. Kleinert Institute (2007) indicated that entry-level therapists also have a difficult time knowing what kind of evaluations should be used for a specific type of upper extremity cumulative orthopaedic injury. A possible reason for this can be understood with review of the results of a study conducted by Kasch et al. (2003). The authors suggested that clinical judgment/reasoning is an area that is learned during the early years of specialized practice. By increasing clinical judgment and reasoning through experience, the likelihood that a therapist will select an appropriate evaluative tool is certainly enhanced.

#### *Knowledge of Treatment Methods*

In addition to limited evaluative skills and knowledge in specialized evaluation, entry-level therapists may also have a limited amount of knowledge in the treatment methods of upper extremity cumulative trauma orthopaedic injuries. Entry-level



therapists who begin his or her career specializing in the treatment of upper extremity orthopaedics, as well as entry-level therapists who occasionally treat patients with upper extremity cumulative trauma orthopaedic injuries, do not have as the same specialized skills and resources as someone who has received certification in the treatment of upper extremity orthopaedics. “Professional educational programs and the early years of practice prepare therapists to perform many of the skills needed during (or for) therapeutic intervention” (Kasch et al., 2003, p. 57). Entry-level therapists do have the skills to carry out therapeutic interventions, however, more advanced clinical skills are needed to know which type of interventions to use for patients’ specific injuries. One way entry-level therapists can build upon his or her knowledge of treatment interventions is by attending continuing education courses and workshops led by therapists who specialize in the treatment of upper extremity orthopaedics. Burke and DePoy (1991) proposed that entry-level therapists need to observe older experienced therapists and discuss and compare treatment ideas with one another to develop higher levels of skill. Another way entry-level therapists can build upon their knowledge is by collecting and reading treatment protocol books on upper extremity cumulative trauma orthopaedic injuries, which might possibly result in a better understanding of the timeframes, different evaluation/treatment methods and a better understanding of upper extremity cumulative trauma orthopaedic injuries. Kasch et al. (2003) proposed that therapists during their second to fifth year of treating upper extremity orthopaedics have an easier time with establishing treatment protocols as well as modifying treatment protocols to better fit the patient’s progression. Being able to modify treatment is a skill that needs to be learned by all entry-level therapists and grows with experience. Shwartz (2006) promoted the

importance of sharing knowledge of treatment interventions, evaluations, and resources amongst other therapists specializing in the treatment of upper extremity cumulative trauma orthopaedic injuries to provide the most effective and current treatment methods possible. A good example of this would be a mentoring relationship where an experienced therapist shares his or her clinical knowledge and technical skill to an entry-level therapist in order to increase his or her clinical knowledge and to receive feedback. However, in some settings this is not a possibility due to limitations in the number of staff or perhaps working with peers who also have a limited amount of experience in treating clients with CTDs. Burke and DePoy (1991) wrote that entry-level therapists need to observe, converse, and exchange treatment methods with one another to become more skilled. This is because “for many professions, this crucial first year is known to be a time of intense professional development” (Atkinson & Steward, 1997, p. 340). Observing and exchanging ideas amongst therapists provides a method for entry-level therapists to not only get to know his or her co-workers better but to also improve interpersonal relationships. Tryssenaar and Perkins (2001) proposed that as time passes an entry-level therapist begins to feel more and more comfortable with his or her own abilities and spend more time focusing on the patient and less time focusing on his or her own performance. A therapist who spends more time focusing on the patient and less time worrying about his or her own actions will likely be able to develop a more therapeutic relationship with the patient and an increase in concentration due to not worrying about his choice of treatment selection. Entry-level occupational therapists specializing in upper extremity cumulative trauma orthopaedic injuries can also benefit from self-learning exercises, such as reading research journal articles which discuss

current trends in the treatment of certain diagnosis and which methods of treatment have been the most effective. While reading evidence based journal articles gives entry-level therapist a better idea as to what type of treatment method to use, there is no substitute to years of experience in the treatment of patients with upper extremity cumulative trauma orthopaedic injuries.

### *Establishing Preparatory Methods*

Establishing treatment protocols and deciding on evaluation methods can prove to be difficult for entry-level therapists when treating upper extremity cumulative trauma orthopaedic injuries. This can also be true with establishing preparatory methods for upper extremity cumulative trauma orthopaedic injuries. Cornish-Painter, Peterson and Linstrom-Hazel (1997) reported that entry-level therapists need to attend additional professional education prior to practicing the use of physical agent modalities. Entry-level occupational therapists are on most occasions not certified to practice modality use, however, this varies by state. Additional training and continuing education in most states needs to occur to practice modality use. Cornish-Painter et al. (1997) reported that the most frequent method of education to gain competency in modality use was from on the job training, with higher level education occurring at a lower frequency. Cornish-Painter et al. (1997) also reported that most facilities do not have a formal way of testing competency levels in modality use and that a more official method needs to be established to test competency. A proposition to establish a more official method to test competency levels is likely due to the danger associated with modalities and the threat of patients becoming injured by incompetent therapists. Just as on-the-job training or continuing education needs to occur to ensure that entry-level therapists are competent in

the practice of modalities, the same can be said when it comes to entry-level therapist's decision as to what type of treatment method to use.

### *Becoming an Experienced Therapist*

Entry-level therapists often have difficulty deciding what treatment method will work the best with a particular patient. Tryssenaar and Perkins (2001) found that entry-level therapist felt that they were especially lacking in technical skills and knowledge of treatment methods in specialized areas. This could possibly be due to a number of factors such as: not feeling competent with a given treatment method, not having experience with a given treatment, being unsure on how to modify treatment, or possibly from being afraid that something might go wrong while carrying out the treatment method.

Tryssenaar and Perkins (2001) investigated the feelings that level II fieldwork students and entry-level clinicians had while treating patients. Each student recorded his or her thoughts and feelings in a journal that was later analyzed to establish common themes amongst level II students and entry-level therapist. "Participants struggled with the feeling that if a more experienced therapist was treating the client, he or she would be making better progress, and their treatment schedule and productivity would meet expectations" (Tryssenaar & Perkins, 2001, p. 22). Throughout the study, self-doubt was a common theme amongst the participants, however, this feeling soon diminished as the therapist's experience level and confidence in his or her own abilities increased. Entry-level occupational therapists when treating upper extremity cumulative trauma orthopaedic injuries, should always try to utilize treatment methods with the highest level of efficacy. However, treatment methods that are thought to provide a high level of efficacy do not always produce optimal outcomes. In situations such as in the

aforementioned example, entry-level therapists may benefit from consulting with an experienced therapist who practices in a similar practice environment. Entry-level therapists who treat patients with upper extremity cumulative trauma orthopaedic injuries will learn from these types of situations and will become better therapists because of them. “Even after the first year of hand therapy practice, skills continue to develop so that by the fifth year of specialized practice, the components are well established” (Kasch et al., 2003, p. 56).

### *Expert Clinicians*

“Many researchers have suggested that expert clinicians have skills not taught in academic courses” (Perkins & Tryssenaar, 2001, p. 20). Perkins and Tryssenaar (2001) stated that one such skill is being able to modify treatment so that the patient is able to experience an appropriate challenge. Being able to modify treatment based on the performance of the patient is a skill that usually becomes easier with more experience. For example an automobile mechanic does not finish school and immediately start performing at the same level of a mechanic who has been working on cars for 30 years. The same scenario applies to entry-level graduates who begin their careers practicing in the treatment of patients with upper extremity cumulative trauma orthopaedic injuries.

### *Certification in Upper Extremity Orthopedics*

To understand fully the specialized nature of upper extremity cumulative orthopaedics, one must first look at the plethora of requirements that are necessary to become a certified specialist of upper extremity orthopaedics. The first requirement being a master’s degree in occupational therapy (OT) or a doctoral degree in physical therapy (PT). Once either of these degrees have been achieved a “minimum of five

years of clinical experience, including 4,000 hours or more in direct practice in hand therapy” (Hand Therapy Certification Commission, 2008, ¶ 2). Upon completion of the required clinical hours and five years of working with patients who have upper extremity injuries, the therapists must also take and pass a certification exam to demonstrate his or her understanding and skills in working with the hand and upper extremity. There is a reporting by the Hand Therapy Certification Commission (2008) stating that once a therapist is certified in the treatment of upper extremity orthopaedics he or she must also attend the required continuing education hours and re-certify after every five years. This is done to ensure that therapists are aware and practicing new and evolving treatment methods as well maintaining competency in core areas of knowledge and practice. Six main focus areas were established to determine the areas in which a therapist needs to be proficient to become competent in the treatment of upper extremity orthopaedics. The six areas that were identified were: “clinical judgment/clinical reasoning, scientific knowledge, technical skills, interpersonal and communication skills, professionalism, and resource management” (Kasch et al., 2003, p. 50).

The Hand Therapy Certification Commission (2008) reported that there are over 4,500 certified specialists of upper extremity orthopaedics in the United States and just less than 4,800 certified specialists of upper extremity orthopaedics in the world. This is substantial since Kasch et al. (2003) reported that until 1989 there was not a certification credential in the treatment of upper extremity orthopaedic injuries. The large number of therapists certified in the treatment of upper extremity orthopaedics within the United States is possibly the result of our medical and allied health professions ensuring that our therapists, doctors and surgeons have received the highest level of training and

certification possible in their field of practice. However, there are well over 50% of occupational therapists working in upper extremity orthopaedics who have not received or have chosen not to receive certification. There are more certified upper extremity orthopaedic therapist that come from an OT background rather than a physical therapy background. A possible reason for this could be due to occupational therapists traditionally having more experience with working with the upper extremities, where as physical therapists focus in on the lower extremities. The Hand Therapy Certification Commission (2008) reported that approximately 85% of all therapists certified in upper extremity orthopaedics come from an occupational therapy background with approximately 15% coming from backgrounds in physical therapy. The large amount of occupational therapists who become certified in the treatment of upper extremity orthopaedics could be due to previous experience in upper extremity dysfunction and wanting to specialize only in upper extremity orthopaedics.

The amount of education required for medical and health science professionals to gain certification is in direct proportion to the specialized nature of the area in which they wish to practice. This is because the amount of additional education and training required needs to be equivalent to the complexity of the body part that is being treated. Similar to how occupational and physical therapists need additional education to become certified in the specialization of upper extremity orthopaedics, so do medical school graduates who want to become surgeons specialized in orthopaedics. The U.S. Department of Labor (2007) reported that after completion of medical school and successful completion of the National Board Exams, a residency must be completed by doctors who want to specialize in surgery. Residencies can be completed in three

different areas: general surgery, plastic surgery or orthopedic surgery. There is a reporting by the American College of Surgeons (2008) that the amount of time for residency completion ranges anywhere from five to seven years depending on which area you decide to specialize in. The amount of time a surgeon spends as a resident doctor is very comparable to the amount of time an occupational or physical therapists spends getting certified at specializing in upper extremity orthopaedics. Similar to process of occupational therapists' certification exam for becoming certified in the treatment of upper extremity orthopaedics, general surgeons, orthopedic surgeons and plastic surgeons must all successfully complete certification examinations prior to practicing with his or her license. The amount of training orthopaedic therapists and surgeons complete is an attribute to the complexity of the upper extremity. In order to treat patients with injuries to such a complex extremity, the resources available to use to guide treatment should be readily available.

#### *Available Resources to Guide Treatment*

Within the realm of occupational therapy, there are a large amount of clinical text books available to use as a reference to guide treatment. There are books with treatment methods that are written on specific diagnosis, injuries and disabilities. There are also a limited number of books that have been written specifically for entry-level therapists. These books are written so that all experience levels of therapists can understand its content. However, there is a dearth of literature for the entry-level occupational therapists who only occasionally treats patients with upper extremity cumulative trauma orthopaedic injuries. As the number of cumulative injuries that occur in the United States has grown, so has the need for literature and research in the area of upper extremity



cumulative trauma orthopaedic injuries. Literature that does exist is often costly and unaffordable for small clinics in which therapists treat a small number of patients with upper extremity cumulative trauma orthopaedic injuries. Entry-level therapists may also not know about treatment resources available to them. Chapter IV of this scholarly project is a treatment guide intended to provide entry-level therapist with a list of resources available to use in the treatment of upper extremity cumulative trauma orthopaedic injuries, from a variety of different sources such as textbooks and electronic references. Along with upper extremity cumulative orthopaedic injury literature being expensive it can also be difficult to comprehend. Literature needs to be written and organized in a way so that treatment protocols can be understood by all levels of therapists regardless of experience.

#### *Adult Learning Theory*

The adult learning theory will be utilized as the model of practice for this entry-level treatment guide for upper extremity cumulative trauma orthopaedic injuries. This theory was chosen as it is anticipated that occupational therapists who use this treatment guide will have a self directed approach to learning and applying the treatment methods to their patients as stated by Knowles, et al. (2005). Knowles et al. (2005) also wrote that the adult learning theory is based upon the idea that when new information is learned, adults will relate the new information to information that has that has already been learned thereby creating a deeper understanding of the concepts as well as a better understanding of how to apply it. Another important part of the adult learning theory identified by Knowles et al. (2005) is motivation. Adults should be motivated to not only read this treatment guide but to use new knowledge to apply to their patients' care.

Entry-level therapists who are motivated to learn new treatment methods will have a better understanding of the treatment methods used in the treatment of upper extremity cumulative trauma orthopaedic injuries.

### *Summary*

This literature review has included the prevalence rates of the three most commonly seen upper extremity cumulative orthopedic injuries as well as information on the specific requirements needed to become certified in the treatment of upper extremity orthopedics. The curricula of occupational therapy programs were also examined along with the difficulties associated with being an entry-level therapist who occasionally treats patients with upper extremity cumulative trauma orthopaedic injuries. The difficulties associated with the use of physical agent modalities, evaluation methods, treatment methods and being able to modify these as the patient progresses is also a critical area included in this literature review. An explanation was also included as to why a treatment guide needs to be created for entry-level therapists not specializing in the treatment of upper extremity orthopedic injuries. The next chapter of this scholarly project (chapter III) elaborates on the process involved in the conception, creation, and writing of this scholarly project. Further, Chapter III prepares the reader for review of the treatment guide portion of this scholarly project which is found in Chapter IV.

## CHAPTER III

### METHODOLOGY

#### Overview of the Research Process

This chapter provides an overview of how this scholarly project was completed starting with the process of deciding on an idea and ending with the development of the product. The methods used for obtaining information are also described in addition to the key words that were used in the search of literature. As a result of the literature review, the need for developing an injury specific entry-level treatment guide was established which culminated in the product of this scholarly project.

The idea to create a treatment guide which covers the three most common upper extremity cumulative trauma orthopaedic injuries arose from reviewing existing literature and discussion with occupational therapy faculty members. Two primary ideas emerged from these processes. The first idea came as a result of a review of literature which showed a dearth of literature available to entry-level therapist in the treatment of upper extremity cumulative trauma orthopaedic injuries. The second idea came as a result of communicating with occupational therapy faculty members expressing the need for an injury specific treatment manual to be written as more of a guide towards treatment, rather than a treatment textbook which covers all orthopaedic injuries and is more comprehensive. Another reason for creating an entry-level injury specific treatment guide was so that therapists who do not specialize in the treatment of upper extremity

orthopaedics might have a low cost treatment guide for three of the most commonly seen upper extremity cumulative trauma orthopaedic injuries.

Once the idea to write an entry-level level treatment guide was established a review of literature was conducted. The author conducted a literature search which included topics in the Journal of Hand Therapy, The American Journal of Occupational Therapy, Journal of Hand Surgery, ergonomic journals, and a variety of credible, professional websites. The Journal of Hand Therapy and the American Journal of Occupational Therapy provided an excellent amount of information related to research studies that have been conducted on specific diagnoses pertaining to evaluation methods and treatment methods as well as effectiveness of home programs. These journals also contained a great deal of information on entry-level therapists such as what kind of problems they face and how they progress to experienced therapists. Other journals used such as The Journal of Hand Surgery and Ergonomics contained relevant information on the treatment of specific cumulative trauma injuries as well as statistics regarding the prevalence of injuries and etiology of injuries. Specific websites that were utilized included the World Health Organization, The National Institute for Occupational Safety and Health, and The U.S. Department of Labor. These websites contained valuable information on specific cumulative trauma injuries such as the rate of occurrence, etiology of the injury, and prevalence.

Some of the main search criteria words included: lateral epicondylitis, tennis elbow, carpal metacarpal (CMC) osteoarthritis, ulnar neuropathy, musculoskeletal injuries/disorders, cumulative trauma injuries and repetitive strain injuries. After reviewing literature, which showed the high occurrence of cumulative trauma injuries in

the United States, along with a review of previous written cumulative trauma literature focused towards entry-level therapists, the need for a current treatment guide in this area became apparent. It should also be mentioned that once information was found to correlate with prior research and was determined to be an effective method of treatment it was implemented in to the product. The product is solely based on evidence based literature, to ensure that patients receive not only the most current and effective treatment possible but also to maximize patient safety and prevent re-injury.

### *Overview of the Product*

#### *Literature Foundation for Product Creation*

The product of this treatment guide includes three of the most common upper extremity cumulative trauma orthopaedic injuries seen by therapists who work in clinics that specialize in orthopaedics. These cumulative trauma injuries include lateral epicondylitis, carpal metacarpal osteoarthritis and ulnar neuropathy. The product is divided into three sections, one for each injury. Each section has the definition of the injury clearly stated to provide entry-level therapist with a better understanding of the injury. The prevalence of the injury was also defined so that the therapist can inform the patient of the prevalence of his or her injury. The product also contains a list of commonly used evaluation methods. It is essential for the therapist to use evaluation methods that are injury specific and that accurately measure what they are intended to measure. Another important part of the product is the treatment methods section. This section includes therapeutic exercises, therapeutic activities, and a list of home programs which can be used in combination with the treatment methods being provided by the therapist. The therapeutic exercises and therapeutic activities portion of the product

provides therapists with a large assortment of treatment interventions. The treatment methods section also covers preparatory methods used to treat the three cumulative orthopaedic injuries mentioned above. Included in the preparatory methods is a list of contraindications, timeframes, and safety concerns.

The literature used to create the product came from many of the aforementioned literary sources such as *The Journal of Hand Therapy*, *The American Journal of Occupational Therapy* and *The Journal of Hand Surgery*. However additional textbooks such as *Physical Agent Modalities: Theory and Application for the Occupational Therapist*, *Screening Adult Neurologic Populations*, *Occupational Therapy for Physical Dysfunction* (5<sup>th</sup> ed.), and *Hand Therapy Lecture Outline* were used to create this product. The authors of these books have extensive knowledge in the areas of upper extremity orthopaedics, orthopaedic surgery, occupational therapy and physical therapy. The information used from these texts was cited and paraphrased so that it could be used efficiently and understood easily by entry-level therapists using this treatment guide.

This treatment guide for entry-level therapist on the three most common cumulative trauma injuries was created because of the need for more cumulative trauma literature focused towards entry-level therapists. The literature review and product of this scholarly project have been created by searching and reviewing numerous amounts of journal articles, textbooks as well as governmental websites. As a result of this a well rounded literature review has been achieved.

Chapter IV of the product contains all the information necessary for entry-level therapists to feel confident while providing treatment. The product contains evidence-based information on the definition of the injury, prevalence, etiology, and treatment

methods of the three most common cumulative trauma injuries. This provides entry-level therapists with a complete guide to treatment of the cumulative trauma injuries of lateral epicondylitis, carpal metacarpal osteoarthritis and ulnar neuropathy.

CHAPTER IV  
PRODUCT/RESULTS

Introduction

Chapter IV of this scholarly project provides information on the evaluation and treatment of patients diagnosed with the three most common upper extremity cumulative trauma injuries seen in occupational therapy practice settings. The three cumulative injuries are carpal metacarpal (CMC) osteoarthritis, lateral epicondylitis, and ulnar neuropathies of the Guyon's Canal and Cubital Tunnel. The treatment guide consists of a section for each cumulative trauma injury which will allow for readers to more easily locate the cumulative injury that they desire. Each cumulative injury section also provides the reader with a definition of the injury, which is understandable to both medical personal as well as non medical personal. This helps entry-level therapist be able to explain more efficiently the injury to the patient in the absence of therapist experience with the patient's diagnosis. The prevalence of the injury is described to provide therapists and patients information regarding the frequency of each diagnosis. The etiology of the injury is also be covered which will give both the reader and patient a better idea of what caused the injury. Potential etiologies for the injury are presented to enhance therapy and patient understanding of possible occupational behaviors that may have contributed to the injury and allow for necessary modification or elimination of those occupational actions. The treatment guide also outlines commonly used evaluation



methods in the treatment of the specific cumulative injury. The evaluation methods portion of the product includes the signs and symptoms associated with each injury as well as other common complaints that patients may report. The evaluation section also includes a set of timelines which will provide the reader with a timeframe of when during the treatment process to conduct the evaluation. Following the evaluation portion of this treatment guide is the preparatory methods section also known as physical agent modalities. Not only does the preparatory section include a list of the most commonly used modalities used in the treatment of specific cumulative injuries, but also provides a list of contraindications. Providing a list of contraindications helps ensure the patients safety as well as improve the therapist's confidence at providing the modality. The number of times a week/day the reader is to perform the modality is also covered as well as safety concerns associated with each modality. This treatment guide also covers a list of treatment exercises as well as treatment activities that the reader can use to help treat the patient's injury. The list includes equipment that is necessary in order to perform the exercises/activities as well as instructions on how to carry out each exercise/activity. The final portion of the treatment section is a home program that readers can use to guide each patients individual home program. Providing patients with a home program allows for patients to work on improving their injury from the comfort of their own home, and possibly reducing the amount of time a patient will require on-site treatment for their injury.

### *Adult Learning Theory*

The theory used to guide the design of this entry-level treatment guide for the three most common upper extremity cumulative trauma orthopaedic injuries is the adult

learning theory. The adult learning theory is used because it is based upon the idea that adults are “self directed” learners Knowles, Holton and Swanson (2005). Adults need to be “self directed” learners to read and apply the treatments that are provided within this guide as described by Knowles et al. (2005). Another principle of adult learning theory that was promoted by Knowles et al. (2005) is that new information learned is associated with previously learned information. Most entry-level therapist who read this treatment guide will likely have a basic understanding of the treatment of upper extremity cumulative trauma orthopaedic injuries. Knowles et al. (2005) believed that adult learners will take newly learned information and associate it with information already known, much like entry-level therapists will do when reading this treatment guide. Knowles et al. (2005) believed that this will allow for better retention of new information and allow for a more complete understanding. A final key aspect identified by Knowles et al. (2005) of the adult learning theory is motivation. Entry-level therapist using this treatment guide will be motivated to learn from it in order to gain a better understanding towards the treatment of cumulative trauma injuries.

#### *Cumulative Trauma Injuries in the United States*

There is an estimated prevalence of approximately 1.8 million workers per year affected by cumulative trauma injuries in the U.S. (Bierma & Hembree, 2008, ¶ 22). This number has slowly been declining in recent years but continues to be a problem in the United States. The three most common cumulative trauma injuries in the U.S. are lateral epicondylitis, ulnar neuropathy, and carpal metacarpal osteoarthritis.

Haahr and Andersen (2003) reported that lateral epicondylitis is the second most common musculoskeletal disorder treated in hospitals and clinics. Hunter, Mackin and

Callahan (1995) reported that lateral epicondylitis occurs in one-third of all of those who regularly participate in tennis. Haahr and Andersen (2003) speculate that the high rates of lateral epicondylitis can also be attributed to our industrial society which requires millions of workers to perform tasks that put them at risk for developing lateral epicondylitis.

High rates of cumulative trauma injuries are also seen in the diagnosis of ulnar neuropathy, also referred to as Cubital Tunnel syndrome or Guyon's Canal syndrome. In the United States alone ulnar neuropathy at the elbow occurs in "10 to 15 percent of adults" (Trumble, 2000, p. 327). Shyam (2008) reported that men are three to eight times more susceptible to developing cubital tunnel syndrome than women. Shyam (2008) also reported that cubital tunnel syndrome has a higher rate of occurrence in those who operate machinery with excess vibration as well as baseball players who often experience extra strain being placed on the elbow when throwing.

Each year carpal metacarpal osteoarthritis (CMC OA) affects 8% of the adult population according to Hunter, Schneider, Mackin and Callahan (1990). In a research study performed by Fontana, Neel, Claise, Ughetto and Catilina (2007), two main factors were identified as being risk factors for CMC OA: repetitive thumb use and not having or taking enough rest breaks.

### *Unique Treatment Guide*

This treatment guide is intended for entry-level therapists who do not specialize in the treatment of upper extremity orthopaedics. This treatment guide is intended to be a low cost solution for entry-level therapists who only treat the occasional patient with an upper extremity cumulative orthopaedic injury. Currently the amount of treatment

literature that is focused towards the treatment of upper extremity cumulative orthopedic injuries is moderate and the amount of treatment literature that is focused towards entry-level therapist in this patient area is minimal. This treatment guide is written to enhance the likelihood that an entry-level therapist can read the material and understand how to readily apply that knowledge to the treatment of clients with the three CTDs reviewed in this guide. This treatment guide is intended only to provide the therapist with foundational ideas and differs from other treatment literature which provides more in-depth information, such as explaining more about the anatomy of the injury. This treatment guide is also different from other textbooks in how it only covers three of the most common upper extremity cumulative trauma orthopaedic injuries. This has allowed for the writer to spend more time on locating a wide variety of treatment resources, which will give therapists more options as to what treatment intervention they would like to apply.

### *Lateral Epicondylitis*

#### *Definition*

- Commonly known as tennis elbow (American Society for Surgery of the Hand, 2006).
- Caused by the weakening of the extensor carpi radialis brevis (ECRB) tendon attachment, resulting in inflammation and pain (American Society for Surgery of the Hand, 2006).
  - This tendon is responsible for abducting/extending the wrist and also plays a role in stabilizing the wrist (Wheless, 2008).

### *Prevalence*

- Haahr and Andersen (2003) reported that lateral epicondylitis is the second most common musculoskeletal disorder treated in hospitals and clinics.
  - Occurs in one-third of all habitual tennis players (Hunter, Mackin & Callahan 1995).
  - Commonly occurs in men and women 35-55 years of age (Owens, 2004).
    - Workplace injuries account for 35-64% of the total number of injuries in the U.S. (Hong, Durand & Loisel, 2004).
    - Workers most at risk for developing lateral epicondylitis are those who repetitively perform task with awkward wrist postures, such as automobile industry workers (Werner et al., 2005).

### *Etiology*

- “ The risk factors for elbow tendonitis include ergonomic factors such as forceful work, high rates of elbow flexion and extension, awkward postures, and exposure to vibration” (Werner et al., 2005, p. 394).
  - Any activity in which supination of the wrist and wrist extension occur can possibly be linked to the overexertion of the ECRB (Owens, 2004).

- Occupations that are the highest risk for developing lateral epicondylitis are: mechanics, butchers, meat processing plants, construction workers, and boilermakers (Werner et al., 2005).
- The disorder can also occur as a result of a direct blow to the ECRB which sometimes causes a partial tear (American Society for Surgery of the Hand, 2006).

### *Evaluation Methods*

- A positive sign of lateral epicondylitis is pain occurring in the proximal forearm while the wrist is in extension and the lateral epicondyle is being palpated (Bagnato, 2008).
  - “The pain is exacerbated by passive extension of the elbow with the wrist flexed and by resisted extension of the wrist or third metacarpal with the elbow extended” (Hong et al., 2004, p. 369).
  - Grip strength is also impaired making simple grasping tasks difficult (Hong et al., 2004).
    - Dynamometers can be used to measure how much a patient’s grip and pinch strength is affected.
      - This should be done prior to the start of treatment and prior to discharge.
    - Patient’s results should be compared to age and gender norms to determine the effect of the injury.

- Range of motion should be measured using a goniometer with the wrist in extension, flexion, pronation and supination (Lorenzo, 2008).
  - Range of motion of the elbow can also be performed but often times is not affected by the injury (Hong et al., 2004).
  - Results should be compared to age and gender norms.
- Manual muscle testing of the wrist can be performed to evaluate loss of strength, testing should be completed prior to the initiation of treatment and prior to discharge.
  - Wrist flexion
    - This measures the flexor carpi radialis and flexor carpi ulnaris (Bagnato, 2008).
  - Wrist extension
    - This measures the extensor carpi radialis longus, extensor carpi radialis brevis and the extensor carpi ulnaris (Bagnato, 2008).
  - Supination
    - This measures the biceps and supinator (Bagnato, 2008).
  - Pronation
    - This measures the pronator teres and pronator quadratus (Bagnato, 2008).
- Pain can be measured by using a visual analog pain scale (VAS) (Burnham, Gregg, Healy & Steadward, 1998).

- The visual analog pain scale allows the patient to rate his or her pain on a scale of one to ten with one being the least amount of pain and ten being the greatest amount of pain (Burnham, et al., 1998).
  - The scale can be displayed to the patient verbally or physically on a piece of paper with a scale of one to ten (Burnham, et al., 1998).
- This pain scale can be used throughout the evaluation process as well as treatment process to measure pain.

*Commonly Used Physical Agent Modalities*

- Ice can be used to help relieve pain during the more acute stages of injury (Kaminsky & Baker, 2003).
  - Cold pack, ice massage and cold ice water immersion baths (Bracciano, 2000).
  - Contraindications/Safety Concerns
    - “Impaired circulation or hypersensitivity to cold, direct placement over wounds that are 2-3 weeks post injury, placement over superficial nerves, direct placement on the skin” (Bracciano, 2000, p. 45). Patient’s blood pressure should be measured as well patient’s skin coloration (Bracciano, 2000).
  - Frequency
- Cold packs should be placed on the skin for 10-20 minutes, during this time skin coloration should be monitored (Bracciano, 2000). Ice massage should not



exceed 7 minutes and also should be closely monitored (Bracciano, 2000). Cold water immersion baths should be 15 to 20 minutes in duration, with at a water temperature of between 35-75 degrees Fahrenheit (Bracciano, 2000). Heat, which can be followed by a gentle massage (Armstrong, 2007).

- Hot pack, hydrotherapy, fluidotherapy, contrast baths and warm water soak (Bracciano, 2000).
- Contraindications/Safety Concerns
  - “Impaired sensation, tumors/cancer, acute inflammation, edema, deep vein thrombophlebitis, pregnancy, primary repair of tendon or ligament, advanced cardiac disease, impaired mental status and rheumatoid arthritis”  
(Bracciano, 2000, p. 53).
- Frequency
  - Hydrotherapy, hot pack, fluidotherapy (20 minutes), warm water soak (15-20 minutes), contrast bath total time of (30 minutes) (Bracciano, 2000). These modalities should be used as preparatory methods to treatment. Warm water soaks and contrast baths can be performed periodically throughout the day by patients at home after instruction from therapist (Bracciano, 2000).
- Ultrasound, which can be accompanied by hydrocortisone (Armstrong, 2007).
  - Contraindications/Safety Concerns

- Special attention should be applied when applying ultrasound over areas with decreased sensation and circulation, growth plate areas of children should also be avoided when using high frequencies of ultrasound (Bracciano, 2000). “Therapist should avoid using a stationary transducer technique due to the increased risk of hot spots in the sound field” (Bracciano, 2000, p. 74). Caution should also be taken over surgical metal implants and prosthetic joint implants due to the increased level of conductivity of foreign metal objects (Bracciano, 2000).
- Frequency
  - “Most often ultrasound is administered once a day or every other day” (Bracciano, 2000, p. 73). Treatment time usually last two weeks depending on level of improvement (Bracciano, 2000). Ultrasound should only be performed by therapists who are trained in physical agent modalities provision.

### *Therapeutic Exercises*

- Gradual mobilization
  - Tendon gliding exercises can be initiated “in pain free range appropriate to the particular structures involved” (Trombly & Radomski, 2002, p. 941).

- Therapeutic exercises should begin with low weight levels and focus on high repetition with small movements (Trombly & Radomski, 2002).
  - As the patient grows stronger “increase the arc of motion and modify proximal positions to be more challenging if appropriate for work simulation” (Trombly & Radomski, 2002, p. 941).
  - Exercises should be performed passively to prevent further discomfort or an increase in swelling (Armstrong, 2007).
  - Exercises that produce the greatest tendon pull are ideal (Armstrong, 2007).
  - Exercise load should be increased depending on patient symptoms (Stasinopoulos, Stasinopoulou & Johnson, 2005).
- Common therapeutic exercises used in the treatment of lateral epicondylitis used alone or with specific exercises.
  - Theraputty (Armstrong, 2007)
    - Squeezing the theraputty to produce finger flexion and releasing to produce finger extension.
  - Free weights (Armstrong, 2007)
    - Wrist extension/flexion and forearm pronation/supination (Armstrong, 2007).

- Hand grippers (Armstrong, 2007)
  - Finger flexion/extension.
  - It is beneficial to perform these exercises while performing a static stretch to the elbow (Stasinopoulos et al., 2005).
    - All stretches should be held for approximately 30 seconds (Stasinopoulos et al., 2005).
- BTE work simulator to improve strengthening as well postures (Armstrong 2007)

### *Therapeutic Activities*

- Wood working (Armstrong, 2007)
- Macramae (Armstrong, 2007)
- Pottery (Armstrong, 2007)
- Baking (Armstrong, 2007)
- Work simulation (Armstrong, 2007)
  - Practice of ergonomic techniques and equipment (Home Therapy, 2006).
    - Safe lifting techniques, instruction on rest breaks, body positioning, use of electric equipment whenever possible drills, nailguns, impact wrenches (Home Therapy, 2006).
  - Work simulation should be practiced using new adaptive techniques that do not involve “high rates of elbow flexion and

extension, awkward postures, and exposure to vibration” (Werner, Franzblau, Gell, Hartigan, Ebersole & Armstrong, 2005, p. 394).

- Adaptive work environment tools should also be considered when performing work simulation tasks.

### *Home Program*

- Tendon gliding exercises can be performed while at treatment as well at home (Nismat, 2007).
- While performing these stretches be sure to keep the elbow extended and to hold stretches for 30 seconds (Nismat, 2007).
  - Holding the wrist in neutral and extending all the fingers of the hand (Nismat, 2007).
  - Holding the wrist in neutral and making a hook with the finger tips (Armstrong, 2007).
  - Holding the wrist in neutral and making a closed fist. (Mid-Tennessee Bone and Joint Clinic, 2007).
  - Making what looks like a table top by bending fingers and thumb at the Metacarpophalangeal joint and keeping all other joints straight (Mid-Tennessee Bone and Joint Clinic, 2007).
  - Complete the table top by bending the fingers in, all the way to the palm of the hand (Mid-Tennessee Bone and Joint Clinic, 2007).
- Stretching of the forearm and wrist

- “To perform the stretch, reach your hand out, and while keeping your elbow straight, use the other hand to bend the wrist down so that the palm of the hand is pushed toward the underside of the forearm” (Tennis Elbow, n.d., ¶ 13).
  - Stretches should be held for 20 to 30 seconds and should be completed one time per hour (Tennis Elbow, n.d.).
- Forearm pronation/supination
  - Grasp a hammer or long handled pipe wrench and perform supination/pronation movements while grasping the object (Nismat, 2007).
    - Resistance is increased the lower the grip on the object (Nismat, 2007).
- Finger extension
  - Place a rubber band around all five fingers, spread fingers approximately 15 times for three sets (Nismat, 2007).

#### *Carpal Metacarpal (CMC) Osteoarthritis*

#### *Definition*

- CMC osteoarthritis is the breakdown of the cartilage that surrounds the carpal metacarpal joint in the thumb (Eustice, 2007).
  - “The CMC joint is formed where the metacarpal bone of the thumb attaches to the trapezium bone of the wrist” (Eustice, 2007, ¶ 1).

### *Prevalence*

- The CMC joint is the most commonly affected arthritic joint of the hand (Wheeless, n.d.).
- CMC osteoarthritis is more common in women than men (Wheeless, n.d.).
  - Approximately one third of women over the age of 40 years develop CMC osteoarthritis (Wheeless, n.d.).
    - Hypermobility CMC joints have been linked to the development of CMC osteoarthritis (Wheeless, n.d.).
    - “In patients older than age 75 years, thumb CMC osteoarthritis has a radiographic prevalence of 25% in men and 40% in women” (Van Heest & Kallemeier, 2008, p. 140).

### *Etiology*

- Occupations that require repetitive use of the thumb and limited rest have been thought to have an increase in the occurrence rate of CMC osteoarthritis (Fontana et al., 2007).
  - However women are more susceptible to develop CMC osteoarthritis as a result of repetitive use of the thumb (Wheeless, n.d.).
- Common profession known to be associated with the development of CMC Osteoarthritis.

- Pianist, carpenters, pharmacist, bakery workers, textile workers, chefs, dental hygienist as well as industrial jobs requiring continuous use of the thumb (Jensen, Boggild & Johansen, 1999).
- Other factors involved in the development of CMC osteoarthritis
  - History of joint trauma, obesity (production of adipokines), and genetic contributions (Kellegren, Lawrence & Bier, 2006).

### *Evaluation Methods*

- An occupational history profile should first be conducted to determine if the affected joint is affecting the patient's occupations (Trombly & Radomski, 2002).
  - Conducting the Canadian Occupation Performance Model will help determine what occupations the patient would like to regain or improve upon (Trombly & Radomski, 2002).
    - Observing the patient performing difficult occupations can also be completed, while looking for difficulties with range of motion, grip strength and coordination (Trombly & Radomski, 2002).
- Grip and pinch strength should be assessed using a dynamometer (U.S. National Institutes of Health, 2008).
  - Grip and pinch strength measurements allow therapists to see deficits in hand strength as well as range of motion (Trombly & Radomski, 2002).
    - Measurements should be taken initially and prior to discharge (U.S. National Institutes of Health, 2008).



- “The grind test is performed by gripping the patient’s metacarpal bone of the thumb and moving it in a circle and loading it with a gentle axial force” (Jaggi & Morris 2007, p. 1309).
  - A sharp sudden pain is often felt if CMC osteoarthritis is present (Jaggi & Morris, 2007).
- Measuring the thumbs range of motion (dexterity) with a goniometer should be completed prior to treatment and discharge (MacDermid, Wessel, Humphrey, Ross & Roth, 2007).
  - Measurement of the thumbs metacarpophalangeal joint while the patient hyperextends and also flexes the joint should be assessed (The Electronic Textbook of Hand Surgery, n.d.).
  - Measurement of the thumbs interphalangeal joint while the patient hyperextends and also flexes the joint should also be assessed (The Electronic Textbook of Hand Surgery, n.d.).
- Therapists may also assess the patients joint integrity by reviewing the patients x-rays.
- AUSCAN
  - The AUSCAN “is a 15 item scale which addresses pain, stiffness, and functional ability disability in patients with OA of the hand” (MacDermid et al., 2007, p. 525).
    - Additional information and purchasing information of the AUSCAN can be found at [www.auscan.org](http://www.auscan.org)

- DASH
  - The Dash is a 30-item questionnaire that addresses functional tasks, symptoms, social life, work, and sleep habits (MacDermid et al., 2007).
    - Additional information and purchasing information of the DASH can be found at [www.dash.iwh.on.ca/](http://www.dash.iwh.on.ca/)
- Pain can be measured by using a visual analog pain scale (VAS) (Burnham et al., 1998).
  - The visual analog pain scale allows the patient to rate his or her pain on a scale of one to ten with one being the least amount of pain and ten being the greatest amount of pain (Burnham et al., 1998).
    - The scale can be displayed to the patient verbally or physically on a piece of paper with a scale of one to ten (Burnham et al., 1998).
  - This pain scale can be used throughout the evaluation process as well as treatment process to measure pain.

#### *Commonly Used Physical Agent Modalities*

- Cryotherapy
  - “Cryotherapy may be used in more acute inflammatory stages, but should be discontinued if pain is increased” (Weiss, LaStayo, Mills & Bramlet, 2000, p. 220). Used most often during an arthritic flare up (Bracciano, 2000).
  - Cold packs, ice massage
  - Contraindications/Safety Concerns

- “Impaired circulation or hypersensitivity to cold, direct placement over wounds that are 2-3 weeks post injury, placement over superficial nerves, direct placement on the skin” (Bracciano, 2000, p. 45.). Patient’s blood pressure should be measured as well patient’s skin coloration (Bracciano, 2000).
- Frequency
  - Cold packs should be placed on the skin for 10-20 minutes, during this time skin coloration should be monitored (Bracciano, 2000). Ice massage should not exceed seven minutes and also should be closely monitored (Bracciano, 2000).
- Superficial Heat Agents
  - Contrast bath, fluidotherapy, paraffin bath, warm water soaks (Bracciano, 2000).
    - Paraffin baths have been found to be very effective at reducing pain and improving the symptoms of osteoarthritis (Vaht, Birkenfeldt & Ubner, 2008).
  - Contraindications/Safety Concerns
  - “Impaired sensation, tumors/cancer, acute inflammation, edema, deep vein thrombophlebitis, pregnancy, primary repair of tendon or

ligament, advanced cardiac disease, impaired mental status and rheumatoid arthritis” (Bracciano, 2000, p. 53).

- Frequency
  - Hydrotherapy, hot pack, fluidotherapy and paraffin bath (20 minutes), warm water soak (15-20 minutes), contrast bath total time of (30 minutes) (Bracciano, 2000). These modalities should be used as preparatory methods to treatment. Warm water soaks and contrast baths can be performed periodically throughout the day by patients at home after instruction from therapist.

#### *Therapeutic Exercises*

- Active range of motion exercises
  - In order to maintain range of motion and decrease joint stiffness (Weiss et al., 2000).
    - “These exercises should ideally be performed for 8-10 repetitions, 3-5 times per day for maximum benefit” (Weiss et al., 2000, p. 222).
- Isometric exercises
  - Isometric exercises will strengthen the CMC joint without placing excessive pressure on it which could result in flare up (Weiss et al., 2000).
  - Theraputty
    - Gripping the theraputty in a fixed position and holding that grip (Weiss et al., 2000).

- Flattening the theraputty with the palm of the hand open while sustaining that position (Weiss et al., 2000).
- Work Simulation Tasks

### *Therapeutic Activities*

- Completion of functional occupations (Weiss et al., 2000).
  - Emphasis on: joint protection techniques.
    - Avoid keeping your joints in one particular position for long periods of time, use stronger joints to perform most of the weight bearing, use good body mechanics, avoid overusing joints, move affected joint through a pain free range of motion at least once a day, take plenty of rest breaks (Mayo Clinic, 2008).
  - Introduction and practice with adaptive equipment
    - Such as built up on handles, for example on hammers and dental hygiene instruments.
    - Use of electric tools instead of manual such as scissors and mixers.
- Fine Motor Activities (Weiss et al., 2000).
  - Playing checkers
  - Placing toothpicks in to theraputty
  - Cooking tasks.
    - Specifically those which involve isometric exercise involving the use of the thumb for example needing bread.

### *Home Program*

- The daily use of paraffin baths for 20 minutes will improve patient's symptoms of pain (Vaht et al., 2008).
- Use of joint protection techniques and adaptive equipment whenever possible.
- Thumb range of motion exercises
  - Perform a thumb roll movement where the thumb touches each finger of the hand one at a time (UW Medicine, 2005).
  - Perform a in and out movement with the thumb where the thumb is brought in towards the palm and then back out (UW Medicine, 2005).
  - Perform a thumb slide movement where the hand is open and the thumb travels down towards the floor and back up making thumbs up sign (UW Medicine, 2005).
    - These exercises are to be performed several times a day with a minimum of five repetitions for each (UW Medicine, 2005).
- Splinting of the carpometacarpal joint is often used in the treatment of CMC osteoarthritis (Weiss et al., 2000).
  - Short opponens splints have been found to be effective at reducing pain as well as reducing the amount of subluxation seen in the CMC joint (Weiss et al., 2000).

## *Ulnar Neuropathy*

### *Definition*

- Ulnar neuropathy at the Guyon's Canal as well as Cubital Tunnel will be covered within this section.
- An ulnar neuropathy is an inflammation of the ulnar nerve causing feelings of numbness, tingling and pain in the arm and hand (Rouzier, 2005).
  - Ulnar neuropathy is associated with numbness, tingling and pain in the little finger and little finger side of the ring finger (Rouzier, 2005).
  - There are five recognized areas where the ulnar nerve can become entrapped, however this treatment guide will concentrate on the two most common sites of entrapment the wrist and the elbow (Chiodo & Chadd, 2007).
    - Guyons Canal is located on the ulnar, volar aspect of the wrist and is formed by the pisiform and hook of hamate (Orhtogate, 2006).
    - Cubital Tunnel is made up of the humerus, flexor carpi ulnaris and another ligament which holds the nerve next to the humerus (American Academy of Orthopaedic Surgeons, 2007).

### *Prevalence*

- Ulnar neuropathy is known as “handlebar palsy” to bicyclist (Rouzier, 2005).
- Men and women are equally affected by ulnar neuropathy (Berman, 2007).
  - “Men develop perioperative ulnar neuropathies at the elbow more frequently than women (Berman, 2007).

- The ulnar nerve is the second most common nerve to become entrapped in adults (Bradshaw & Shefner, 1999).
  - The elbow (Cubital Tunnel) is the second most common site of nerve entrapment with the wrist (Guyon's Canal) being the first (Berman, 2007).

### *Etiology*

- Causes of ulnar nerve entrapment at the elbow.
  - Blunt trauma (Berman, 2007)
  - Compression during anesthesia (Berman, 2007)
  - Prior elbow fractures (American Academy of Orthopaedic Surgeons, 2007)
  - Deformities (Berman, 2007)
  - Venipuncture (Berman, 2007)
  - Bone spurs (American Academy of Orthopaedic Surgeons, 2007)
  - Malnutrition causing loss of muscle (Berman, 2007)
  - Cigarette smoking (Berman, 2007)
- Causes of ulnar nerve entrapment at the wrist.
  - Ganglionic cysts (Berman, 2007)
  - Heavy gripping (Orthopod, 2002)
  - Constant twisting of the wrist (Orthopod, 2002)
  - Tumors (Berman, 2007)
  - Blunt injuries (Berman, 2007)
  - Abberant artery (Berman, 2007)



- Fracture Hamate bone in the wrist (Orthopod, 2002)
- Idiopathic (Berman, 2007)
- Common occupation associated with ulnar neuropathy.
  - Bicycle riding (Rouzier, 2005)
  - Assembly line work (Descatha, Leclerc, Chastang & Roquelaure, 2004)
  - Footwear production (Descatha et al., 2004)
  - Food packaging (Descatha et al., 2004)
  - Meat workers (Descatha et al., 2004)
- Physical and psychological factors affecting ulnar nerve entrapment.
  - “Psychosomatic or depressive problems” (Descatha et al., 2004, p. 237).
  - “Body mass index using the elbows for support” (Descatha et al., 2004, p. 237).
  - “Holding a tool in position” (sustained wrist flexion) (Descatha et al., 2004, p. 237).

### *Evaluation Methods*

- Screening for neuropathies at the Guyon’s Canal and Cubital Tunnel should include:
  - “Sensory screening of the involved regions” (Gutman & Schonfeld, 2005, p. 202).
    - Areas to be screened during sensory testing.
    - “Touch, proprioception, vibration, pain and temperature” (Gutman & Schonfeld, 2005, p. 202).

- Touch
  - Semmes-Weinstein monofilament test, static two point discrimination, and touch localization (Trombly & Radomski, 2002).
- Vibration
  - Vibration awareness using tuning forks (Trombly & Radomski, 2002).
- Temperature
  - Hot and cold discrimination (Trombly & Radomski, 2002).
- Pain
  - Pain awareness of pinprick test, used with a sterilized safety pin (Trombly & Radomski, 2002).
- “ROM screening of the involved joints” (Gutman & Schonfeld, 2005, p. 202).
- “Manual muscle testing (with comparison of the denervated muscles to the intact muscles)” (Gutman & Schonfeld, 2005, p. 202).
- “Observation of how the patient’s performance of functional activities has been affected by the presence of neuropathy” (Gutman & Schonfeld, 2005, p. 202).
  - Entrapment at the Guyons Canal may cause motor problems such as impaired coordination, sensory problems in the wrist and fourth and fifth digits, hand pain or a mixed lesion (Stern, 2004).

- Entrapment at the Cubital Tunnel may cause numbness in the hand and fourth and fifth digits, hand pain, hand and thumb clumsiness due to weakness (University of Virginia Health System, 2007).
  - Clawing of the fourth and fifth digits, pain in the medial aspect of the forearm (Lund & Amadio, 2006).
- Pain can be measured by using a visual analog pain scale (VAS) (Burnham et al., 1998).
  - The visual analog pain scale allows the patient to rate his or her pain on a scale of one to ten with one being the least amount of pain and ten being the greatest amount of pain (Burnham, et al., 1998).
    - The scale can be displayed to the patient verbally or physically on a piece of paper with a scale of one to ten (Burnham, et al., 1998).
  - This pain scale can be used throughout the evaluation process as well as treatment process to measure pain.

#### *Commonly Used Physical Agent Modalities*

- Superficial heat agents
  - Contrast bath (Bracciano, 2000)
  - Contraindications/Safety Concerns
    - “Impaired sensation, tumors/cancer, acute inflammation, edema, deep vein thrombophlebitis, pregnancy, primary repair of tendon or ligament, advanced cardiac disease, impaired mental status and rheumatoid arthritis”

(Bracciano, 2000, p. 53). Warm water temperature should be between 100-110 degrees, with cold water temp between 50-70 degrees (Bracciano, 2000).

- Frequency
  - Contrast bath total time of (30 minutes) (Bracciano, 2000). Contrast baths can be performed periodically throughout the day by patients at home after instruction from therapist (Bracciano, 2000).

### *Therapeutic Exercises*

- Splinting
  - If the patient's symptoms are unrelenting splinting should be used to control pain (Lund & Amadio, 2006).
  - Cubital Tunnel
    - A long arm resting splint that immobilizes the wrist, combined with gentle range of motion exercises (Lund & Amadio, 2006).
    - The elbow portion of the splint should be padded or expanded outward to avoid compression of the Cubital Tunnel (Lund & Amadio, 2006).
  - Guyons Canal
    - A wrist splint is often time constructed to decrease sensations of pins and needles (Hand Surgery Center, n.d.).

- Sleeping habits
  - Patients should avoid sustained positions of the elbow, (Lund & Amadio, 2006).
    - Extension/Flexion (Lund & Amadio, 2006).
  - Sleeping with the elbow or wrist against a hard surface (Lund & Amadio, 2006).
  - Sleeping with flexed wrist (Hand Surgery Center, n.d.).
- Therapeutic exercise should focus on:
  - Improving the patient's present level of functioning (American Academy of Orthopaedic Surgeons, 2007).
  - Improving range of motion in the wrist and finger abduction/adduction (Armstrong, 2007).
    - Range of motion exercises can be completed with the assistance of:
    - Active range of motion exercises
      - Should only be completed when pain has subsided and patient can tolerate the injury (Lund & Amadio, 2006).
    - Weights or therabands (Lund & Amadio, 2006).
      - Elbow extension/flexion, wrist supination/pronation, wrist flexion/extension (Hand Health Resource, 2006).
    - Work hardening activities (Armstrong, 2007).

- Wrist strengthening, proper body mechanics, grip strengthening (Hand Health Resource, 2006).
- Grip and pinch strength (Armstrong, 2007).
  - Grip and pinch strengthening exercises can be completed with assistance from:
    - Theraputty (Armstrong, 2007)
    - Weights (Armstrong, 2007)
    - Hand Grippers (Armstrong, 2007)
- Nerve gliding activities for the Cubital Tunnel and Guyon's Canal.
  - Place arms out to the side with wrist pulled back holding the fingers straight (Hand Health Resources, 2006).
  - Bring the palm of your hands up to your ears like you are going to cup them (Nismat, 2007).
  - Hold your arm to the side with elbows straight and fingers curved in (Hand Health Resources, 2006).
  - Tilt the head to each side until your ear touches the shoulder (Nismat, 2007).

### *Therapeutic Activities*

- Therapeutic activities should focus on:
  - Work simulation (Armstrong, 2007)
  - Instruction on proper body mechanics and hand placement while working (Armstrong, 2007).

- “Avoid repeated forceful elbow flexion and extension”  
(Armstrong, 2007, p. 28).
- “Avoid static elbow flexion for long periods of time” (Armstrong, 2007, p. 28).
- “Avoid leaning on the elbow (especially when pronated)”  
(Armstrong, 2007, p. 28).
  - Elbow pads may be an option if this type of position has to regularly occur (Lund & Amadio, 2006).
- Use of adaptive equipment to prevent re-injury (Armstrong, 2007).
  - Built up handles on doorknobs, tools and kitchen utensils(Trombly & Radomski, 2002).
  - Knob turners (Trombly & Radomski, 2002)
  - Vibration absorbers (Trombly & Radomski, 2002)

### *Home Program*

- Use of home contrast bath several times a day if pain or edema is present  
(Bracciano, 2000).
- Wrist and finger range of motion exercises (as mentioned above) (Lund & Amadio, 2006)
  - Can be completed with or without the use of weights.
    - Soup cans be used if dumbbells are not available.
- Grip and pinch strengthening (Armstrong. 2007)

- The gripping and pinching of foam is a good strengthening exercise, along with theraputty (Armstrong, 2007).
- Use of adaptive equipment (Armstrong, 2007).

### *Helpful Resources*

- Resources that proved to be helpful in the creation of this product:
  - Health Journals

- **The American Journal of Occupational Therapy**

The American Journal of Occupational Therapy provides its readers with new evidence based research going on within the domain of occupational therapy. This journal examines different theories, evaluation methods, treatment methods and other important areas within occupational therapy that are being used to treat different diagnosis and injuries. The web address for this journal is [www.aota.org](http://www.aota.org)

- **The Journal of Hand Therapy**

The Journal of Hand Therapy is similar to the American Journal of Occupational Therapy in that they both provide their readers with new evidence based research. However the Journal of Hand Therapy only focuses on upper extremity orthopaedics. The Journal of Hand Therapy is a great resource to learn about treatment methods used on specific injuries. The web address for this journal is [www.jhandsurg.org](http://www.jhandsurg.org)

- **The Journal of Hand Surgery**

The Journal of Hand Surgery is a great journal for locating information on the definition, etiology and prevalence of specific upper extremity orthopaedic injuries. This journal also discusses the anatomy of the injury, surgical procedures and recovery



outlook of upper extremity orthopaedic injuries. The web address for this journal is [www.jhandsurg.org](http://www.jhandsurg.org)

- **American Occupational Therapy Association**

The American Occupational Therapy Association is an excellent organization for promoting the profession of occupational therapy. At this sites web address [www.aota.org](http://www.aota.org) you can find links to a number of different publications, information on continuing education, licensing, areas of specialization within OT as well as information on what is being done to secure our profession.

- **The American Society for Hand Therapists**

The American Society for Hand Therapists is a valuable resource for any therapists that treat patients who have upper extremity orthopaedic injuries. At the sites web address [www.asht.org](http://www.asht.org) therapists can find links to a number of different publications, similar to the American Occupational Therapy Association's web page. Therapists can also locate requirements of becoming certified in upper extremity orthopaedics, continueing education information and upper extremity orthopaedic fellowships.

- Textbooks

- *Occupational Therapy for Physical Dysfunction* (5<sup>th</sup> ed.) by Catherine A. Trombly and Mary Vining Radomski

Trombly, C.A., & Radomski, M.V. (2002). *Occupational therapy for physical dysfunction*. (5<sup>th</sup> ed.). Baltimore, MD: Lippincott Williams & Wilkins

- *Screening Adult Neurologic Populations* by Sharon A. Gutman and Alison B. Schonfeld

Gutman, S.A., & Schonfeld, A.B. (2003). Screening adult neurologic populations.  
Baltimore, MD: Victor Graphics.

- *Physical Agent Modalities: Theory and Application for the Occupational Therapist* by Alfred Bracciano

Bracciano, A.G. (2000). Physical agent modalities: theory and application for the occupational therapist. Thorofare, NJ: Slack Incorporated.

- *Hand Therapy Lecture Outline* by Joni Armstrong

Armstrong, J. (2007). Hand therapy lecture outline. 1-37.

- *Rehabilitation of the Hand: Surgery and Therapy* (3<sup>rd</sup> ed.) by James Hunter, Lawrence Schneider, Evelyn Mackin, and Anne Callahan

Hunter J.M., Schneider, L.H., Mackin, E.J., & Callahan, A.D. (1990). Rehabilitation of the hand: surgery and therapy. (3<sup>rd</sup> ed.). St. Louis, MO: Mosby Inc.

- *Principle of Hand Surgery and Therapy* by Thomas E. Trumble

Trumble, T.E. (2000). Principles of hand surgery and therapy. St. Louis, MO: Mosby Inc

○ Electronic Resources

- The University of Michigan Health System
  - [www.med.umich.edu](http://www.med.umich.edu)
- The Mayo Clinic
  - [www.mayoclinic.com](http://www.mayoclinic.com)
- American Academy of Orthopaedic Surgeons
  - [www.orthoinfo.aaos.org](http://www.orthoinfo.aaos.org)
- Job Accommodation Network

- [www.o-net.org](http://www.o-net.org)
- The University of Washington, Orthopaedics and Sports  
Medicine
  - [www.orthop.washington.edu](http://www.orthop.washington.edu)
- Orthogate
  - [www.orthogate.org](http://www.orthogate.org)
- U.S. National Institutes of Health
  - [www.nih.gov](http://www.nih.gov)

### *Additional Resources*

Along with using the recommended journal articles, textbooks and electronic resources mentioned above, entry-level therapists should also utilize orthopaedic and plastic surgeons for their knowledge and input in the area of cumulative trauma. Orthopaedic and plastic surgeons will be able to answer questions on specific cumulative trauma injuries and provide additional input on treatment methods.

Entry-level therapists interested in becoming certified in the treatment of upper extremity orthopaedic therapy should visit the American Society of Hand Therapist web site. This web site has information on the requirements of becoming certified in upper extremity orthopaedic therapy as well as information on continuing education, research and news in the profession. The web address for this site is [www.asht.org](http://www.asht.org)

### *Summary*

In order to prevent reinjury patients will need to avoid specific movements and hazards while at home and in the workplace. Patients who have experienced cumulative trauma injuries to the lateral epicondyle will need to avoid repetitive movements and

awkward positions (Haahr & Anderson, 2003). Haahr and Anderson (2003) also stated that movements involving repetitive wrist extension and supination movements should be avoided. Fontana et al. (2007) wrote that patients with carpal metacarpal osteoarthritis should avoid occupations that require repetitive use of the thumb and implement brief periods of rest. The University of Washington (2005) promoted that joint protection techniques should be practiced along with the use of adaptive equipment and self range of motion exercises. Descatha et al. (2004) proposed that patients who have experienced ulnar neuropathies in the past should pay close attention to how they hold tools while at work, how they use their elbows as support and the amount of rest breaks they take during the work day.

There are a number of stretches patients can do while engaged in occupations where there is potential for re-injury. However Fontana et al. (2007) state that regular rest breaks are the best method in the prevention of injury. Armstrong (2007) suggest tendon stretching exercises such as the ones covered in the home program for lateral epicondylitis allow for the muscle to relax and stretch preventing both inflammation as well as nerve entrapment. While Weiss et al. (2000) stated that range of motion exercises combined with exercise allow men and women to maintain their mobility while also preventing injury.

This product provides entry-level therapists with a complete guide towards the treatment of three of the most common upper extremity cumulative trauma orthopaedic injuries. Entry-level therapists will be able to take the information found within this guide and be able to immediately implement it in to their treatment sessions. This is due to this treatment guide being injury specific and organized in a way which allows for easy

information withdrawal. Entry-level therapists using this treatment guide will also benefit from the resources listed and described. These resources will allow for entry-level therapists to gain additional insight in to the treatment of different diagnosis and injuries.

Chapter V of this scholarly project will discuss how the product will be implemented in to use by entry-level therapists. This includes plans of how the product will be marketed and implemented in to practice. Chapter V also discusses limitations that are seen within this product as well as methods on how to overcome them. The usefulness of this product will also be examined in chapter V which includes methods to measure the effectiveness of this product. Methods of how this product could be further developed also are discussed which includes ideas of how to expand off of this original product.

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## CHAPTER V

### SUMMARY

#### Purpose of the Project

The purpose of this scholarly project was to provide entry-level therapist who do not specialize in the treatment of upper extremity orthopaedics a treatment guide that focuses on the three most common upper extremity cumulative trauma orthopaedic injuries. What makes this treatment guide unique when compared to other cumulative trauma resources already available is that it was written so that occupational therapists of all experience levels can understand it. Another key difference of this treatment guide compared to other cumulative trauma treatment literature is the fact that the treatment information is presented as a guide rather than a comprehensive literary source, which requires vast amounts of time and navigation. This allows for entry-level therapists to locate treatment information quickly without having to search and page through large amounts of other literature. As a result of having less literature and only focusing on the three most common cumulative trauma injuries the cost of this guide is obviously less cumbersome for those who wish to use it (i.e. it is more affordable and may benefit those therapists who are faced with financial restrictions).

## *Implementation and Limitations*

### *Limitations*

Implementation of this scholarly project may be limited as a result of not becoming published. This is due to having potential difficulties with finding a publishing company willing to publish an inexperienced author's work. However, James (n.d.) stated that only about .5% of the authors who write novels are published. Another limitation of this project is that it does not comprehensively describe how to perform certain evaluations, therapeutic exercises, therapeutic activities and home programs, instead this treatment guide offers suggestions for treatment implementation. This project also only covers three of the most common cumulative trauma injuries rather than a large scope of cumulative trauma injuries which may limit its usefulness in some practice settings. It is also important that therapists use this treatment guide in conjunction with other resources so that a more complete understanding of the treatment process is understood.

### *Implementation*

A need for a treatment guide that is focused towards entry-level therapists is evidenced by the "1.8" million workers per year affected by cumulative trauma injuries in the U.S. (Bierma & Hembree, 2008, ¶ 22). However, publication of this treatment guide may not be necessary if entry-level therapists in the local area learn about the benefits of this low cost treatment guide and implement it in to their practice. This will then, hopefully, lead to more therapists implementing the treatment guide and sharing it with their colleagues, who might potentially share it with past classmates and other therapists. Another way that this treatment guide could be implemented is through the use of an

internet web page, where an abstract of the treatment guide would be displayed. Using the internet would allow for therapists all over the world to see that this treatment guide is out there and how it is different from other treatment resources.

### *Usefulness*

The usefulness of this treatment guide will be based upon four different items, with the first item being the level of improvement by the patient at the time of discharge. The second item will be the satisfaction level that entry-level therapists have when using the treatment guide and the third item will be based upon the amount of treatment guides purchased over the internet page, along with how many views the site receives. The fourth item will be a questionnaire for therapists to fill out following the treatment of their first patient, when using the treatment guide. An example of the questionnaire can be found at (appendix).

### *Conclusion*

This treatment guide for entry-level therapist on the three most common cumulative trauma injuries was created because of the need for more cumulative trauma literature focused towards entry-level therapists. The literature used to create this treatment guide came from a variety of different sources so that treatment methods are evidenced-based. It is essential to use evidence based treatment sessions in order to assure patients have the highest level of care possible.

### *Further Product Development*

If there is a positive response by entry-level therapist using this treatment guide, additional cumulative trauma injuries could be added to the original guide. This would once again involve searching for evidenced based research in order to produce a quality

treatment guide, as well as writing the treatment portion of the guide. Follow up research studies will also be conducted examining patient improvement as a result of the treatment methods used in this guide.

### *Summary*

The purpose of this project is to provide entry-level therapists who do not specialize in the treatment of upper extremity orthopaedics a treatment guide that focuses on the three most common upper extremity cumulative trauma orthopaedic injuries. The need for a treatment guide of this source became evident after a review of literature as well as learning that cumulative trauma injuries are “one of the fastest growing workplace hazards” (McCauley-Bell et al., 1999 ¶ 2). This treatment guide will provide entry-level therapist with a comprehensive guide to the treatment of upper extremity cumulative trauma injuries, while at the same time being low cost.



APPENDIX  
Treatment Guide Questionnaire

1. What did you find the most helpful on the treatment guide?
2. What did you not like about the treatment guide?
3. What did you like about this treatment guide in comparison to others that you have used?
4. Do you believe that your patient's outcomes have improved since using this treatment guide?
5. How did you hear about this treatment guide?
6. How do you think this treatment guide could be improved?

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