EVALUATING THE EFFECTIVENESS OF A RESEARCH-BASED GUIDE FOR OCCUPATIONAL THERAPISTS ADDRESSING SELF-CARE ACTIVITIES IN PATIENTS WITH UPPER EXTREMITY IMPAIRMENTS AND TYPE II DIABETES MELLITUS

A Thesis submitted to the faculty at Stanbridge University in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy

by

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Certification of Approval

I certify that I have read Evaluating the Effectiveness of a Research-Based Guide for Occupational Therapists Addressing Self-Care Activities in Patients with Upper Extremity Impairments and Type II Diabetes Mellitus by Claudia Becerra, Christina Han, Allison Okugawa, and Erika Rodriguez, and in my opinion, this work meets the criteria for approving a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy at Stanbridge University.

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Abstract

Purpose: The objective of our research served two purposes. The first was to create a guide that contained resources and adaptive solutions occupational therapists could use when treating clients with type II diabetes mellitus and upper extremity dysfunctions. The second was to test the feasibility of the self-care guide by surveying the opinions occupational therapists had on it.

Design: We created a 60-page evidence-based guide for occupational therapists to use when addressing clients' common self-care activities. To test the effectiveness of the guide, occupational therapists were recruited to review and provide feedback on the guide through postings on the American Occupational Therapy Association general discussion forums and a convenience sample.

Results*:* A total of eight licensed and registered occupational therapists provided feedback on the guide. Participants identified that the top five common self-care areas they incorporate into functional treatment with patients managing type II diabetes mellitus are exercise, healthy eating, medication management, blood glucose monitoring, and sleep. After reviewing the guide, all participants reported that they found it easy to follow, and the list of adaptive solutions, images of adaptive equipment, and stress management techniques are useful information they could incorporate into their practice

Conclusion*:* By condensing the information into one resource, occupational therapists can promote health and wellness by addressing type II diabetes mellitus, upper extremity dysfunction, and self-care activities together. Based on the survey of participant input, suggestions for future research are a larger sample size and the incorporation of other self-care interventions.

Keywords: upper extremity (UE), type II diabetes mellitus (T2DM), occupational therapy, self-care, activities of daily living (ADLs), adaptive equipment

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Evaluating the Effectiveness of a Research-Based Guide for Occupational Therapists Addressing Self-Care Activities in Patients with Upper Extremity Impairments and Type II Diabetes Mellitus

According to the World Health Organization (2020), type II diabetes mellitus (T2DM) is characterized as a metabolic disorder where an individual has high blood glucose with insulin resistance and deficiency. This process can be damaging to several systems such as the neuromuscular, integumentary, cardiovascular, endocrine systems, along with their vital organs, creating adverse health effects on individuals and their occupational performance (Centers for Disease Control and Prevention, 2019). In 2018, 34.2 million Americans reported having T2DM, which is 10.5% of the population (American Diabetes Association, 2020). When T2DM is unmanaged, microvascular complications may occur such as retinopathy, nephropathy, and neuropathy. The most common musculoskeletal upper extremity (UE) disorders that cause hand dysfunctions in individuals with T2DM are carpal tunnel syndrome, limited joint mobility, Dupuytren's contracture, trigger finger, and shoulder capsulitis (Kiani et al., 2014). Both microvascular and musculoskeletal disorders can create irreversible health consequences on the body. To address these limitations and increase prevention measures, occupational therapists (OTs) can play a major role in promoting T2DM self-care and management.

According to the Certified Board for Diabetes Care and Education (2020), OTs are among the 13 different health care providers that are qualified to be trained in diabetes education. Through adaptations and medications, OTs can use their expertise in a client-centered approach to evaluate clients' engagement in their occupation, and the context of their environment to help them grow and become independent (American

Occupational Therapy Association [AOTA], 2014). OTs are also guided by the AOTA Vision 2025. This vision encourages OTs to work on increasing accessibility for clients to participate in activities of daily living by collaborating with them on what works best and customizing their treatment plans (AOTA, 2017). However, when an individual is seen for hand dysfunction, other comorbidities such as T2DM must also be addressed. An OT can better treat UE dysfunctions by also addressing management of T2DM.

Statement of the Problem

Our review of recent research has found that there are connections between (1) T2DM and common UE impairments, (2) T2DM and self-care activities, and (3) UE impairments and self-care activities (Chasen et al., 2012; Gates et al., 2016; Gunggu et al., 2016; Kiani et al., 2014; Langer et al., 2016; Lucado et al., 2018; Mueller et al., 2018; Mustafa et al., 2016; Oosterwijk et al., 2018; Pandey et al., 2013; Pourmemari & Shiri, 2015; Sözen et al., 2018; Swann, 2015; Turesson et al., 2020; Vicente et al., 2020; Weinger et al., 2014; Win et al., 2019). However, there is a gap in the literature between an OT's role in providing care for individuals in all three components of (1) T2DM, (2) UE dysfunction, and (3) self-care activities. To close this gap, we have created a guide for occupational therapy practitioners to address prevention strategies that are tailored to promote occupational participation (AOTA and American Occupational Therapy Foundation, 2011). This study provided translational research—meaning to solve problems by moving basic discoveries quickly into practice—by evaluating how OTs can assist this population and using peer-reviewed studies to develop a guide OTs can use to understand T2DM and UE dysfunction care (AOTA, 2017).

OTs can use this guide to direct interventions to enhance the client's health, well-being, and overall occupational engagement and participation through self-management and educational services (AOTA, 2014). The two intended outcomes of this guide are: One, to provide evidence-based education for the therapist regarding common self-care challenges that clients may encounter; and two, to also address ways for clients with T2DM to improve in self-care occupations such as attending to personal hygiene/grooming, meeting daily physical activity needs, managing blood glucose levels and maintaining a proper diet (World Health Organization, 2001). Overall, the guide will provide information to both OTs and the clients at facilities where occupational therapy services are offered and where many therapists lack the resources and knowledge to educate and help their clients who have T2DM and UE dysfunctions. These outcomes will uphold the Stanbridge University curricular threads of health care and group communication by using our development of research skills to create a guide that will enhance the field of occupational therapy (Stanbridge University, 2021). We encourage that this intervention be further investigated in studies by future cohorts.

Literature Review

Many individuals with T2DM face microvascular and musculoskeletal complications that can hinder their performance in their activities of daily living (ADLs). This prevents patients from performing their self-care activities and improving their occupational performance. Pandey et al. (2013) found that out of 200 subjects with T2DM, 67% (134/200) of participants had one or more hand dysfunctions based on a thorough clinical examination, indicating that this is a prevalent topic to be further investigated. OTs can step in and help these individuals in their occupational

performance. The role of our literature review is to explore common UE impairments caused by T2DM, discover how UE impairments affect patient's self-care ADLs, and identify techniques that have been found to enhance ADL performance in this population.

Common Upper Extremity Impairments

According to the Hand Therapy Certification Commission (2020), of the 6,460 certified hand therapists in the U.S., 86% are OTs. Kiani et al. (2014) identified five upper musculoskeletal disorders out of 432 participants from the Hamadan Diabetes Center in Hamadan, Iran. Participants were evaluated by an endocrinologist, and then further examined by a rheumatologist for a final diagnosis. Researchers found that the top five UE impairments in individuals with T2DM are shoulder capsulitis (SC), limited joint mobility (LJM), Dupuytren's contracture (DC), carpal tunnel syndrome (CTS), and trigger finger (TF). In Pandey et al. (2013), 81 out of the 200 participants (40.5%) had LJM making it the most prevalent hand disorder within this study. In Sözen et al. (2018), researchers found a high prevalence of musculoskeletal disorders in T2DM patients, and that around 25-76% of individuals with T2DM had LJM, 7-32% experienced frozen shoulder, 12-14% experienced DC, 12% experienced CTS, and 3.8% experienced TF. T2DM can cause chronic hyperglycemia which changes the structure and function of proteins. These changes of the intracellular proteins, such as collagen, can cause physical disabilities to arise. Similarly, the results from Pandey et al. (2013) and Mustafa et al. (2016) provide data on the prevalence of hand disorders in patients with diabetes, specifically LJM, DC, CTS, and TF. This information contributes knowledge on what

specific musculoskeletal disorders OTs may encounter when treating clients with T2DM at their clinics.

According to Pandey et al. (2013), LJM, also known as diabetic cheiroarthropathy or diabetic stiff hand syndrome, occurs when individuals experience thickening and stiffness in the connective tissue mainly involved in the small joints of the hand. If individuals with T2DM and a UE dysfunction neglect taking care of their diabetes, they can experience severe hand deformities. In SC, metabolic factors such as the accumulation of advanced glycation end-products can create inflammation and pain in the tissues of the shoulder, both of which can lead to limited mobility and chronic pain (Mueller et al., 2018). DC is when an increased thickening and shortening of the palmar fascia creates a nodule formation (Pandey et al., 2013). CTS is a compression on the wrist that leads to median nerve entrapment. In a meta-analysis, Pourmemari and Shiri (2015) found that 19 studies on nerve conduction and 17 studies on clinical diagnosis confirmed that pain, numbness, burning, or tingling in the thumb, index, or middle finger were top symptoms of CTS. Lastly, TF is when a catching sensation occurs in affected fingers due to a nodule formation overlying the metacarpophalangeal joint along the flexor tendon sheath (Pandey et al., 2013). Most of these UE dysfunctions lead to limitations such as a limited range of motion around the joints, pain, and overall discomfort.

While these studies used large sample sizes, few of them were conducted in the United States. These studies were done in Israel, Turkey, Iran, India, and Jordan. This shows that there is a gap in knowledge regarding the prevalence of T2DM and UE impairments in the United States.

Diabetes Self-Care

Diabetes self-care is a crucial element in routines that help diminish risks of future diabetic complications. Areas of self-care that pose a challenge for individuals with diabetes consist of nutrition, physical activity, monitoring blood glucose, and medication management (Weinger et al., 2014). In addition, issues such as comorbidities and polypharmacy can complicate diabetes self-care. Nutrition is an essential component of diabetes self-care. The ability to follow a healthy diet impacts an individual's ability to reach glycemic targets and prevent or prolong the onset of serious diabetes complications. However, being able to follow a healthy diet has posed challenges for most individuals with diabetes. Daily physical activity of 45 minutes, 5 days a week, has been shown to improve glycemic control, insulin sensitivity, and promote weight loss in those with diabetes. Despite the benefits of exercise, Weinger et al. (2014) found that out of the number of adults with diabetes who participated in a national survey, only 25% met the American Diabetes Association guidelines for physical activity which is defined as 30 minutes of moderate activity five days a week and two muscle-strengthening activities twice a week.

Another self-care task is monitoring blood glucose levels to manage diabetes and prevent complications. Many individuals lack resources to help them understand what glucose levels are, what they should be, and how to properly check them. They also struggle to adhere to a routine when monitoring their glucose levels and staying in control of them. Patients can use adaptive devices such as an automatic soap dispenser to maintain proper hand hygiene when measuring glucose levels. This can also decrease pain when operating the soap dispenser. Patients can also use a weekly care log to help

themselves stay on top of their blood glucose levels and keep track of their levels throughout the day. Common tips such as setting a timer to remind someone when to check their levels and considering other non-invasive glucose monitors can also be addressed for clients to keep them motivated and responsible to stay in their target blood glucose range (see Appendix A).

Moreover, medication management is another important area of diabetes self-care, as being able to take the appropriate dose of medication at the correct time is vital. Due to the presence of one or more comorbid conditions associated with T2DM, several medications are often prescribed for multiple conditions. A higher number of daily medications increases the risk of medication error. Therefore, medication management is often a challenge for individuals with T2DM with other comorbidities such as UE dysfunction. To address these common difficulties with medication management, individuals can use adaptive devices to improve overall hand strength and decrease a need for precision grips when completing ADLs independently. Additionally, tips for patients to help reduce pain, and the addition of a medication diary can be used for patients to take their medications in accordance with their doctor's orders (see Appendix A).

Gunggu et al. (2016) have defined diabetes self-management behaviors as following a diet, participating in exercise, taking oral medication, self-monitoring blood glucose levels, and practicing foot care. In this study, a questionnaire was given to 400 adult participants with T2DM, and results showed that 60.8% of the individuals practiced diet control. Looking at exercise, 29.1% of individuals engaged in 30-minutes of exercise for at least 5 days a week, and only 4.1% engaged in a specific exercise. Exercise is a

challenging habit and self-care activity for patients with T2DM to partake in due to a lack of confidence and resources available. To address this self-care activity adaptive solutions for exercising can be going for walks, or partaking in yoga, resistance training, and chair exercises. These forms of exercise are full-body workouts that can reduce a patient's risk of injury. To treat pain and/or discomfort from these exercises, heat or a cold compress can help to soothe muscles and reduce inflammation. Lastly, an exercise log can be implemented as a way for the individuals to keep track of their workout plan to increase their motivation and work on creating a habit to exercise (see Appendix A).

Vicente et al. (2020) looked at the correlation between functional capacity and self-care in older adults with diabetes. Of the subjects, 68.3% reported that they could independently carry out daily activities. Using the Diabetes Self-Management Questionnaire, subjects self-reported 16 questions about their self-management actions. Results showed high adherence to diabetes medications, taking diabetes pills, taking insulin injections, and caring for their feet. However, statistics showed a low adherence to individuals assessing blood glucose and engaging in physical activity for less than 30 minutes.

Looking at self-care activities, a couple of studies addressed psychosocial elements of those with T2DM and managing self-care activities. Park et al. (2018), conducted a cross-sectional study that evaluated how stress affected an individual’s emotions and eating behaviors. In the study, perceived stress was defined by how individuals evaluate stressful events in their lives. Additionally, diabetes-related stress was defined as the emotional stress that is related to the self-management of diabetes and their interpersonal relationships with their health care providers and family members.

Emotion-oriented coping strategies—meaning how an individual regulated their emotions from a stressor—had a direct relationship with both perceived and diabetes-related stress causing the individual to either over or under-eat. Healthy eating is a self-care activity and unhealthy eating habits lead to a decrease in how individuals manage their self-care. By creating stress management goals, health professionals can help clients create healthy coping strategies that increase healthy behaviors and overall self-care.

When individuals experience UE impairment-related stress, there is a tendency for increased emotional-eating behaviors and metabolic changes such as higher glucose levels. Adaptive solutions for stress management are diaphragmatic breathing, transcendental meditation, progressive muscle relaxation, guided imagery, biofeedback sensor modalities, cognitive behavioral therapy, and social support (Varvogli & Darviri, 2011). All these interventions are tools that individuals can use to manage their stress more effectively and efficiently. By adhering to the stress management techniques, individuals will be able to identify healthier coping strategies that will guide them to select healthier eating habits to regulate their glucose levels (see Appendix A).

Sleep disorders are often associated and coexist with diabetes. Between 40% to 86% of adults with T2DM have been found to have obstructive sleep apnea (Chasens et al., 2012). Additionally, there is an increased risk of comorbid insomnia and restless leg syndrome in individuals with T2DM, along with daytime sleepiness. Obstructive sleep apnea and having a disrupted sleep duration can negatively impact glycemic control. Poor sleep quality and daytime sleepiness affect multiple psychological and social aspects of self-care such as having a decreased positive mood, feelings of incompetence in managing diabetes, reduced confidence in self-care efficiency, and decreased adherence

to self-management behaviors. An OT can collaborate with their client to improve their quality of sleep. The OT can help with the design and implementation of a sleep schedule for the client by completing a home assessment to analyze the client's sleep environment and nightly routine. The OT can also provide night aids to help position the client's extremity to reduce pain throughout the night. In Watt et al. (2014), participants with hand osteoarthritis were given splints to use at night for 3 months to help with pain and joint deformity. The study's findings indicate that of the participants, 43% reported that they had a reduction of pain on the Numeric Rating Scale. Of the 23 participants who completed the study, 74% reported improvement in the joint and 61% wanted to continue using the night splint after the study.

In Tajika et al.'s (2020) study, 159 participants were given the QuickDASH questionnaire to measure the level of UE disability, as well as the Athens Insomnia Scale to measure sleep difficulties and patterns. Results of the study showed that participants that had difficulties with their sleep, based on the AIS score, had significantly higher QuickDASH scores than participants without sleep disturbances. On the other hand, researchers found that sleep disturbance is attributed to psychological stress (Peters et al., 2016). Adaptive solutions that can be used to improve quality of sleep can be (1) education on sleep hygiene (2) education on optimal sleeping positions (3) incorporating a sleeping splint/aid and (4) using CBT to address ineffective coping strategies that disrupt sleep quality and quantity (see Appendix A).

Gaps in these studies are that there is limited research on UE dysfunctions and the impact it has on individuals with T2DM and their self-care activities. There is also limited research on ways to address these self-care activities and how to improve them

with different adaptations. Additionally, there is limited research on the percentage of individuals diagnosed with both T2DM and UE dysfunctions and how these individuals can address their self-care activities to improve their functioning.

Upper Extremity Dysfunctions and Activities of Daily Living

UE dysfunctions can inhibit individuals from completing their ADLs to the best of their ability, resulting in a person struggling to complete personal care activities. According to Swann (2015), common problems such as painful fingers, weak grip, and loss of movement down an arm can highly affect how individuals can grasp objects such as bathroom items like a toothbrush, hairdryer, hair tie, and opening and closing containers. It also affects their ability during daily use of holding a phone or cup for a long duration as well as using light switches and opening and closing door handles without getting weak and tired. Similarly, Oosterwijk et al.'s (2018) systematic review found that for shoulder flexion and abduction approximately 130° out of the 180° of range of motion is needed to complete ADLs such as reaching high shelves, grooming, bathing, eating with a spoon, and drinking out of a cup. If individuals have a UE dysfunction that prevents them from reaching these degrees of range of motion, they are unable to complete their ADLs. In another study, Gates et al. (2016) found that individuals experiencing limited joint mobility of the shoulder, wrist, or digits might have trouble completing ADLs such as perineal care, grooming, dressing, and carrying heavy objects. To address ways to help patients decrease pain and develop the range of motion needed to complete these activities, adaptive devices can be used that address all seven categories that fall under grooming and hygiene: dressing, bathing, oral care, hair

management, nail management, face washing, and toileting. See the guide in Appendix A, under grooming and hygiene, for more information.

Furthermore, individuals with diabetic peripheral neuropathic pain experienced functional hand weakness which led them to encounter difficulties completing hand-based tasks (Win et al., 2019). Performing tasks such as fastening buttons, using cutlery, opening doors, and doing chores may be challenging for individuals to complete. The same challenges were found in another study by Turesson et al. (2020) that looked at individuals with DC. Common challenges that participants with DC reported were difficulties with grip and fine motor skills when performing ADLs. Many stated that they had difficulty when washing their face or body, putting their hands in their pockets, handling tools, and doing push-ups when exercising. DC creates a constant stiffness, and decreases range of motion of the fingers which causes an inability to fully open the hands.

Lastly, Langer et al. (2016) looked at the functional outcomes of acute TF and prolonged follow-up trigger finger (PF-TF). The authors interviewed participants by using the Quick Disabilities of the Arm Shoulder and Hand and Numeric Pain Scale and found that both groups reported high levels of difficulty in opening a jar—the acute TF group reported 48% and the PF-TF group reported 38%. These groups also had difficulties in other functions such as household and recreational activities that require arm and hand strength. When asked about their normal social activities, work, and daily life, about half of the acute TF group and a quarter of the PF-TF group stated that activities were moderately to severely interrupted by their hand condition. Not only were their activities disrupted by the dysfunction but also by the pain that TF caused these

individuals; 72% of participants in the acute TF group and 37% of the PF-TF group reported moderate to extreme pain and sleeping difficulties.

All these studies similarly address how specific UE dysfunctions can cause impairments when performing ADLs that can be devastating for many individuals. There are many challenges for individuals with a UE dysfunction, many of which OTs can provide solutions for. OTs can set treatment goals based on the movements needed to complete activities and teach compensatory strategies to encourage participation in ADLs (Gates et al., 2016).

Clinical Significance of Research Evidence

The clinical significance of these findings is important for OTs who treat individuals with a UE impairment and T2DM. Based on studies by Kiani et al. (2014), Sözen et al. (2018), Pandey et al. (2013), Mustafa et al. (2016), and Pourmemari and Shiri (2015), musculoskeletal and microvascular UE complications are common in patients with untreated T2DM. These hand disorders create muscle weakness, numbness, tingling, and limited range of motion that, if left untreated, can cause hand deformities. Such deformities can then affect both participation in and performance of occupations. It is the goal of the OT to identify any gaps in knowledge regarding T2DM, UE impairments, and self-care activities. By having this information, they can work with the client to create a client-centered treatment plan that allows them to be independent in their ADLs. By looking at the research conducted, therapists will be able to implement a high-quality occupation-based education guide into their original occupational therapy hand care, that specifically addresses self-care and engagement in ADLs. Based on the studies by Weinger et al. (2014), Gunggu et al. (2016), and Vicente et al. (2020) T2DM

patients face many challenges of self-care: medication management, healthy eating habits, checking glucose levels, grooming/hygiene, physical exercise, sleep, and stress management. OTs can address these self-care activities by setting goals and using their client-centered approach to find ways for patients to adapt to the self-care activities that are more challenging with a UE dysfunction. Based on the studies by Swann (2015), Oosterwijk et al. (2018), Win et al. (2019), Gates et al. (2016), Turesson et al. (2020), and Langer et al. (2016), individuals with UE dysfunctions are unable to complete certain ADLs due to muscle weakness, range of motion limitations, and pain. If individuals are unable to complete ADLs additional challenges may arise, especially when it comes to their diabetes self-management.

Overall, the literature supports that there is a high prevalence of UE dysfunctions in patients with T2DM, and a need for them to receive proper treatment to minimize complications when performing ADLs. OTs can impact a client's health by promoting health, wellness, and prevention. This can be done by addressing lifestyle behaviors such as physical inactivity, poor diet, insufficient sleep, stress, and medication adherence (Lucado et al., 2018). While the literature supports the fact that individuals do experience challenges in completing self-care activities, it does not support how someone with an UE dysfunction and T2DM will be able to perform in ADLs and self-care management. Not only is there a gap in the literature regarding this issue, but also in occupational therapy practice. Lucado et al. (2018) state that there is an increasing need for hand therapists to incorporate the promotion of health, wellness, and prevention for their clients to improve population health. The common barriers for health and wellness promotion in hand therapy practice are a lack of time during treatment, a lack of patient

interest, and a lack of materials or resources (Lucado et al., 2018). This gap in practice can be closed by creating a guide that will help therapists in treatment interventions, in addition to providing resources to patients and directing them towards improving their self-care and ADLs.

Theoretical Framework

The rehabilitative frame of reference incorporates concepts that address adaptation, compensation, and environment modifications with an overall goal to encourage the client to be as independent as possible (Gillen & Nilsen, 2019). This is done by maximizing the clients' strengths and independence. This frame of reference is more commonly used with clients who have permanent or progressing dysfunctions and struggle with changing to their new lifestyle which can be a long and challenging process. OTs can work as educators who look at both the physical and mental features that make up the client's occupational performance and address ways that will encourage the client to learn. This involves analyzing the client's potential, motivations, and learning style. Additionally, this frame of reference looks at the importance of environmental adaptations and compensatory strategies (Cole & Tufano, 2020). OTs can collaborate with clients on finding adaptive equipment or discussing environmental adaptations that can aid in occupational engagement. By focusing on the client's strengths, OTs can also help address diabetes management and how individuals can adapt to their UE dysfunction to improve their self-care. Approaches individuals can use for adaptation include modifying positions when completing a task, using adaptive equipment, eliminating steps to complete a task, and improving education on the movement of tasks. Additionally, Mosey's Role Acquisition approach is significant

within the rehabilitative frame of reference by incorporating the client's mental and physical functions (Cole & Tufano, 2020). OTs must consider the psychosocial aspect of their clients and look internally at the client's motivation, wants, and needs to be successful in treatment. By doing so, OTs can implement a client-centered approach to find what is best for the client.

This frame of reference will also follow the guidelines of the occupational adaptation model. The occupational adaptation model addresses a holistic approach by looking at the interaction between the person and their environment and the adaptive process people engage in during occupations (Cole & Tufano, 2020). Occupation and adaptation are connected as one. When an individual faces dysfunction in their occupations, OTs can set up clients to be successful in their adaptive ability. Moreover, dysfunction occurs when an individual is unable to complete ADLs and adapt. This is where OTs have the chance to address the client's dysfunction, as they can look at contributing factors that make up the person and their environment. When examining an individual's internal and external factors, their occupational challenges may arise, creating a desire for mastery. For clients who develop UE impairments due to complications of T2DM, their level of dysfunction may be high, which can cause them to significantly change the way they perform occupations. When struggling to adapt, OTs can refer to the occupational adaptation model to address a way to bridge their clinical expertise with the client's physical limitations by facilitating adaptation and improving motivation within the client to achieve a more functional occupational performance (Jack & Estes, 2010).

Overall, the rehabilitative frame of reference directly correlates with how OTs can work with those who need education and guidance in regulating their diabetes while managing their UE dysfunctions. Through the use of the occupational adaptation frame of reference, therapists can identify what adaptations can be done to improve the client's functional independence. These interventions are done to benefit the clients and help them regain the strength and control they need for their ADLs.

Methodology

This thesis project was accomplished in two parts: We created a guide, and then we conducted a survey for licensed and registered OTs living in the United States working in an outpatient setting serving people with a primary diagnosis of SC, LJM, DC, CTS, and TF. We hypothesized that a high-quality occupation-based guide can be developed and prove to be useful for OTs providing care for individuals with UE impairments, T2DM, and self-care activities. The purpose of the guide was to close the gap in research regarding an OT's role when providing care for individuals with UE impairments, T2DM, and self-care activities.

Creating the Guide

The guide addressed registered and licensed OTs who work in an outpatient setting serving individuals with UE dysfunctions with a comorbid diagnosis of T2DM. The guide provided recommendations for the occupational hand therapists in leading an effective and efficient protocol when addressing both the UE dysfunction of the client and their T2DM. We plan on the guide being used alongside the patient's original occupational plan of care for their UE dysfunction. After we complete the thesis, digital

guides will be provided at hand clinics where therapists have the option to access the guides and provide adaptive solutions to clients if they choose to opt-in.

Literature Review

A literature review was conducted to collect data on information regarding T2DM and UE dysfunctions. Research studies were selected based on the following criteria: published within the last 10 years, addressed UE dysfunctions such as SC, LJM, DC, CTS, and TF, addressed occupational therapy interventions, involved T2DM interventions and T2DM self-care activities. No countries were excluded. In total, 21 studies were collected, analyzed, and used in the literature review, along with two other educational and academic websites. Based on the information collected from the studies, research revealed no correlation in an OT's role when providing care for individuals with UE impairments, T2DM, and self-care activities.

Design of Guide

The 60-page guide was designed using Microsoft Word. The information was broken up into four main parts: (1) a list of 4 standardized assessments, (2) a Diabetes and Upper Extremity Impairments Self-Care Scale, (3) a self-care chart, and (4) handouts (see Appendix A).

Standardized Assessments

We chose to include four standardized assessments in the guide to provide therapists more options when gathering information on their clients. To help the therapist further, we have hyperlinked each assessment and included an explanation of the purpose of each assessment, as well as details regarding what each assessment measures. The four assessments included are: the QuickDash, the Upper Extremity Functional Index, the

Diabetes Distress Scale, and the Diabetes Management Self-Efficacy Scale-Revised. The QuickDash and Upper Extremity Functional Index are similar in that they both analyze how an individual's impairment affects their performance in their ADLs. The Diabetes Distress Scale is a scale that assesses how individuals personally feel about their stress levels when managing and dealing with their diabetes, while the Diabetes Management Self-Efficacy Scale-Revised looks at how well individuals with T2DM are managing and taking care of themselves through physical activity, healthy eating habits, and management of blood glucose levels.

Diabetes and Upper Extremity Self-Care Impairment Scale

A diabetes and UE self-care impairment scale was created based on the top seven self-care items that were mentioned above. We developed this scale so therapists can assess their client's level of difficulty when performing tasks due to their shoulder/arm/hand impairment, while also evaluating how much a UE dysfunction is affecting a patient's performance in their diabetes management. The activities listed on the scale are managing diabetes medication, maintaining a healthy diet, getting dressed, completing oral care, exercising for 150+ minutes a week, monitoring blood glucose levels, developing healthy sleep habits, and managing stress. Patients are to rate their difficulties completing self-care activities for diabetes management on a scale from 0 to 6, where 0 represents the individual is experiencing no difficulties and 6 represents the individual is unable to complete the activity. This scale is intended to help the therapist to have a better understanding of which area(s) of concern they need to address with their client in helping them manage their diabetes.

Self-Care Chart

The self-care chart was developed to provide an illustrated resource for OTs to identify common self-care activities that become impaired with UE dysfunction and T2DM, as well as difficulties clients may struggle with, and adaptive solutions that OTs can provide. We created the self-care chart based on the previously mentioned literature review. From the literature review, prevalent UE dysfunctions and self-care activities were identified. Kiani et al. (2014) found that SC, LJM, DC, CTS, and TF are the most common UE disorders that affect individuals with diabetes. The top seven self-care activities that affected these UE dysfunctions were then collected and listed. These self-care activities are medication management, healthy eating, checking blood glucose, grooming and hygiene, exercise, sleep, and stress management.

Three self-care activities were broken down further. We broke down healthy eating into meal preparation, shopping for groceries, education on healthy meals, using utensils, eating, and drinking. Checking blood glucose was broken down into washing hands, drying hands, holding the glucose device, tracking the number of times patients are checking their glucose, and interpreting the results. Grooming and maintaining proper hygiene were broken down into dressing, bathing, oral care, hair management, nail management, face washing, and toileting. This allowed the broad terms of grooming and hygiene to be simplified into specific categories that the literature review found to be the most challenging. We decided to list the common UE impairments that are associated with the specific self-care activity in a chart. Next to each activity is a list of adaptive solutions.

Handouts

We decided to attach handouts to the guide that correlate with each of the seven self-care activities in the chart, which are: medication management, healthy eating, checking blood glucose, grooming and hygiene, exercise, sleep, and stress management. Each handout is 3-4 pages long. In these handouts, we have included location, price, and photos of adaptive devices, as well as tips for both the therapist and patient to take note of or look out for when completing the specific self-care tasks. At the end of each handout, there is an appendix with links for all the devices and tools so OTs can easily access where to find them.

Conducting the Survey

The purpose of conducting a survey was to create a qualitative feasibility study so we could test the effectiveness of the guide and see if practitioners thought it could be implemented into an occupational therapy hand clinic setting. The goal of the survey was to answer these three questions regarding the guide: (1) Can this work? (2) Does it work? (3) Will it work? (Bowen et al., 2009; Tickle-Degnen, 2013; see Appendix C).

Participants

The inclusion criteria were participants who are licensed and registered OTs living in the United States. Individuals had to be currently working in an outpatient setting serving people with a primary diagnosis of SC, LJM, DC, CTS, or TF. Moreover, participants had to be currently working in an outpatient setting serving people who have a comorbid diagnosis of T2DM.

The exclusion criteria consisted of individuals who are not licensed and registered OTs living in the United States. People who did not work in an outpatient setting serving

people with a primary diagnosis of SC, LJM, DC, CTS, and TF. Additionally, we excluded individuals who did not work in an outpatient setting serving people who have a comorbid diagnosis of T2DM.

Recruitment

Recruitment and retention were accomplished by posting on the AOTA general discussion forums. Additionally, recruitment and retention were done using a convenience sample. Virtual flyers were created and distributed so participants could access the survey and email others who may have been interested in participating in the survey as well (see Appendix B). Thesis advisors and Stanbridge Master of Science in Occupational Therapy faculty were able to distribute it through their work or professional networks and people could respond to the flyer by following the link. We anticipated recruiting five participants.

Storage Procedures

The information and data collected from Google Forms were automatically sent to a private Google email (diabetes.thesis.group@gmail.com) that only we had access to. From there the information was transferred to Microsoft Word and Microsoft Excel. Data was stored until the end of the third term, July 23, 2021. There was no need for future storage of the data past this date. The data and information collected will be published and used for the Thesis and a poster presentation at Stanbridge University.

Data Analysis

Using Google Forms and Excel, we used a coding system to identify common themes collected from the open-ended responses of the participants. The coding system was developed by first analyzing participants' responses, followed by identifying

common words or phrases within the responses. Next, we met to review the repeated words to create common themes. Subsequently, bar-charts were created from the multiple-choice responses to provide a visual representation of the data from the survey.

Ethical Considerations

Implementing the Guide

When implementing the guide into practice, the therapist should use their clinical reasoning skills to adhere to the core values of occupational therapy. These core values are addressed in the AOTA 2020 Occupational Therapy Code of Ethics, which include altruism, equality, freedom, justice, dignity, truth, and prudence (AOTA, 2020). Dignity focuses on preserving the inherent worth of the client, showing that language should be considered since this guide is written in English and there are many individuals from different cultural backgrounds. Body issues should also be considered as clients might feel insecure and dissatisfied with their body. OTs should take into account the different body types that can affect a client's self-esteem and confidence, making them unmotivated to make lifestyle changes during treatment. Additionally, T2DM is not an easy adjustment, so the client's sensitivity to change when dealing with the disease process and their inability to perform their ADLs should be considered. Another core value of the AOTA 2020 Occupational Therapy Code of Ethics is freedom, which is defined as ensuring that individuals make their own decisions and have self-direction. Upon receiving the guide, therapists will have the option to opt-in or opt-out of using the guide in their practice, as well as giving clients the option to opt-in or opt-out of using the handouts attached to the guide. This provides them the autonomy to make a choice based on their values and beliefs. OTs can address dignity and freedom by building rapport with

clients and using the therapeutic use of self when creating interventions that can address UE impairments, T2DM, and self-care activities. Every session with a client is not the same, therefore, building rapport should be considered first. Moreover, truth is a core value that focuses on being accountable and honest with clients. Maintaining anonymity and confidentiality will be done following HIPAA guidelines by not revealing the patient's personal information and medical records.

Additionally, principles that model ethical reasoning and support occupational therapy that are addressed in this thesis are beneficence, non-maleficence, autonomy, justice, veracity, and fidelity (AOTA, 2020). OTs are health care providers that demonstrate beneficence by promoting wellness and ensuring safety for all clients. They will protect their clients from harm by utilizing this safe and reliable guide that addresses T2DM, and their UE impairment. Nonmaleficence will be protected by the research that went into creating the guide, as well as the professionalism of the OT knowing what is best for the client. Moreover, OTs will show veracity by being transparent with clients about the guide and what it entails. OTs have the option to opt-in or opt-out of using the guide in their practice, and clients have the option to opt-in or opt-out of following the guide and using the handouts provided. When clients opt-in, they are providing consent to participate in the occupational therapy intervention. If a client feels that they want to go in a different direction of therapy, the OT will allow autonomy and respect the decision and confidentiality of the client. All clients have their rights and do not need to address reasons for partaking or withdrawing from using the guide and its handouts. Overall, OTs will be respectful to all clients and commit to helping the client succeed in

their treatment. By showing fidelity, the therapists and clients can build a professional and trusting relationship.

Research and Survey

There were also ethical and legal considerations for the survey and its distribution. The beginning of the survey had a consent form that OTs could fill out regarding their privacy. If they choose to go forward with the survey, they were opting-in to participate in the study and confirmed that they were meeting the inclusion criteria. The survey did not contain language that made participants feel pressured or coerced into taking part in the survey. Participation was not mandatory. The consent form also contained contact information with a private email that only the researchers had access to in case any issues arose. The survey consisted of multiple-choice questions and fill-in-the-blank options. Participants had to answer all the questions before moving on to the next question. Participants were not asked to identify any personal information (see Appendix C).

Results

The results of the survey are presented in Appendix E and F. The survey was opened May 13, 2021, and closed June 23, 2021. It was open for a total of 41 days. We anticipated five participants to be recruited for the survey, however, it resulted in a total of eight participants. Of these, six participants stated they have an advanced practice certification in hand therapy. Five participants work in an outpatient setting, one works in a skilled nursing facility, one works in an inpatient setting and another participant works in both an inpatient and outpatient setting. All eight participants stated that they treat patients referred for SC, LJM, and neuropathy. Seven treat patients with CTS and TF, and

five stated they treat patients with DC. All participants have patients diagnosed with T2DM, and only two had resources to help them with patient self-management of T2DM, which included a home exercise program for T2DM and a nurse educator. Participants of the survey also had to identify the common self-care areas that they address during client treatments. Two participants selected medication management, monitoring glucose levels, and developing healthy sleep habits as areas they incorporated into treatment. Three participants selected healthy eating, one selected stress management, one selected ADLs and one stated that self-care is not incorporated into the treatment plan. Six participants selected exercise as the most common self-care area incorporated into treatment. When asked about what client factors affect hand therapy outcomes for the participants' patients with T2DM, all eight participants selected sensory impairments and musculoskeletal impairments. This question presented the option to “select-all” that applies. Seven participants selected endurance factors, five selected socioeconomic factors, four selected edema factors, and three selected psychological or mental functions that affect patient outcome in occupational therapy.

All participants reported that the guide was easy to follow and rated it a five out of five for being useful towards occupational therapy practice when incorporating T2DM health promotion and wellness. See Appendix F for full statements. Results show that the guide can effectively be incorporated and used in an occupational therapy setting for patients with T2DM and UE impairments.

Discussion

Survey results support that the OTs who participated found the guide to be useful, easy to follow, and a great starting point when it came to helping treat clients with T2DM

and UE dysfunction. In terms of the background information that was collected from the participants (see Appendix E), six participants had an advanced practice certification in hand therapy. This shows that not all OTs have an extensive background in hand therapy, and many even lack the resources to help provide the best care for clients with UE impairments. Additionally, only two of the participants stated that they have resources for clients with T2DM. This supports the hypothesis that there is a lack of resources for OTs who are serving patients with a UE impairment and comorbid T2DM. The goal of this guide is to bridge the gap of the lack of resources that OTs require to help their clients with T2DM. The guide will also provide concise information that is in one resource and allows for easy accessibility for the OT to read and implement. Looking at the type of diagnoses of UE impairments, all participants selected that they have seen clients with a primary diagnosis of SC, LJM, and neuropathy. Seven selected CTS and TF, and five participants selected that they have treated clients with DC. This supports the research on the top five UE impairment diagnoses commonly seen in OT settings.

When identifying common self-care activities OTs incorporate into their functional treatment for T2DM, the most common activity identified was exercise, followed by healthy eating, then medication management, checking blood glucose levels, and sleep. Exercise is a challenging habit to adhere to. Within the literature review, Gunggu et al. (2016) found that out of 400 participants, only 29.1% engaged in physical activity. This shows that exercise is a main concern OTs have for their clients in helping manage T2DM. Moreover, the top two client factors that affect occupational therapy outcomes are sensory and musculoskeletal impairments. This is consistent with the previous literature, which has found that individuals with T2DM face microvascular and

musculoskeletal complications that hinder how they can perform ADLs. This guide enables OTs to show clients how they can incorporate adaptive devices and new strategies in managing their T2DM. This guide can also help clients improve their adherence to medications, exercise, and glucose monitoring to prevent exacerbation of T2DM symptoms.

Based on what participants found to be the most useful part of the guide (see Appendix F), participants stated that the list of various adaptive devices, pictures, stress management techniques, and diary logs made the guide to be easy to follow, and that it could be seamlessly incorporated into their practice. When asked what participants would like to see changed or added to the guide, one participant said information about low vision, another stated more information about nutrition, and another stated more information on different medications patients take. While the guide is 60 pages in length, we wanted to make the guide organized and easy to navigate by combining multiple evidence-based resources into one comprehensive guide. Therefore, the guide is broken down into multiple handouts based on a self-care task, which allows OTs and clients to condense the guide if needed, and only use the handouts relevant to the treatment plan. This flexibility means the guide can be tailored to each client's needs. By using the guide, OTs may feel more comfortable treating patients with T2DM. When asked to rate the guide on a sliding scale of one (being not useful) and a five (being very useful), all participants rated the guide as a five. These responses indicate that the guide can effectively be implemented into multiple settings to benefit OTs' treatment plans to address clients' self-care activities relative to their UE impairment and comorbid T2DM.

Limitations

The study had multiple limitations to consider. The survey had a small sample size of eight individuals. The survey was posted on the AOTA forum, which had many survey requests posted by other OTs and occupational therapy students. With numerous surveys being posted daily, our survey may not have reached the full population that we had hoped for. Additionally, individuals had to access a Google account and have knowledge on how to use the link or quick response code to access the survey. When taking the survey, it was suggested that it can take around 20 minutes total. This may have excluded some individuals from taking the survey or withdrawing from the survey. Moreover, the survey was only made available in English, limiting the number of ethnicities and cultures who could access and comprehend the guide. Since this was a small sample size, information cannot be generalized to the larger population of occupational therapy.

Clinical Implications

Occupational therapy is a profession that promotes the health and well-being of others through meaningful activities (occupations) and strives to create, maintain, or restore independence. By implementing this evidence-based educational guide into an occupational therapy practice, it will assist an OT's role in providing support for clients to promote health and wellness by addressing T2DM, UE dysfunction, and self-care activities. Since the guide addresses all three components that affect a client's occupational performance, OTs can provide holistic care relevant to the client. Additionally, this guide bridges the gap by addressing T2DM, UE dysfunction, and self-

care activities simultaneously; this makes the guide a unique resource for OTs, as no current studies have previously addressed all three together.

By condensing the information into one resource with multiple handouts, OTs will have a guide that reduces the barriers that were identified in the literature review regarding the lack of materials/resources to help clients with T2DM. This guide also serves as a starting point for OTs and clients to introduce a discussion on how they can address T2DM and UE impairments, and how both can affect each client's self-care activities. By using this resource, clients will have proper information and resources to comfortably work with the OT and be a part of the treatment process. It can also give clients a feeling of being more in control of their diagnosis and encourage clients to be proactive in their rehabilitation process. Moreover, the OT can be guided with the best possible tips, adaptive devices, and different strategies to promote clients' independence. Diaries and logs added in the guide can be printed and filled out with the client, as both the OT and client can collaborate on an intervention. Specific exercises from the guide can also be used as an intervention for OTs to improve client factors and provide a resource for OTs to create a treatment plan that addresses T2DM, UE dysfunction, and self-care activities.

For future development of the guide, the following suggestions can be considered based on the study's methodology and results. Due to the low number of OT participants, future research can consider a larger sample size and extend the duration the survey remains open to accumulate more data and recruit more participants. Since the guide was only developed for OTs, the client's perspective could also be considered and incorporated in developing the guide. With the addition of a patient satisfaction and input

survey, we would get to know more about how beneficial the guide would be from the client's point of view. Additionally, based on participant responses, low vision and medication lists are other components of self-care activities that can be added in future guide development. Researchers should consult with a physician about medications before adding them to the guide. Upon receiving the guide, a disclaimer should be added to advise OTs to adhere to the AOTA Code of Ethics when using the guide and apply their clinical reasoning skills when using it for patient interventions. Overall, this guide will greatly benefit OTs in practice by giving them the proper resources and allow for increased client participation when going through the guide and attached handouts. By increasing both an OT and the client's knowledge on how to improve lifestyle changes, it will likely create a more effective and beneficial change for the client's health and well-being.

Conclusion

The purpose of the study was to create an evidence-based guide for OT practitioners to address common self-care occupations for individuals with T2DM and UE impairments. The concept of the study was selected based on the gap found in the literature review. All studies collected from the literature review showed there was a connection between occupational therapy and UE impairments, diabetes and self-care activities, and UE impairments and ADLs. We found no studies that connected occupational therapy practice in conjunction with all three components: UE impairments, T2DM, and self-care activities. Additionally, studies also identified that lack of time, resources, and patient interest contributed to this gap in the literature.

A 60-page guide was created to fill the gap identified from the literature review by creating handouts within the guide that clients can use and work with the OTs to improve self-care and ADLs. There are two intended outcomes of this guide. The first is to provide evidence-based education for the therapist regarding common self-care challenges that clients may encounter. The second is to address ways for clients with UE impairments and T2DM to improve participation in self-care occupations such as attending to personal hygiene/grooming, meeting daily physical activity needs, managing blood glucose levels, increasing medication adherence, maintaining a proper diet, improving stress management skills, and addressing quality of sleep.

To test if this guide could be useful in an OT clinic, we surveyed participants who are licensed and registered OTs serving clients with a primary diagnosis of SC, LJM, DC, CTS, and TF, and also have a comorbid diagnosis of T2DM. The intended outcome of the survey was to identify if and how the guide works. The results of the survey supported the hypothesis that it is useful and provides foundational education for the OT and the client.

The guide contributes relevant clinical implications for OT practice and clients with UE impairments and T2DM. The guide increases an OT's client-centeredness and holistic treatment care by referring to the guide and working closely with the client to create a more personal treatment process. With the creation of the guide, OTs will have a reliable and accessible resource to reference at their clinic, decreasing their need for more resources and increasing time efficiency during treatment sessions. We hope that the guide will be available for OTs to use and implement in their practice. The goal is to

disseminate the guide at conferences or postings on AOTA to get the guide out to the public.

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Appendix A

Occupational Therapist Guide

Occupational Therapist Guide for Patients with Type II Diabetes Mellitus (T2DM) and Upper Extremity (UE) Impairments

Table of Contents

Occupational Therapist Guide for Patients with Type II Diabetes Mellitus (T2DM) and Upper Extremity (UE) Impairments

PURPOSE OF GUIDE:
The purpose of this guide is to help occupational hand therapists lead an effective and efficient protocol when addressing both the UE dysfunction of the client and their T2DM. A list of standardized assessments, a newly developed assessment, and a chart will be provided to help therapists work with clients in their adaptive process of regaining function.

STANARDIZED ASSESSMENTS: (See Appendix A)
The following are standardized assessments and their links that the therapist can access and use to assess an individual's UE dysfunction and their management of T2DM.

QuickDash: The QuickDash is an assessment that measures the level of impairment an individual with a UE dysfunction has when performing activities of daily living (ADLs) (Institute for Work & Health, 2010).

Upper Extremity Functional Index (UEFI): The UEFI is an assessment that looks at how an individual manages their impairment and how it affects specific ADLs (Stratford, 2010).

Diabetes Distress Scale (DDS): The DDS is a scale that assesses how individuals personally feel about their stress levels when managing and dealing with their diabetes, based on a 17-questionnaire scale (Behavioral Diabetes Institute, 2017).

Diabetes Self-Efficacy Scale: The DSES is a self-care assessment that looks at how well individuals with T2DM are managing and taking care of themselves through physical activity, healthy eating habits, and management of blood glucose levels (Self-Management Resource Center, n.a.).

DIABETES AND UPPER EXTREMITY IMPAIRMENTS SELF-CARE SCALE:
We have created this Diabetes and Upper Extremity Impairments Self-Care Scale to provide occupational therapists with a more cohesive assessment that addresses both UE dysfunction and diabetes management in one. This scale will directly correlate to the self-care chart.

Diabetes and Upper Extremity Impairments Self-Care Scale

Within the **past 7 days**, how much has your shoulder/arm/hand impairment cause difficulty when performing the following:

	Activity	No difficulty	Slight difficulty	Some difficulty	Moderate difficulty	High difficulty	Extreme difficulty	Cannot do it
1	Managing diabetes medication	0	1	2	3	4	5	6
2	Maintaining a healthy diet	0	1	2	3	4	5	6
3	Getting dressed for the day	0	1	2	3	4	5	6
4	Oral care	0	1	2	3	4	5	6
5	Exercising for 150+ mins/wk	0	1	2	3	4	5	6
6	Regularly checking blood glucose levels	0	1	2	3	4	5	6
7	Quality of sleep	0	1	2	3	4	5	6
8	Managing stress	0	1	2	3	4	5	6

SELF-CARE CHART:
The self-care chart is an illustrated resource for occupational therapists to identify common self-care activities that become impaired with UE dysfunction and T2DM, as well as difficulties clients may struggle with, and adaptive solutions that occupational therapists can provide.

Common Self-Care Activities	Common Difficulties Due to UE Impairment	Adaptive Solutions
Medication Management (See p. 14)	Opening medication bottles: • Precision grip (Wani & Mullerpatan, 2019) • Weakness in hand strength (Swann, 2015; Wani & Mullerpatan, 2019; Win et al., 2019)	• Pill bottle grip (Flinn et al., 2013) • Pill bottle opener • Push button pill organizer • Automatic pill dispenser • Use palm of hand & avoid prolonged gripping actions (Swann, 2015) Lifestyle changes: • Medication diary
Healthy Eating Steps involved: • Meal preparation • Shopping for groceries • Education on healthy meals • Using utensils • Eating • Drinking (See p. 17)	• Using both hands to stabilize food when cutting • Grasping utensils • Limited ROM at the joints (Oosterwijk et al., 2018) • Overall weakness • Fatigue	Meal Preparation: • Buy pre-cut and washed food • One-handed chopper (Pendleton & Schultz-Krohn, 2018) • Adaptive cutting board (Pendleton & Schultz-Krohn, 2018; Swann, 2015) Eating: • Enlarged handled cutlery (Swann, 2015) • Plate guard (Pendleton & Schultz-Krohn, 2018; Swann, 2015) • Plate stabilizer (Pendleton & Schultz-Krohn, 2018) Drinking: • Cup adaptors (Pendleton & Schultz-Krohn, 2018)

		• Insulated cup (Swann, 2015) • One way valve in straw (Swann, 2015) • Bottle openers (Swann, 2015) Lifestyle changes: • Healthy eating education • Joint protection • Energy conversation • Know when to ask for help at the grocery store • Use cart/electric cart instead of carrying a basket • Use cart if having to walk longer distances to home or car
Checking Blood Glucose Steps involved: • Clean hand • Dry hand • Hold device • Record how often blood glucose is being checked • What results are/mean (See p. 23)	• Sensory impairments (Pourmemari & Shiri, 2015; Win et al., 2019) • Weak grip strength (Swann, 2015; Wani & Mullerpatan, 2019; Win et al., 2019) • Difficulty holding device	• Changing fingers (Kirk & Stegner, 2010) • Adaptation to environment (arm supported on table) • Non-invasive glucose monitors (sensors) (Weigner et al., 2014) • Faucet temperature gauge • Use an automatic soap dispenser when washing hands Lifestyle changes: • Education on glucose numbers • Care Log (Pendleton & Schultz-Krohn, 2018) • Finger prick log • Setting a timer so patient is alerted when to check blood glucose

Grooming & Hygiene Steps involved: • Dressing • Bathing • Oral Hygiene • Hair Management • Nail Management • Washing face • Toileting (See p. 28)	• Weak grip strength (Swann, 2015; Wani & Mullerpatan, 2019; Win et al., 2019) • Precision grips (Wani & Mullerpatan, 2019) • Limited ROM at the joints (Oosterwijk et al., 2018)	Dressing: • Button hook (Pendleton & Schultz-Krohn, 2018) • Put affected arm in first when dressing (Pendleton & Schultz-Krohn, 2018; Swann, 2015) • Long handled shoehorn (Roelands et al., 2002) • Velcro (Pendleton & Schultz-Krohn, 2018) • Avoid shirts with many buttons Bathing: • Long-handled sponge (Pendleton & Schultz-Krohn, 2018) • Bath mitt (Pendleton & Schultz-Krohn, 2018) • Shower soap dispenser (Swann, 2015) Oral Hygiene: • Electric toothbrush (Pendleton & Schultz-Krohn, 2018; Swann, 2015) • Pump dispenser (Swann, 2015) • Enlarged toothbrush handle (Swann, 2015) • Waterpik Hair Management: • Long-handled brush (Pendleton & Schultz-Krohn, 2018; Swann, 2015) • Hairdryer stand (Pendleton & Schultz-Krohn, 2018) • Wall-mounted hair dryer (Pendleton & Schultz-Krohn, 2018; Swann, 2015)

		Nail Management: • Enlarged file holder (Swann, 2015) • Table-top nail clipper (Swann, 2015) Washing face: • Tap turner (Swann, 2015) Toileting: • Foot flusher • Automatic toilet flusher • Toilet paper dispenser • Long handled toilet aid • Install a bidet
Exercise (See p. 37)	• Fatigue • Limited ROM at the joints (Oosterwijk et al., 2018) • Pain • Reduced hand grip strength (Nair et al., 2019; Wani & Mullerpatan, 2019; Win et al., 2019)	• Walking (Hill, 2005) • Exercise Log • Heat compress to soothe musculature (McGorm et al., 2018) • Ice compresses to reduce inflammation (Collins, 2008) • Yoga (Schmid et al., 2018) • Resistance training (Weinger et al., 2014) • Chair exercises (Weinger et al., 2014)

Sleep (See p. 44)	• Chronic pain (Watt et al., 2014) • Difficulty sleeping (Chasens et al., 2012; Langer et al., 2016; Surani et al., 2015) • Psychosocial factors: Poor coping strategies (Peters et al., 2016)	• Educate on appropriate body positioning (McCabe et al., 2011) • Educate on sleep hygiene (Zizi et al., 2010) • Splint/aid (Walt et al., 2014; Wong, 2002) • CBT for sleep disturbances (Peters et al., 2016)
Stress Management (See p. 49)	• Chronic pain (Watt et al., 2014) • Increase of emotional-eating behaviors (Park et al., 2018) • Metabolic changes/ elevated glucose levels (Morris et al., 2011)	Coping strategies: (Varvogli & Darviri, 2011) • Diaphragmatic breathing • Transcendental meditation • Guided imagery • Biofeedback (Sensor modalities) • Autogenic training • Progressive muscle relaxation • Social support

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Appendix A

QuickDash
Link: https://dash.iwh.on.ca/sites/dash/files/downloads/quickdash_questionnaire_2010.pdf

Upper Extremity Functional Index (UEFI)
Link: https://myturningpoint.org/files/UEFI_2010.pdf

Diabetes Distress Scale (DDS)
Link: https://behavioraldiabetes.org/xwp/wp-content/uploads/2015/11/The-DDS-witrh-scoring-recommendations-current-version-December-2017.pdf

Diabetes Self-Efficacy Scale (DSES)
Link: https://www.selfmanagementresource.com/docs/pdfs/English_-_self-efficacy_diabetes.pdf

Medication Management

Medication Management: (See Appendix B)

Adaptive Device	Location & Price	Image
Jokari Easy Open Prescription Medicine Bottle Opener and Built in Magnifying Glass	Amazon Price: $9.99	
Apothecary Products Pill, Medicine, Vitamin Container Opener	Amazon Price: $11.98	
EZY DOSE Push Button (7-Day) Pill, Medicine, Vitamin Organizer	Amazon Price: $9.99	
LiveFine Automatic Pill Dispenser with 28-Day Electronic Medication Organizer	Amazon Price: $89.99	

Tip: Use palm of hand when trying to open bottles and avoid prolonged gripping actions to reduce pain and conserve energy.

Medication Diary

A medication diary is used to keep a record of the date, specific medication, dosage, frequency, and time of day that the medication is taken. This will make sure that you take your medications according to your doctor's orders. By filling this out weekly, it will allow you to feel more comfortable and in control of your treatment plan.

Example Template:

Weekly Medication Diary				
Day	**Date**	**Dose**	**Frequency**	**Time**
SUN	/ /			**am/pm**
MON	/ /			**am/pm**
TUES	/ /			**am/pm**
WED	/ /			**am/pm**
THURS	/ /			**am/pm**
FRI	/ /			**am/pm**
SAT	/ /			**am/pm**

Appendix B

Jokari Easy Open Prescription Medicine Bottle Opener and Built in Magnifying Glass
Link: https://www.amazon.com/dp/B002A2NCVA

Apothecary Products Pill, Medicine, Vitamin Container Opener
Link: https://www.amazon.com/dp/B01B5DB7VQ

EZY DOSE Push Button (7-Day) Pill, Medicine, Vitamin Organizer
Link: https://www.amazon.com/dp/B001OK1YUA

LiveFine Automatic Pill Dispenser with 28-Day Electronic Medication Organizer
Link: https://www.amazon.com/dp/B08CJMSGMY

Healthy Eating

Meal Preparation (See Appendix C)

Adaptive Device	Location & Price	Image
North Coast Medical: Adaptative Cutting Board	Amazon Price: $39.59	
Alrens: Vegetable Chopper	Amazon $25.99	

Tip: Buy pre-cut and washed food

Eating (See Appendix C)

Adaptive Device	Location & Price	Image
Special Supplies Adaptive Utensils	Amazon $19.95	
Able-T Plate Guard	Amazon $14.99 (set of 2)	
Ableware Scooper Plate with Suction Cup Base	Amazon $11.39	

Drinking (See Appendix C)

Adaptive Device	Location & Price	Image
Yoelike: Anti-Slip Adjustable Tumbler Handle Fit	Amazon Price: $5.99	
TLINNA: Coffee thermos with LED Temperature Display	Amazon Price: $19.99	
ARK's Theraputic: One-Way Straws	ARK Therapeutic Products Price: $11.99	

Lifestyle Changes Toward Health Eating

When Grocery Shopping:

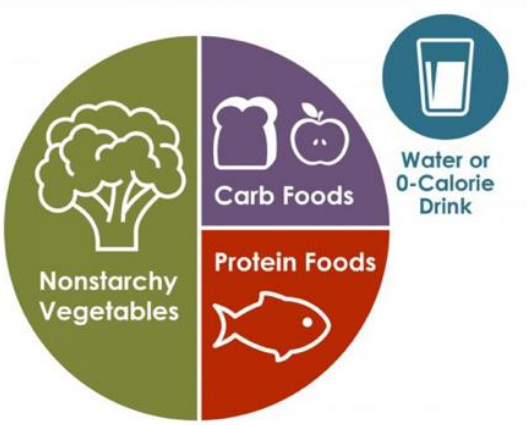
- Ask for help if you need a special cart or if you need to reach for items that are hard to get
- Use a pushcart or electric cart instead of carrying a basket
- Use the palm of your hand and the weight of your body to push the cart
- Open fridge and freezer sections with the palm of your hand, keeping the fingers straight
- Avoid using a tight grip
- Avoid pinching
- Take breaks when needed
- Stop activity if it causes pain

Healthy Eating Education (McLaughlin, 2020)

What are Carbohydrates?

Carbohydrates give the body energy. The body breaks down carbohydrates into sugar. The pancreas releases insulin to absorb the sugar. In individuals with type 2 diabetes mellitus, the body does not respond normally to insulin. This creates extra sugar in the body, which goes back into your bloodstream increasing your blood sugar level. Managing how many carbohydrates you eat can help control your blood sugar level.

Follow The Plate Method:



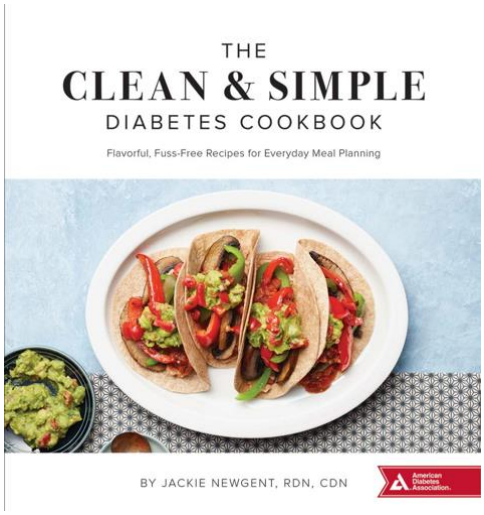
Example of Non-starchy Vegetables:
Salad, green beans, broccoli, cauliflower, cabbage, and carrots

Example of Carbohydrate (Carb) foods:
Potatoes, peas, rice, pasta, beans, fruit, and yogurt

Example of Protein Foods:
Chicken, turkey, beans, tofu, fish, or eggs.

(Centers for Disease Control and Prevention, 2020)

Diabetes Cookbook



Location: American Diabetes Association
Price: $22.95

References

Centers for Disease Control and Prevention. (2020). *Diabetes meal planning.* https://www.cdc.gov/diabetes/managing/eat-well/meal-plan-method.html

McLaughlin, D. (2020). *How food affects blood sugar*. Diabetes Foundation. https://diabetesfoundationinc.org/how-food-affects-blood-sugar/

Appendix C

Adaptive Cutting Board
Link: https://www.amazon.com/dp/B0052ZY7IE

Vegetable Chopper
Link: https://www.amazon.com/dp/B07YG3PK8H

Special Supplies Adaptive Utensils
Link: https://www.amazon.com/dp/B074JGZTKV

Able-T Plate Guard
Link: https://www.amazon.com/dp/B07T4N2WFP

Ableware Scooper Plate with Suction Cup Base
Link: https://www.amazon.com/dp/B004SOX8ZS

Yoelike Anti-Slip Adjustable Tumbler Handle Fit
Link: https://www.amazon.com/dp/B07JN26F29

TLINNA Coffee thermos with LED Temperature Display
Link: https://www.amazon.com/dp/B07MR37B2F

ARK'S One-Way Straws
Link: https://www.arktherapeutic.com/arks-one-way-straws

Diabetes Cookbook
Link: https://shopdiabetes.org/products/the-clean-simple-diabetes-cookbook

Checking Blood Glucose

What is blood glucose? (American Diabetes Association, n.d.-a)

When you eat food, the body breaks down carbohydrates into glucose (sugar). The pancreas releases insulin to absorb the sugar. In individuals with type II diabetes mellitus, the body does not respond normally to insulin. This creates extra sugar in the body, which goes back into your bloodstream increasing your blood glucose level.

Hyperglycemia (Blood sugar is too high)	Hypoglycemia (Blood sugar is too low)
Causes: • Eating too many carbohydrates • Dehydration • Lack of exercise • Not enough insulin or oral diabetes medications • Side effects from other medications • Stress	Causes: • Not eating enough carbohydrates • Drinking alcohol, especially on an empty stomach • Excessive exercise • Too much insulin or oral diabetes medications • Side effects from other medications

Blood Glucose Levels (American Diabetes Association, n.d.-b)

Name of Test	What is being tested?	Normal Levels	Prediabetes	**Diabetes**
A1C	Average blood sugar over past 2-3 months	Less than 5.7%	5.7%-6.4%	**6.5% or higher**
Fasting Plasma Glucose (FGP)	Blood sugar after 8 hours of no food or drink (except water)	Less than 100 mg/dL	100 mg/dL - 125 mg/dL	**126 mg/dL or higher**
Oral Glucose Tolerance Test (OGTT)	Blood sugar tested 2 hours before drinking a sweet drink and 2 hours after	Less than 140 mg/dL	140 mg/dL - 199 mg/dL	**200 mg/dL or higher**
Random Plasma Glucose Test	Blood sugar at any time of the day	Less than 200 mg/dL	N/A	**200 mg/dL or higher**

Tips when checking blood glucose levels:

- Make sure your hands are clean
- Change fingers or hands when pricking
- Test blood glucose at a table where your arm will be well-supported
- Set alarms to remind yourself when to check your blood glucose

Adaptive Devices (See Appendix D)

Adaptive Device	Location & Price	Image
Care Touch Diabetes Testing Kit	Amazon Price: $30.99	
Rubin Shower Thermometer, LED Digital Display	Amazon Price: $17.99	
Slicillo Stainless Steel Touchless Soap Dispenser Automatic Dispenser with Waterproof Base	Amazon Price: $25.99	

Note: There are additional options for those who want convenient and non-invasive glucose kits. For instance, a continuous blood glucose monitoring device. With one of these devices, sensors are attached to the body for continuous monitoring that can be checked with an app. Talk with your healthcare provider and insurance company to make sure this product is right for you.

Diabetes Weekly Care Log

The purpose of a diabetes weekly care log will allow you to stay on top of your blood glucose levels and keep track of your levels throughout the day. Every day before eating and going to bed, check your glucose levels. You should note the time, if insulin or meds are needed and what type, and which finger was pricked. This will help you be more motivated and responsible to stay in your target blood glucose range.

Example Template

Target Blood Glucose Range:													
Week: / / - / /													
Day	**Breakfast**			**Lunch**			**Dinner**			**Bedtime**			
	Blood Glucose	Insulin/ Meds	Finger Pricked	Blood Glucose	Insulin/ Meds	Finger Pricked	Blood Glucose	Insulin/ Meds	Finger Pricked	Blood Glucose	Insulin/ Meds	Finger Pricked	
SUN	Time:			Time:			Time:			Time:			
MON	Time:			Time:			Time:			Time:			
TUES	Time:			Time:			Time:			Time:			
WED	Time:			Time:			Time:			Time:			
THURS	Time:			Time:			Time:			Time:			
FRI	Time:			Time:			Time:			Time:			
SAT	Time:			Time:			Time:			Time:			

References

American Diabetes Association. (n.d.-a). *Blood sugar testing and control.* https://www.diabetes.org/healthy-living/medication-treatments/blood-glucose-testing-and-control

American Diabetes Association. (n.d.-b). *Diagnosis*. https://www.diabetes.org/a1c/diagnosis

Appendix D

Care Touch Diabetes Testing Kit
Link: https://www.amazon.com/dp/B076VSN7TR

Rubin Shower Thermometer, LED Digital Display
Link: https://www.amazon.com/dp/B08ZM26BG7

Slicillo Stainless Steel Touchless Soap Dispenser Automatic Dispenser with Waterproof Base
Link: https://www.amazon.com/dp/B086G3PNNX

Grooming and Hygiene

Dressing (See Appendix E)

Adaptive Device	Location & Price	Image
Special Supplies Button Hook (2-pack)	Amazon Price: $10.98	
Premium Long Handled Shoe Lifter	Amazon Price: $9.99	
VELCRO Brand Sticky Back for Fabrics	Amazon Price: $5.97	

Tips:

- Put affected arm in first when dressing, and out last when undressing
- Avoid shirts with multiple buttons
- Use a mirror to help with skin checks

Bathing (See Appendix E)

Adaptive Device	Location & Price	Image
LFJ Bath Body Brush Set with Long Handle	Amazon Price: $13.99	
Bath Shower Gloves Mitt for Exfoliating and Body Scrubber (2 packs)	Amazon Price: $9.89	
AIKE Double Automatic Soap and Shower Dispenser 2 Chamber Wall Mount	Amazon Price: $64.00	

Oral Hygiene (See Appendix E)

Adaptive Device	Location & Price	Image
Philips Sonicare Daily Clean 1100 Rechargeable Electric Toothbrush	Amazon Price: $24.97	
Universal Soft Easy Grip Handle Tool, Provides Wider Grip for Arthritis and Limited Dexterity (Set of 4)	Amazon Price: $14.94	
Waterpik, Cordless Water Flosser, Battery Operated & Portable for Travel & Home, ADA Accepted Cordless Express	Amazon Price: $34.81	

Hair Management (See Appendix E)

Adaptive Device	Location & Price	Image
Long Reach Handled Comb and Hair Brush Set	Amazon Price: $16.99	
CHRUNONE Hair Dryer Stand	Amazon Price: $32.99	
Bestie Adjustable Hair Dryer Holder - Hands Free Blow Drying with Fully Positionable Arm, Permanent Wall Mount or Temporary Suction Mount to Mirror	Amazon Price: $29.95	

Nail Management (See Appendix E)

Adaptive Device	Location & Price	Image
Body Care Nail File Holder	Arthritis Supplies Price: $12.95	
PETA Table Top Finger Nail Clipper	Rehab-Store Price: $10.99	

Disclaimer: Follow your physician's instructions for nail care. If you have signs of an infection, you should seek immediate medical attention.

Signs of infection may look like: (Healthline, 2017)

- Redness
- Warmth
- Swelling
- Bad smelling odor
- Changes in nail shape, color, or texture
- Detachment of nail
- Pus filled blister

Washing Face (See Appendix E)

Adaptive Device	Location & Price	Image
NRS Crosshead Tap Turners (Pair)	Essential Living Solutions Price: $16.68	

Toileting (See Appendix E)

Adaptive Device	Location & Price	Image
Zurn ZERK-CCP E-Z Flush Automatic Retrofit Kit for Closets and Urinal Valves	Amazon Price: $128.39	
The Classic Foot Flush	Amazon Price: $19.99	
Kimberly Clark Professional MOD Hygienic Bathroom Tissue Dispenser	Amazon Price: $15.81	
Fanwer Toilet Aids Tools, Long Reach Comfort Wipe, Extends Your Reach Over 15" Grips Toilet Paper or Pre-Moistened Wipes	Amazon Price: $9.99	
Greenco Bidet Fresh Water Spray Non-Electric Mechanical Bidet Toilet Seat Attachment	Amazon Price: $24.99	

References

Healthline (2017). *Paronychia*. Healthline media.

https://www.healthline.com/health/paronychia

Appendix E

Special Supplies Button Hook
Link: https://www.amazon.com/dp/B07NX8M3DC

Premium Long Handled Shoe Lifter
Link: https://www.amazon.com/dp/B07PLJFBML

VELCRO Brand Sticky Back for Fabrics
Link: https://www.amazon.com/dp/B00N0W89Z8

LFJ Bath Body Brush Set with Long Handle
Link: https://www.amazon.com/dp/B07W591Z5G

Bath Shower Gloves Mitt for Exfoliating and Body Scrubber (2 packs)
Link: https://www.amazon.com/dp/B078M88D3D

AIKE Double Automatic Soap and Shower Dispenser 2 Chamber Wall Mount
Link: https://www.amazon.com/dp/B08KY4R4NM

Philips Sonicare Daily Clean 1100 Rechargeable Electric Toothbrush
Link: https://www.amazon.com/dp/B083FWP5FK

Universal Soft Easy Grip Handle Tool, Provides Wider Grip for Arthritis and Limited Dexterity (Set of 4)
Link: https://www.amazon.com/dp/B00LP2F41W

Waterpik, Cordless Water Flosser, Battery Operated & Portable for Travel & Home, ADA Accepted Cordless Express
Link: https://www.amazon.com/dp/B07DQSC9B5

Long Reach Handled Comb and Hair Brush Set
Link: https://www.amazon.com/dp/B07CZK83TZ

CHRUNONE Hair Dryer Stand
Link: https://www.amazon.com/dp/B07ST5NLD1

Bestie Adjustable Hair Dryer Holder - Hands Free Blow Drying with Fully Positionable Arm, Permanent Wall Mount or Temporary Suction Mount to Mirror
Link: https://www.amazon.com/dp/B016MVKAQ4

Body Care Nail File Holder
Link: https://www.arthritissupplies.com/body-care-nail-file-holder.html

PETA Top Table Finger Nail Clipper
Link: https://www.rehab-store.com/p-peta-easi-grip-table-top-finger-nail-clipper.html

NRS Crosshead Tap Turners
Link: https://www.amazon.com/NRS-Crosshead-Tap-Turners-Pair/dp/B01F1XZB4U

Zurn ZERK-CCP E-Z Flush Automatic Retrofit Kit for Closets and Urinal Valves
Link: https://www.amazon.com/dp/B009GPX9K8

Fanwer Toilet Aids Tools, Long Reach Comfort Wipe, Extends Your Reach Over 15" Grips Toilet Paper or Pre-Moistened Wipes
Link: https://www.amazon.com/dp/B07D1M6PGR

The Classic Foot Flush
Link: https://www.amazon.com/Foot-Flush-Hands-Flushing-Classic/dp/B002L02SJ8

Kimberly Clark Professional MOD Hygienic Bathroom Tissue Dispenser
Link: https://www.amazon.com/dp/B01MU077PR/

Greenco Bidet Fresh Water Spray Non-Electric Mechanical Bidet Toilet Seat Attachment
Link: https://www.amazon.com/dp/B01A17T3N6

Exercise

CDC Recommendations (Centers for Disease Control and Prevention, 2020)
Exercise benefits:

- Lower risks of furthering developing type II diabetes mellitus if in the prediabetes stage
- Helps control blood pressure levels
- Helps individuals maintain a healthy weight
- Increase cells' ability to use blood glucose (blood sugar)

For individuals 18 years and older:

Moderate-Intensity Aerobic Exercise
Anything that gets you up and your heart beating!

AT LEAST 150 MINUTES A WEEK

Ex: walking fast, yoga, gardening, pushing a lawn mower, biking on a flat surface

Tip: If you are breathing hard, but can easily carry on a conversation, you are doing a moderate-intensity exercise.

AND

Muscle Strengthening Activities
Anything that gets your major muscles to work!

AT LEAST 2 DAYS A WEEK

Ex: resistance training, weight training

—OR —

Vigorous-Intensity Aerobic Activity
Anything that gets you up and your heart beating!

75 MINUTES A WEEK

Ex: running, biking hills, hiking, swimming, playing a sport

Tip: If you are breathing hard and cannot carry on a conversation easily, you are doing a vigorous-intensity exercise.

AND

Muscle Strengthening Activities
Anything that gets your major muscles to work!

AT LEAST 2 DAYS A WEEK

Ex: resistance training, weight training

Exercise Log

The purpose of an exercise log is for you to track your exercise and help you reach your weekly goal (see recommendations above).

Feel free to fill this log out with your therapist on what type of goal you want to accomplish and brainstorm exercises that you can do easily.

If you experience chest pain, shortness of breath, dizziness, discomfort, or pain, and/or a rapid or irregular heartbeat while exercising, **STOP** immediately and call your doctor.

Weekly Goal:			
Day	**Date**	**Type of Exercise**	**Duration**
Sun	/ /		
Mon	/ /		
Tues	/ /		
Wed	/ /		
Thurs	/ /		
Fri	/ /		
Sat	/ /		

Benefits of Yoga (John Hopkins, n.d.)
John Hopkins Medicine lists the benefits of yoga:

- Improve flexibility, strength, and balance
- Relieves back pain
- Ease arthritis symptoms
- Benefit heart health
- Enhance quality of sleep
- Increase energy
- Brighten mood
- Help with stress management
- Encourage community support
- Promote better self-care

Yoga exercise examples:

Warrior II

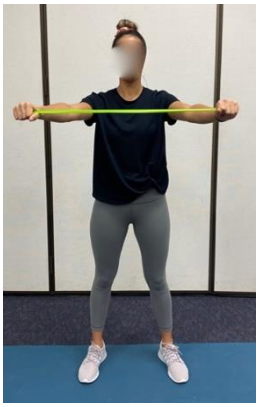
Spinal Twist

Low Lunge

Benefits of Resistance Training (Strasser & Pesta, 2013)
Resistance training improves the cells' ability to use blood glucose (insulin sensitivity) and how well the body uses blood glucose (glucose tolerance) which leads to improved overall physical health and reduces risk factors in patients with diabetes.

Tip: It is okay to do upper extremity exercises in moderation. Do not do too many overhead exercises.

Resistance training exercise examples



Benefits of Chair Exercises (Klempel et al., 2021)
Chair exercises can improve balance, walking speed, grip strength and several other physical abilities. This low-impact form of exercise is a great way to work on strength, endurance, and flexibility.

Chair exercises examples

Images Copyright 2021 by Allison Okugawa. Used by permission.

Active Hands (See Appendix F)

What is it? A gripping aid designed to support and increase tight, strong grip to hold objects. Can be used for various activities such as working out in the gym. Please consult with your doctor and occupational therapist about this option. **Item:** Active Hands General Purpose Aid **Location:** Amazon **Price:** $84.95	

Heat vs. Ice Compress (Baillie, 2018; Discover Chiropractic Austin, 2018)

Heat compress	Ice compress
Benefits: • Increase blood flow • Promote muscle relaxation • Promote tissue healing • Soothe tight muscles • Reduce pain When to use: • Chronic pain • Muscle aches • Arthritis • Joint stiffness • Muscle stiffness	Benefits: • Relieve inflammation • Reduce swelling • Numb pain • Reduce blood flow • Reduce bruising When to use: • Chronic pain • Muscle soreness • Strains • After new injuries

References

Baillie, L. (2018, August 23). Heat or ice: Which is best for your pain or injury? *A. Vogel Herbal Remedies.* https://www.avogel.co.uk/health/muscles-joints/heat-or-ice/

Centers for Disease Control and Prevention. (2020, October 7). *How much physical activity do adults need?* https://www.cdc.gov/physicalactivity/basics/adults/index.htm

Discover Chiropractic Austin. (2018, February 13). *Hot and cold therapy for pain.* https://discoverchiropracticaustin.com/hot-and-cold-therapy/

John Hopkins Medicine. (n.d.). *9 benefits of yoga.* https://www.hopkinsmedicine.org/health/wellness-and-prevention/9-benefits-of-yoga

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Strasser, B., & Pesta, D. (2013). Resistance training for diabetes prevention and therapy: Experimental findings and molecular mechanisms. *BioMed Research International, 2013*, 805217. https://doi.org/10.1155/2013/805217

Appendix F

Active Hands
Link: https://www.amazon.com/General-Purpose-gripping-standard-right/dp/B008PFHGUE

Sleep

Appropriate body positioning (Torres, 2017)

What is it?
If you notice pain, numbness, or tingling in the arms or hands while sleeping, it may be from an inappropriate sleeping position. Sleeping in an appropriate body position can reduce these symptoms.

Preferred sleeping positions:

- *On your back:* There is less stress and risk of nerve compression at the shoulders, elbows, and wrists.
- Lay with arms opened and relaxed

- *On side with pillows:* Individuals who like to sleep on their side should have a pillow or body pillow to gently hug to prevent the fetal position which increases pressure to the elbows, wrists, and hands.

Avoid these sleeping positions:

- *Fetal Position:* It increases the risk of nerve compression in the elbows, shoulders, wrists, and cervical spine. It can also increase the risk of carpal tunnel syndrome and does not provide good back and hip support.
- *Laying on Stomach:* It increases pressure to the wrists and fingers which can cause nerve compression at the elbows and shoulders while irritating the neck, back, and spine.

Images Copyright 2021 by Allison Okugawa. Used by permission.

Adaptive Pillow (See Appendix G)

What is it?
A pillow with an arm cutout that is suitable for side and back sleepers, while providing neck and back support. The 17-degree gradual slope will help reduce neck, back, and shoulder stress.

Item: NOVA Bed Wedge for Back & Side Sleepers with Half Roll Pillow Insert, Bed Wedge with Cut Out for Side Sleepers, Combo Bed Wedge & Half Roll Pillow

Location: Amazon
Price: $54.99

Education on sleep hygiene (Suni, 2020)

<table>
<tr><td colspan="2">What is it?
Sleep hygiene is having a comfortable bedroom environment, stable sleep schedule, and a relaxing pre-bed routine. Sleep hygiene plays an important role in better quality of sleep.</td></tr>
<tr><td>How to practice good sleep hygiene:
Have a pleasant bedroom environment free of distractions
Set a sleep schedule (have a fixed wake up time)
Prioritize sleep (do not skip sleep)
Make gradual adjustments to shift sleep times (make small step by step adjustments of up to an hour or two)
Don’t overdo it with naps
Keep your routine consistent
Set aside 30 minutes to wind down
Don’t look at electronics before bed
Use relaxation methods (meditation, mindfulness, paced breathing)</td><td>Signs of poor sleep hygiene:
Having a hard time falling asleep
Having frequent sleep disturbances
Suffering from daytime sleepiness
Having poor quality of sleep
Not getting enough hours of sleep</td></tr>
</table>

Splint/aid (see Appendix G)

<table>
<tr><td>What is it?
A splint or brace helps keep your wrist or hand in a supportive position which alleviates pressure, pain, and stiff joints.

Please consult with your doctor and occupational therapist about this option.

Item: BraceUp Night Sleep Wrist Support Brace, Lightweight Splint with Cushioned Pads for Carpal Tunnel, Hand Support, and Tendonitis Arthritis Pain Relief

Location: Amazon
Price: $13.99</td><td>  </td></tr>
</table>

Cognitive Behavioral Therapy for Insomnia (Newsom, 2020)

What is it?
It is an effective treatment for falling asleep faster, staying asleep, and feeling more rested during the day. Cognitive Behavioral Therapy for Insomnia (CBT–I) is a structured and evidence-based approach to helping with symptoms of insomnia or sleeping disturbances. Please consult with your doctor and occupational therapist about this option.
How does it work?
A trained professional will help identify the connection between your thoughts, feelings, and behaviors that are harming your quality and quantity of sleep. The professional will then try to clarify or reframe any dysfunctional or distorted thoughts to help you fulfill a better night's rest with the use of 3 interventions: • *Cognitive interventions:* change harmful thoughts about sleep • *Behavioral interventions:* promote relaxation training and control over stimulus, and improve healthy sleep habits • *Psychoeducational interventions:* explain the connection between thoughts, feelings, behaviors, and sleep

References

Newsom, R. (2020, October 22). *Cognitive behavioral therapy for insomnia (CBT – I).* Sleep Foundation. https://www.sleepfoundation.org/insomnia/treatment/cognitive-behavioral-therapy-insomnia

Suni, E. (2020, August 14). *Sleep hygiene*. Sleep Foundation. https://www.sleepfoundation.org/sleep-hygiene

Torres, M. (2017, April 14). *Sleeping positioning and carpal tunnel syndrome*. Athletico. https://www.athletico.com/2017/04/14/sleep-positioning-carpal-tunnel-syndrome/

Appendix G

NOVA Bed Wedge for Back & Side Sleepers with Half Roll Pillow Insert, Bed Wedge with Cut Out for Side Sleepers, Combo Bed Wedge & Half Roll Pillow
Link: https://www.amazon.com/dp/B01K5SB8CA

BraceUp Night Sleep Wrist Support Brace, Lightweight Splint with Cushioned Pads for Carpal Tunnel, Hand Support, and Tendonitis Arthritis Pain Relief
Link: https://www.amazon.com/BraceUP-Support-Lightweight-Splint-Cushioned/dp/B06XKTYT1S/ref=sr_1_26?dchild=1&keywords=hand+splint&qid=1619110298&sr=8-26

Stress Management

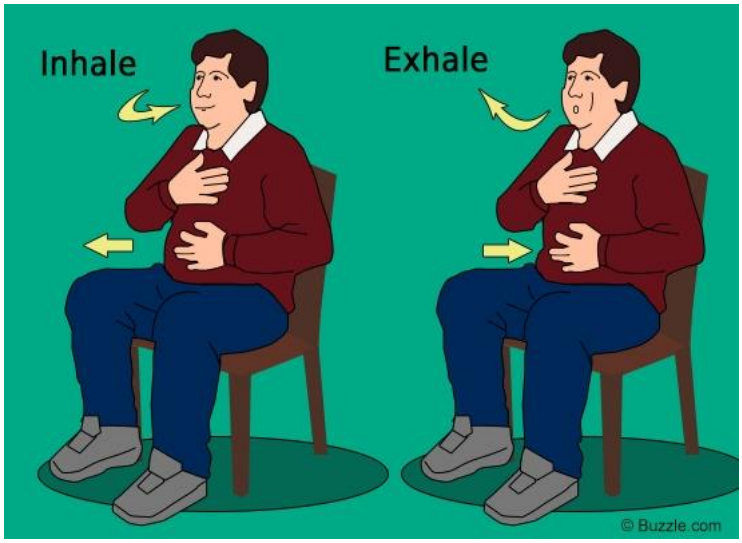
Strategies to Manage Stress

Diaphragmatic Breathing (Cleveland Clinic, 2018; Varvogli & Darviri, 2011)

Purpose/Benefits:
Deep and slow abdominal breathing calms the nervous system, decreases oxygen usage, and makes it easier to breathe.

How to use:

- Place one hand on your upper chest and the other just below your rib cage. This will allow you to feel your diaphragm move as you breathe.
- Breathe in slowly through your nose so that your stomach moves out against your hand. The hand on your chest should remain as still as possible.
- Tighten your stomach muscles, letting them fall inward as you exhale through pursed lips (like you are blowing out hot food). The hand on your upper chest must remain as still as possible.



(Buzzle, 2016)

Transcendental Meditation (Varvogli & Darviri, 2011; Ansorge, 2020)

Purpose/Benefits:
This technique allows the mind to be free from distractions and increase a state of relaxed awareness. Studies show that blood pressure, chronic pain, and anxiety are reduced when practicing meditation regularly.

How to use:
Sit with your eyes closed and repeating a mantra, which is a meaningless sequence of sounds specific to each individual. This practice promotes a natural shift of awareness to a wakeful but deeply restful state can be practiced for 20 minutes twice a day.

Note. From Organic flat people meditating illustration [Image], by Free Vector, n.d., Freepik (https://www.freepik.com/free-vector/organic-flat-people-meditating-illustration_13297280.htm#page=1&query=meditation&position=0%20). CC BY 2.0

Guided Imagery (Kaiser Permanente, 2019)

Purpose/Benefits:

Guided imagery helps with relaxation to make you feel like you are experiencing something relaxing with the use of your imagination. It can take you to peaceful and calm settings to relieve stress.

How to use:

Guided imagery can be done with the use of audio recordings, an instructor, a video, or written instructions. You can use all your senses. For example, in a tropical setting you can imagine the warmth of the sun on your skin, the sight of blue ocean water, the sound of crashing waves, the scent of ocean breeze, and the taste of coconut water.

How to do:

1. Find a comfortable sitting or lying position
2. Close your eyes
3. Take 5 deep breaths
4. Picture a setting that is peaceful to you (such as a beach, mountain, or meadow)
5. Add the sense to your setting: what do you see, hear, touch, smell, and taste?
6. Breathe slow and feel your setting
7. When you are ready, count to 5, slowly take yourself out of your setting and return to the present
8. Notice how you are feeling now

Resources:

Guided Imagery for Stress Relief: https://youtu.be/gU_ABFUAVAs
Guided Meditation and Visualization: https://youtu.be/lgSbF_xH9LU
Guided Imagery https://youtu.be/35ch88kmlls

(Mindfulness Exercises, n.d.)

Biofeedback (Varvogli & Darviri, 2011)

Purpose/Benefits:
Sensor modalities are used to measure physiological activity such as skin temperature, blood pressure, oxygen levels, heart rate, sleep, and physical activity to provide feedback to the user so that they can change thought processes, emotions, and behaviors.

How to use:
Your wearable device such as a smartwatch will have health features that keep track of your daily health activity. You can open the feature or application on your phone for information about your body.

Biofeedback (See Appendix H)

Device	Location & Price	Image
CooSpo Heart Rate Monitor Chest Strap Bluetooth 4.0 ANT+ Waterproof HR Sensor for Wahoo Peloton Zwift Polar DDP Yoga Map My Ride Garmin Sports Watches	Amazon Price: $28.04	
Fitbit Charge 4	Target Price: $99.95	
Apple Watch Series 6 GPS Aluminum	Target Price: $399.99	
Samsung Galaxy Watch Active 2 Smart Watch	Amazon Price: $179.99	

Autogenic Training (GoodTherapy, 2016; HealthLink BC, 2019)

Purpose/Benefits:

This technique helps teach your body to respond to verbal commands. By telling your body to relax, it will help lower your breathing rate, blood pressure, heart rate, and body temperature to reduce stress. This influences your body's reactions by strengthening the communication between the mind and body.

Consult with your doctor about this technique before trying it. It is not recommended for individuals under 5 years old or those with severe mental illness. If you feel anxious or restless during or after exercise stop immediately.

How to use:

There are 6 standard exercises:

1. **Create sense of heaviness:** Verbal cues to suggest heaviness in the body.
2. **Create sense of warmth:** Verbal cues to induce feelings of warmth.
3. **Heart practice:** Verbal cues to call attention to the heartbeat.
4. **Breathing practice:** Verbal cues to focus on breath.
5. **Abdominal practice:** Verbal cues to focus on abdominal sensations.
6. **Head practice:** Verbal cues to focus on the coolness of the forehead.

Example: (Hurgobin, 2006)

Exercises	Self-statement Example	Effect(s) on the body
Heavy	"My left arm is heavy"	Muscles in left arm will relax
Warm	"My left arm is warm"	Blood vessels in left arm will open creating warmth
Heart/Pulse	"My heart is beating quietly"	Pulse rate will decrease and become calm
Breathing	"My breathing becomes slower and quieter"	Creates calm and relaxed breathing
Abdominal	"The area around my chest and abdomen is warming up"	Creates relaxation in the organs of the abdominal area
Forehead	"My forehead is cool"	Creates a calm and cool mind

Progressive Muscle Relaxation (Lakeshore Chiropractic, n.d.; Varvogli & Darviri, 2011)

Purpose/Benefits:
It is a technique used to purposefully tense and relax muscles to reduce stress and anxiety.

How to use:
In a continuous pattern, with eyes closed, focus on tensing a specific muscle group for approximately 10 seconds and then release it for 20 seconds before continuing with the next muscle group. Focus on the different feelings when tensing and relaxing the muscles. Perform exercise 15-20 minutes daily.

(Lakeshore Chiropractic, n.d.)

Social support

Purpose/Benefits:

Joining a social support group provides an opportunity for individuals to share their feelings, coping strategies, and lived experiences with one another. For those battling a chronic disease such as type II diabetes, a health-related support group can provide emotional support, reduce feelings of anxiety and stress, while giving a sense of empowerment.

Resources:

- American Diabetes Association
  https://community.diabetes.org/home
- Carenity
  https://www.carenity.us/join/diabetes-type2
- The Tribe
  https://support.therapytribe.com/anxiety-support-group/
- Anxiety and Depression Association of America
  https://adaa.org/supportgroups
- Daily Strength
  https://www.dailystrength.org/groups?all=true

American Diabetes Association (ADA)

Who they are: The American Diabetes Association is an organization that seeks to spread awareness and education to the public about preventing and managing diabetes.

Below is a link to the ADA website and ADA resources:

Main website**:** https://diabetes.org/

Information center**:** 1-800-DIABETES: (800-342-2383)

Mental Health Resources

If you or someone you know is in a crisis, please contact the
Suicide Prevention Lifeline ***(1 –800–273–8255)***
or dial 911.

Crisis Text Line: Text SIGNS to 741741

If you or someone you know is experiencing a mental health problem, below is a list of several resources to obtain more information or connect with help.

National Suicide Prevention Lifeline
https://suicidepreventionlifeline.org/
(1 –800– 273– 8255)

National Alliance on Mental Health Illness:
https://www.nami.org/Home
(800–950–6264)

National Eating Disorders Association:
https://www.nationaleatingdisorders.org/
(800–931–2237)

National Cancer Institute Smoking Quitline:
https://smokefree.gov/
(1–877–448–7848)

Anxiety and Depression Association of America (ADAA)
https://adaa.org/
(240-485-1001)

Substance Abuse and Mental Health Services Administration (SAMHSA) National Health Line:
https://www.samhsa.gov/find-help/national-helpline
(1–800–662–4357)

(Fuller, 2019)

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Varvogli, L., & Darviri, C. (2011). Stress management techniques: Evidence-based procedures that reduce stress and promote health. *Health Science Journal, 5*(2), 74-89. https://www.hsj.gr/medicine/stress-management-techniques-evidencebased-procedures-that-reduce-stress-and-promote-health.php?aid=3429

Appendix H

CooSpo Heart Rate Monitor Chest Strap Bluetooth 4.0 ANT+ Waterproof HR Sensor for Wahoo Peloton Zwift Polar DDP Yoga Map My Ride Garmin Sports Watches
Link: https://www.amazon.com/dp/B07BS6B4PD

Fitbit Charge 4
Link: https://www.fitbit.com/global/us/products/trackers/charge4?sku=417BKBK

Apple Watch Series 6 GPS Aluminum
Link: https://www.target.com/p/apple-watch-series-6-gps-aluminum/-/A-81498743

Samsung Galaxy Watch Active 2 Smart Watch
Link: https://www.amazon.com/dp/B07VQJDGX2

Appendix B

Consent Form

Allison Okugawa, Erika Rodriguez, Christina Han, and Claudia Becerra are graduate students in the Master of Occupational Therapy Program at Stanbridge University, conducting a research study to test the feasibility of a self-care guide that will provide occupational therapists a client-centered approach when addressing common upper extremity (UE) dysfunctions and UE solutions for individuals with Type II Diabetes Mellitus (T2DM). You are being asked to complete this survey because of your clinical experience serving clients with T2DM and UE dysfunctions.

Participation is voluntary. The survey will take approximately 15 minutes to complete. You must be 18 years or older to complete this survey.

There are no foreseeable serious risks involved in this study. Please try to answer all questions. However, please skip any questions that make you feel uncomfortable. Your responses are anonymous.

Please feel free to contact Dr. Rebecca Wang, the faculty advisor or Stanbridge University Vice President of Instruction if you have any questions or concerns:

Faculty Advisor:
Rebecca Wang, OTR/L, OTD, CHT
Ph: (888)-789-6208
rwang@stanbridge.edu

Stanbridge University
Vice President of Instruction
VP.instruction@stanbridge.edu

If you have questions about your rights as a research participant, you may contact the Stanbridge University Institutional Review Board (IRB), which is concerned with the protection of volunteers in research projects. Please call IRB Office at 949-794-9090 or via email at irb@stanbridge.edu.

If you would prefer not to participate, please do not fill out a survey.
If you consent to participate, please complete the survey.

Appendix C

Recruitment Flyer

Appendix D

Survey Questions

Background information

1. Do you have an advanced practice certification in hand therapy?
   Yes ☐ No☐
2. What is your setting? (Select all that apply)
   - ☐ Outpatient
   - ☐ Inpatient
   - ☐ Acute care
   - ☐ Skilled Nursing Facility
   - ☐ Assisted living
   - ☐ Other
3. What is the age range of patients you see? (Select all that apply)
   - ☐ 0-18 years old
   - ☐ 18 – 30 years old
   - ☐ 30-40 years old
   - ☐ 40-50 years old
   - ☐ 50-60 years old
   - ☐ 60-70 years old
   - ☐ 70+
4. Do you treat patients referred for any of the following diagnoses? (Select all that apply)
   - ☐ Shoulder Capsulitis
   - ☐ Limited Joint Mobility
   - ☐ Dupuytren's contracture
   - ☐ Carpal Tunnel Syndrome
   - ☐ Trigger Finger
   - ☐ Neuropathy
5. Have any of your hand therapy patients been diagnosed with Type II Diabetes Mellitus?
   Yes ☐ No☐
6. Do you have resources to help you work with patient self-management of Type II Diabetes Mellitus?
   Yes ☐ No☐

   If yes, please explain: _____

7. What common self-care areas do you incorporate into functional treatment with patients managing Type II Diabetes Mellitus?
   - ☐ Medication Management
   - ☐ Healthy Eating
   - ☐ Checking Blood Glucose
   - ☐ Exercise

- ☐ Sleep
- ☐ Stress Management
- ☐ Self-care is not incorporated in the treatment plan
- ☐ Other: _____

8. What are some client factors affecting hand therapy outcomes for your patients with comorbid type II Diabetes Mellitus?
   - ☐ Sensory impairments (e.g., pain, numbness, tingling)
   - ☐ Musculoskeletal impairments (e.g., decreased grip strength, overall strength, atrophy)
   - ☐ Edema
   - ☐ Endurance
   - ☐ Psychological or mental functions
   - ☐ Socioeconomic
   - ☐ Other: _____

<u>Regarding the guide:</u>

1. What do you think are the most useful interventions/ adaptations? (Open-ended)

2. What other interventions/ adaptations would you like to see included in the guide? (Open-ended)

3. Is the guide easy to follow?
   ☐ Yes ☐ No

   Please explain: _____

4. Does this guide help your occupational therapy practice incorporate Type II Diabetes Mellitus health promotion and wellness? Please select a number on the scale from 1-5, with 5 being very useful and 1 being not useful at all.

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. Is there anything you would change?
   Yes ☐ No ☐

   If yes, please explain: _____

Appendix E

Survey Results

Figure E1

Number & Percentage of OTs with an Advanced Practice Certification in Hand Therapy

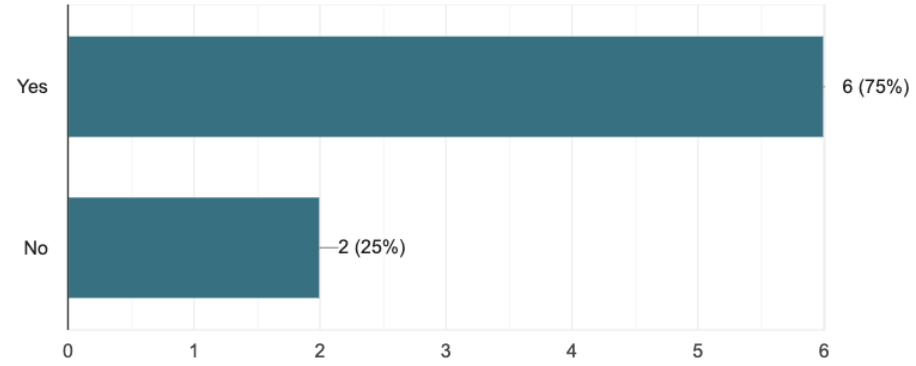


Figure E2

Number & Percentage of OTs in Their Setting

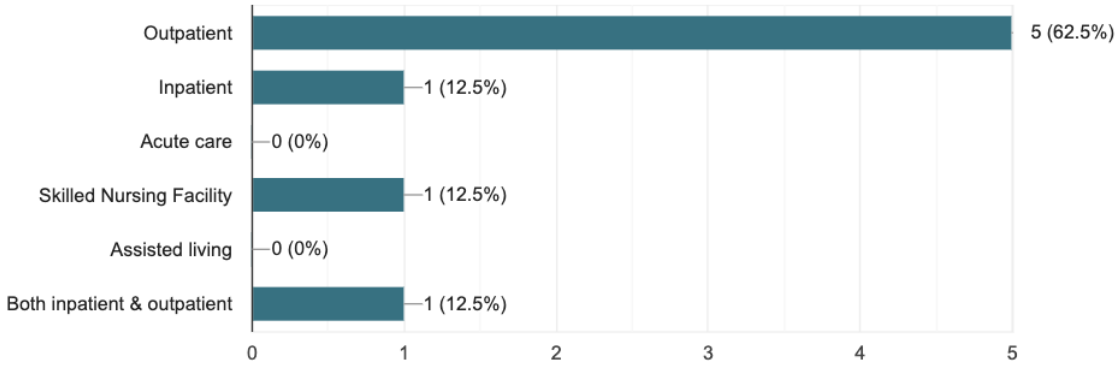
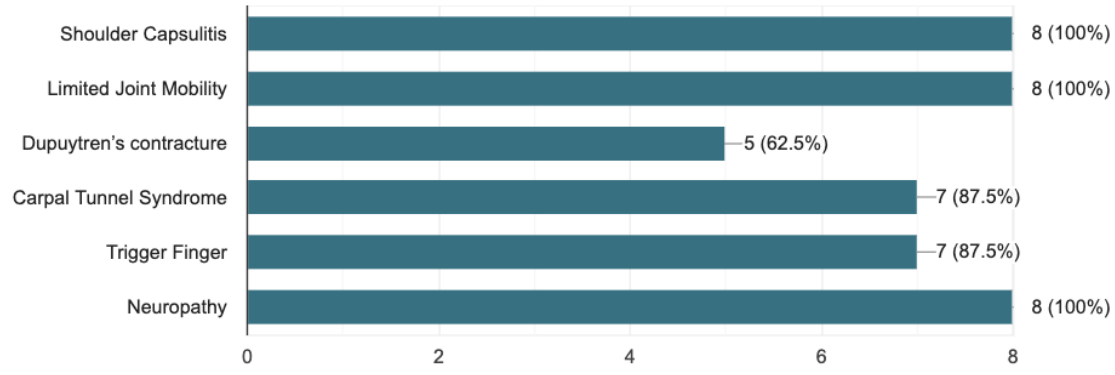


Figure E3

Number & Percentage of OTs Treating Patient for The Following Conditions



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Number & Percentage of OTs With Patients Diagnosed with T2DM

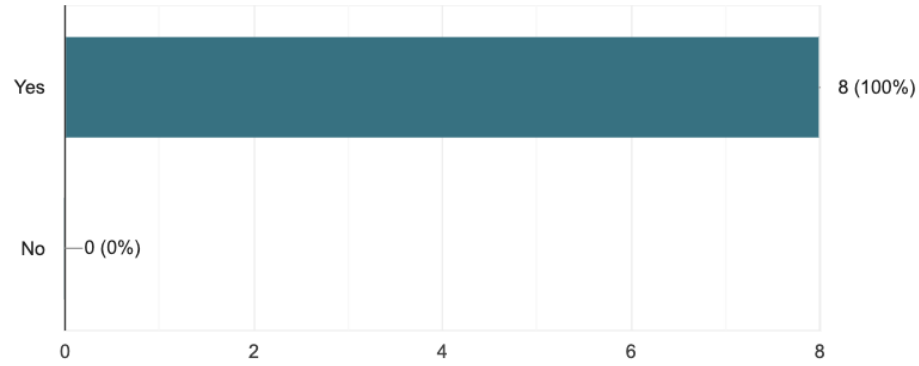


Figure E5

Number & Percentage of OTs With Access to T2DM Resources

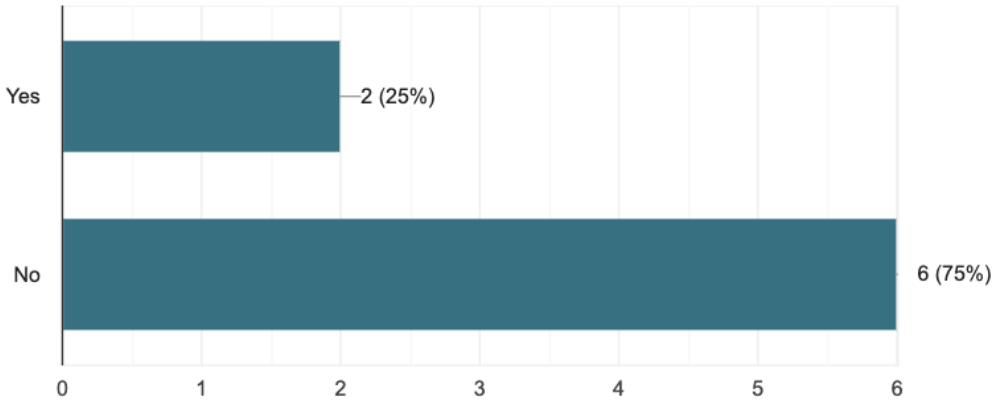


Figure E6

Number & Percentage of the Common Self-Care Areas OTs Incorporate into Functional Treatment with Patients Managing T2DM

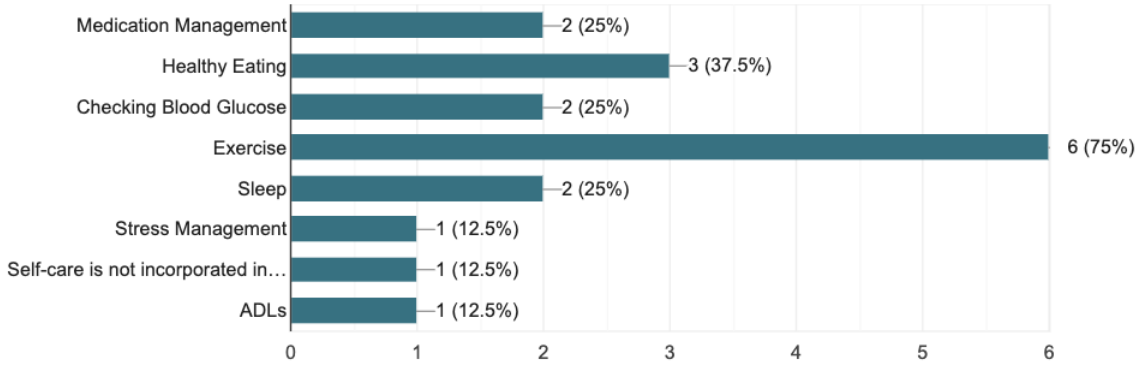


Figure E7

Number & Percentage of the Client Factors Affecting Hand Therapy Outcomes for OT Patients with T2DM

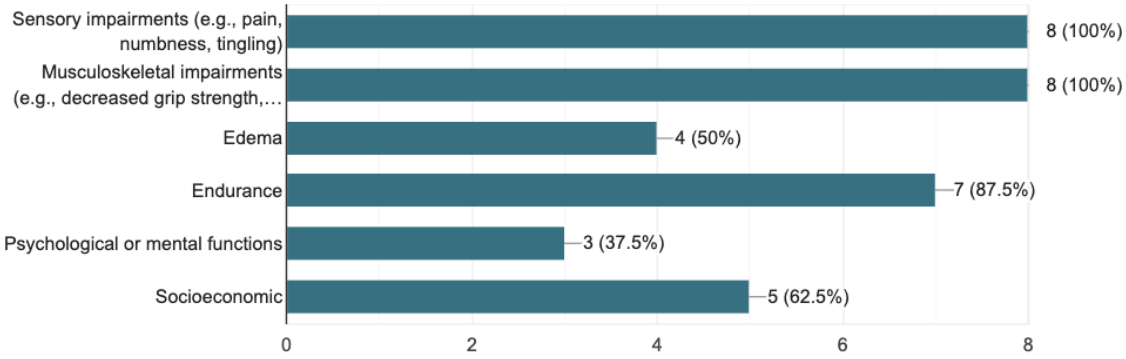
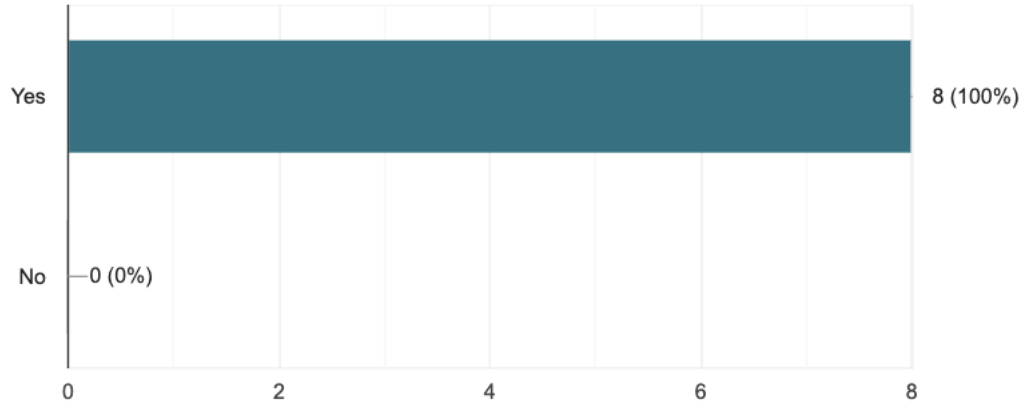


Figure E8

Number & Percentage of OT Who Thought the Guide was Easy to Follow



Appendix F

Participant Statements

Table F1

Statements From Participants Regarding What the Most Useful Interventions/ Adaptations Were in The Guide

Statements From Participants Regarding What the Most Useful Interventions/ Adaptations Were in The Guide	
Participant 1	"The simple explanation of the list of adaptations"
Participant 2	"Pictures of suggestions/recommendations"
Participant 3	"Insulin diary"
Participant 4	"AE & DME"
Participant 5	"All the adaptive devices"
Participant 6	"Stress management techniques"
Participant 7	"Adaptive solutions"
Participant 8	"All the individual stress management techniques"

Table F2

Statements From Participants Regarding What Other Interventions/ Adaptations They Would Like to See Included in The Guide

Statements From Participants Regarding What Other Interventions/ Adaptations Participants Would Like to See Included in The Guide	
Participant 1	"None I can think of"
Participant 2	"I think it was very comprehensive and can be used to locate additional products/resources as a starting point as there is no way to list absolutely everything"
Participant 3	"Low vision"
Participant 4	"None"
Participant 5	"More nutrition info"
Participant 6	"None"
Participant 7	"More information on the different medications our patients take, like metformin etc"
Participant 8	"Nice!"

Table F3

Statements From Participants Regarding What They Would Change on The Guide

Statements From Participants Regarding What They Would Change on The Guide	
Participant 1	"Nothing"
Participant 2	"Make sure there is a way to shorten if needed, at times people can get overwhelmed with something that is 60 pages long and just utilizing 20 pages, for example, of what is pertinent to them would be useful"
Participant 3	"NA"
Participant 4	"Suggested IOS/ android app for DM"
Participant 5	"Nutrition information"
Participant 6	"None"
Participant 7	"None"
Participant 8	"No"

Appendix G

Institutional Review Board Approval

04/09/2021

Re: IRB Application Number MSOT10-02

Dear Dr. Wang and Research Team,

The Stanbridge University Institutional Review Board has completed a review of your application entitled " Type II Diabetes Mellitus and Upper Extremity Dysfunctions." Your research protocol MSOT10-02 is fully approved and categorized as exempt.

Should you wish to modify this approved protocol, please submit a modification request.

Sincerely,

Dominique N. Wascher

Dominique N. Wascher, Ph.D.
IRB Chair