Research Day

2020

10 am to 12 pm
July 25, August 08 and 15, 2020.
## Schedule

**July 25, 2020**

[https://fiu.zoom.us/j/91161046230](https://fiu.zoom.us/j/91161046230)

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**August 08, 2020**  
[https://fiu.zoom.us/j/96553342759](https://fiu.zoom.us/j/96553342759)

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[https://fiu.zoom.us/j/92519764018](https://fiu.zoom.us/j/92519764018)

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A Rehabilitation Protocol for the Use of a 3D Printed Prosthetic Hand in Pediatrics
Amanda Delgado, Brielle Perlingieri, Oday Abad (Terry Munecas, Amanda Thomas)

Background and purpose: 3D printed prosthetic alternatives are significantly cheaper and more customizable when compared to traditional prosthetics. However, little is known about rehabilitation protocols for children utilizing 3D printed prosthetics. Therefore, the purpose of this study was to determine the effectiveness of an at home rehabilitation protocol with the use of a 3D printed prosthetic in order to help prepare a child with transverse upper limb deficiency for a regular prosthesis.

Case description: A six-year-old boy presented to the clinic with a right transradial congenital transverse upper limb deficiency. The patient demonstrated right upper extremity weakness, limited shoulder and wrist range of motion (ROM) and decreased upper extremity function. Using evidence-based practice guidelines and applied clinical knowledge, a four-week home rehabilitation protocol was established. Prior to protocol implementation, range of motion and strength of the right upper extremity were assessed. Additionally, the patient was assessed with the Abilihand questionnaire and the BOT-2. The protocol included ROM exercises, body-powered use of the 3D printed device and concentric and eccentric control without the device. The protocol was performed at a frequency of 3 times per week for 30 minutes with adult supervision and instruction from his mother.

Outcomes: Pre-and post-testing with the Abilihand questionnaire revealed improvements from a total score of 15 to a total of 21. The BOT-2 showed improvements in bilateral coordination, which increased from a total score of 8 out of 24 to 9 out of 2, and in upper limb coordination which increased from a total score of 10 out of 39 to 18 out of 39. Improvements were also noted in right upper extremity ROM. Right upper extremity active wrist flexion increased from 80 degrees to 105 degrees and right forearm supination increased from 60 degrees to 70 degrees. Right upper extremity strength improved from an MMT grade of 3/5 to 4/5 for wrist extension, from 3+/5 to 4/5 for wrist flexion and from 4+/5 to 5/5 for elbow flexion.

Discussion: This study outlines one rehabilitation protocol for a 6-year old boy with a right transradial congenital transverse upper limb deficiency. The results suggest that a structured home exercise program with and without a 3D printed hand may improve upper extremity function in this population. Future studies evaluating the effectiveness of rehabilitation protocols for children with 3D printed hands secondary to congenital upper limb deficiencies will provide clinicians with additional information to guide treatment and clinical decision making.
Evaluation of Signs and Symptoms of Temporomandibular Disorders in Patients who Underwent Orotracheal Intubation - A Study Protocol

Danny Hernandez and Rina Irikawa (Inae Gadotti)

Background/Purpose: General anesthesia with orotracheal intubation has been considered a risk factor for the development or exacerbation of temporomandibular disorders. There is limited research specifically focused on assessing the risk of TMD following orotracheal intubation. The purpose of this study was to develop a protocol to evaluate signs and symptoms of TMD in patients who underwent medical procedures using general anesthesia with and without orotracheal intubation.

Methods: In this longitudinal study, 2 groups of patients will be included: the study group comprising patients receiving general anesthesia with orotracheal intubation, and the control group comprising patients receiving general anesthesia without orotracheal intubation. Inclusion criteria will be adults aged 18-65 years of age, male and female, and in need of non-emergency intubation. An estimated sample size of at least 35 patients per group will be included. Hospitals in Miami-Dade County in Florida will be contacted for potential collaboration with this study. The patient will be evaluated during four periods: pre-intubation, 1 day, 2 weeks, and 2 months post-intubation. An evaluation tool was developed and included information on subject’s previous history of TMD; current signs and symptoms of TMD including temporomandibular joint (TMJ) or muscle pain, TMJ sounds, neck pain, and headaches; general information received about risks with anesthesia; manual palpation of TMJ and masticatory muscles; and measurements of maximum comfortable mouth range of motion (opening, lateral excursions, and protrusion) using a caliper. TMJ palpation during mouth opening and any mandibular deviations will also be evaluated. Information regarding the type of anesthesia used, duration under anesthesia, and position of patient during the procedure will be collected from anesthesia providers. Differences between groups will be calculated and compared.

Implications: This study will provide relevant information regarding TMD risks for patients undergoing orotracheal intubation and the potential need for further TMJ evaluation by anesthesia providers in order to reduce TMJ issues associated with intubation.
Sternocleidomastoid electromyography during the craniocervical flexion test in subjects with forward head posture - A Pilot Study

Haris Aman, Marcus Reis, Yihad Sabagh (Inae Gadotti)

Background/Purpose: The deep neck flexors (DNF) are important postural muscles that help maintain the vertical alignment of the cervical spine and provides neck stability. Individuals with weakness of these muscles measured by the craniocervical flexion test (CCFT) have demonstrated increased activity of the superficial neck flexors as a compensation. The purpose of this pilot study was to evaluate the muscle activity of the sternocleidomastoid muscles (SCM) during the craniocervical flexion test (CCFT) in subjects with and without forward head posture (FHP). It was hypothesized that subjects with FHP present more activity of the sternocleidomastoid muscles during the CCFT when compared to control subjects.

Methods: Head and neck posture was standardized and analyzed visually in natural standing position and using photogrammetry. A plumb line was used as vertical reference to classified subjects with upright posture-control (UP) or with FHP. The craniovertebral angle (CVA) was measured in the photographs using Alcimage software. Surface electromyography (sEMG) was used to evaluate the SCM muscle activity bilaterally during the CCFT. The Chattanooga Pressure-Biofeedback was used to perform the CCFT. The pressure cuff was positioned under the neck with subject in supine and inflated to the baseline of 20mm/Hg. Subjects were asked to sustain a nod movement at 22, 24, 26, 28 and 30 pressure targets for 10 seconds each. SCM activity was recorded at baseline and at each increment of pressure. The mean and standard deviation of the normalized EMG data was calculated for each pressure level for both groups. Independent t-test was used to calculate differences between groups.

Results: Seven subjects participated (4 females, mean age 29±4.9 years). Four subjects were classified with FHP (mean CVA=50.6±6.9) and 3 with upright posture (mean CVA=55.1±2.1). Significant differences of muscle activity of the SCM muscles during the performance of the CCFT considering all pressure target levels together was found between groups (p=0.001). No significant differences in muscle activity between groups were found when calculating differences per pressure target level (p>0.05). However, a trend of increased SCM muscle activity was observed for FHP group for all pressure levels of the CCFT.

Discussion/Conclusion: This study shows preliminary indications of an increased activity of the SCM muscles during the CCFT for subjects with FHP when compared to control which is an indicator of weakness, impaired endurance and decreased activation of the DNF muscles.

Limitations/Recommendations: The evaluation of both deep and superficial neck flexors should be included in the management of patients with FHP.

This study suggests the importance of increasing the activation and motor control of the DNF muscles in patients with FHP so the superficial neck flexors are not hyperactive as a compensation. Future studies should increase sample size and the study power to possibly increase the chances to find differences between groups by target level.
Deep neck flexor motor control and neck disability in subjects with and without cervicogenic headache – A Pilot Study
Krystal Noriega and Nirveeta Ramkalawan (Inae Gadotti)

Background/Purpose: Cervicogenic headache (CEH) is defined as a secondary headache due to a physical disorder of the upper cervical spine and soft tissue of the neck. The Craniocervical Flexion Test (CCFT) is an assessment tool used to assess the neuromuscular motor control of the deep neck flexors. Failure to complete the CCFT implicates weakness of the deep neck flexor muscles. More studies are needed on the association between the performance of the CCFT and neck disability in subjects with cervicogenic headache. The objectives of this study were to evaluate the CCFT and the neck disability index in subjects with and without CEH.

Methods: This pilot study included 15 participants, 5 with CEH (2 males, 3 females, mean = 30 years old) and 10 without CEH (3 males, 7 females, mean = 25.4 years old). Each subject underwent a physical screening process consisting of palpation to the posterior neck musculature, suboccipital region, C2-C3 joint and neck range of motion (ROM) evaluation. Then the self-reported neck function during daily activities was assessed with the Neck Disability Index (NDI). The CCFT was evaluated using the stabilizer pressure biofeedback (Chattanooga TN, USA) positioned under the suboccipital region of the subjects in supine position. Subjects were asked to perform a nod movement and maintain for 10 seconds in 5 different pressure target levels. Two trials of the CCFT was performed with a resting period of 5 minutes in between trials. Descriptive statistics were calculated and presented by group.

Results: In the group of subject without CEH, 9 were classified with no disability and 1 with mild disability. In the CEH group all were classified with mild disability. All subjects were able to perform the CCFT in the first and/or the second CCFT trial.

Discussion/Conclusion: Results of this study showed that there was no difference in the performance of the CCFT between groups. Although the CEH group scored higher on neck disability, there was not a proportional relationship to their CCFT results and therefore no correlation between disability with weakness of the DNF muscles.

Limitations/Recommendations: Future studies with a larger sample size is needed to increase the power of the study and to determine whether more severe CEH has an effect on CCFT results.
The development of a protocol and pilot tests to evaluate subjects with chronic whiplash during driving tasks.
Annalyssa Laney and Colleen Smardz (Inae Gadotti)

**Background/Purpose:** Individuals with chronic whiplash-associated disorders (WAD) often report difficulties with driving. Disturbances of the eye and head movement control, decrease neck motion and increased neck muscle activity was reported in WAD. These alterations are likely to contribute to their driving difficulty. The purpose of this study was to test methods to evaluate eye, head, neck and trunk motion in subjects with WAD during a driving task.

**Methods:** The Xsens motion analysis system to measure head and trunk movements, the Biometrics electromyographic (EMG) system to measure the muscle activity of the sternocleidomastoid muscles bilaterally, and the ASL Mobile-eye tracker system to measure eye movements were tested in the Human Performance Laboratory and during a driving task using a driving simulator. The driving simulator was located at Lehman Center for Transportation Research (LCTR) in the College of Engineering and Computing. The systems were set up simultaneously and tested in effort to reach synchronization and develop a protocol on how to effectively use all the systems together.

**Results:** The motion capture system and eye-tracker were set up and calibrated successfully with subject in the car. The synchronization of all systems and car was not accomplished mostly due to the increased length of time to set up the systems and run them simultaneously while subject performed the driving task. Troubleshootings were performed with the effort to develop a good protocol that would help improve the accuracy and reliability of data collection. Troubleshootings included double checking that the Xsens sensors match prior to calibrating it, cleaning the skin properly before applying the EMG sensor, and properly fitting the eye tracker glasses so the pupil is centered appropriately during calibration to ensure accurate readings.

**Discussion/Conclusion:** This study helped to further develop a protocol for running all three systems simultaneously for data collection to evaluate subjects with chronic WAD during driving tasks.

**Recommendations:** Future testing is needed to synchronize the equipment while the patient is operating the driving simulator.
Preliminary Results of Segmental Gait Symmetry and Repeatability in Able-Bodied People Using Mobile Sensor-Based Measures

Background/Purpose: Patients who suffer from lower limb pathology often display asymmetrical gait patterns, which could lead to an increased fall risk and contribute to future joint degeneration. Detecting and quantifying the independent movements of bilateral thighs and shanks using wearable sensor technology may provide insight into gait pathologies. The purpose of this study was to establish normative data on the symmetry and repeatability of bilateral thighs and shanks of healthy individuals during walking.

Methods: Ninety-six able-bodied participants were recruited for the study. Gyroscope signals were recorded from four inertial measurement units (IMUs) worn on bilateral thighs and shanks, one IMU placed on the trunk, and one IMU placed on the pelvis during straight-path walking for 10-meters while participants walked on an electronic GAITRite mat. Three trials were recorded, then raw sagittal angular velocity signals were processed using dynamic time warping (DTW). Custom algorithms were applied resulting in symmetry measures (SSS=segmental symmetry score) comparing similarity of left and right limb strides, and repeatability measures (SRS=segmental repeatability score) comparing movement of one limb to its consecutive strides.

Results: The mean age of participants was 25 years old, with a standard deviation of 5 years and a range of 18-45 years old. For the entire participant population (N=96), the mean values were as follows: bilateral SSS thigh (mean=99.42, SD .45), bilateral SSS shank (mean=98.06, SD 2.92), sway RMS trunk (mean=1.42, SD .50), and sway RMS pelvis (mean=2.56, SD .75). Step length differential (mean=1.83, SD 1.12, N=95) and step time differential (mean=.01, SD .01, N=95) were also calculated for the entire population. We then compared the values between males and females and the following results were obtained. Significant differences, after Bonferroni adjustment, are marked with an asterisk on Table 1. Significant differences in segmental symmetry and repeatability between males and females were detected in bilateral thigh SRS, L shank SRS, and sway RMS trunk (p<.008).

Correlations were then calculated between spatial-temporal GAITRite variables and symmetry and repeatability sensor variables. The only significant correlations were weak and were between step length and L shank SRS (r=.259, p=.011), and step time differential with bilateral shank SSS (r=.258, p=.012). These results show that spatial-temporal parameters are independent from symmetry and repeatability metrics for normal individuals and that the SSS and SRS parameters may offer new insight into gait biomechanics.
<table>
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<tr>
<th>Table 1. Variable</th>
<th>Male (n = 49); Mean (SD); [range]</th>
<th>Female (n = 47); Mean (SD); [range]</th>
<th>P value</th>
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<tr>
<td>Thigh SSS (%)</td>
<td>99.3 (0.42); [97.7-99.8]</td>
<td>99.2 (0.46); [97.4-99.8]</td>
<td>0.02</td>
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<td>Shank SSS (%)</td>
<td>98.6 (1.52); [92.9-99.6]</td>
<td>97.5 (3.82); [77.6-99.6]</td>
<td>0.097</td>
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<td>R Thigh SRS (%)</td>
<td>98.2 (0.91); [94.7-99.4]</td>
<td>97.5 (1.44); [91.0-99.2]</td>
<td>0.001*</td>
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<tr>
<td>L Thigh SRS (%)</td>
<td>98.2 (0.82); [95.3-99.4]</td>
<td>97.2 (1.43); [91.5-99.1]</td>
<td>0.000*</td>
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<tr>
<td>R Shank SRS (%)</td>
<td>96.3 (1.24); [90.9-98.7]</td>
<td>95.7 (1.95); [85.7-98.8]</td>
<td>0.029</td>
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<tr>
<td>L Shank SRS (%)</td>
<td>96.6 (0.85); [94.5-98.5]</td>
<td>95.7 (1.49); [91.0-98.6]</td>
<td>0.001*</td>
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<tr>
<td>Sway RMS Trunk (%)</td>
<td>1.77 (0.44); [0.94-2.92]</td>
<td>1.06 (0.24); [0.60-1.64]</td>
<td>0.000*</td>
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<tr>
<td>Sway RMS Pelvis (%)</td>
<td>2.70 (0.82); [1.19-4.65]</td>
<td>2.42 (0.64); [1.53-4.46]</td>
<td>0.054</td>
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**Discussion/Conclusion:** Sensor-based measures of symmetry and repeatability were found to be reliable as a useful means of capturing motion during the stance and swing phase of gait, providing quantifiable clinical data beyond observational gait analysis (OGA). Our results indicate that normal individuals exhibit highly symmetrical and repeatable measures during gait. These findings suggest that able-bodied individuals exhibit higher segmental symmetry and repeatability while walking on a linear path when compared to people with a lower limb amputation or vestibular dysfunction which have previously been studied. Spatial-temporal parameters do not correlate with the symmetry and repeatability scores obtained because they are unable to measure movement in space of the lower limbs, trunk and pelvis.

**Limitations/Recommendations:** The participants in this study were able-bodied individuals between the ages of 18 to 45 years old, therefore generalizability of findings should be limited to this population. Further work with SSS and SRS can help guide rehabilitation interventions by providing an indication of gait quality via improvements in segmental motions.
Background/Purpose: At least one-third of older adults fall each year. Falls can cause injuries leading to hospitalization and disability. Exercise can help reduce falls in older adults, but little is known about its effectiveness in preventing subsequent falls among those that have been hospitalized. The objectives of this study were to pilot test the feasibility of implementing a post-discharge exercise program for falls prevention in older patients and evaluate the effects on gait, strength, and balance.

Methods: Six subjects (3 in the control and 3 in the intervention group) completed this pilot study. After signing an informed consent form, patients ≥60 years old being treated for fall-related injuries were randomly assigned into the intervention (exercise program) or control group. All participants were assessed at baseline, 3 and 6 months; the assessments included a health questionnaire, gait analysis during preferred and fast walking speeds using an instrumented mat and the timed up and go (TUG) test, the Tinetti balance assessment, and the 30s chair stands test.

Results: At 6 months, the preferred walking speed increased by 16% for the control group and 31% for the intervention group, while the fast walking speed increased by 7% and 16%, respectively. Stance time during preferred walking speed decreased by 8% for the control group and 13% for the intervention group, while during fast walking it decreased by 3% and 9%. Step length during preferred walking increased by 18% for both groups, while during fast walking it increased by 2% and 6% for the control and intervention groups. Stride width increased by 2% during preferred walking speed and by 8% during fast walking in the control group; on the other hand, for the intervention group, it decreased by 9% and 11%. Balance scores increased by 11% for both groups, and TUG times decreased by 9% for the control and 11% for the intervention group.

Discussion/Conclusion: The findings demonstrate that it was feasible and helpful to implement a post-discharge, home-based falls prevention program. The intervention group had larger improvements in gait after six months than the control group, but improvements in balance were similar.

Limitations/Recommendations: The main limitations of this pilot study are the small sample size, and the high rate of attrition or withdraw (~60%) due to patients quitting the program or presenting significant changes in medical conditions requiring removal from the study. Future studies should investigate measures to reduce attrition and increase the number of subjects that complete the 6 months intervention.
Testing a Diet and Exercise Intervention for Disadvantaged Older Hispanics with Type II Diabetes
Stephanie Caceres, Catherine Frampton, Alexandria Guillen, Cara Whitney (Edgar Vieira)

Background/Purpose: Type 2 diabetes affects 9.3% of the U.S. population. The estimated cost of diabetes was $327 billion in 2017. Diabetes-related hospitalizations have doubled in the past 20 years. Older adults with type 2 diabetes have an increased risk of falls. Type 2 diabetes standard of care includes one annual self-management session which does not include information on mobility impairments and falls prevention. The rate of type 2 diabetes in Hispanics is twice as high as the rate in non-Hispanic Whites. In addition, diabetes education programs are less likely to be offered and more likely to be discontinued in economically disadvantaged communities. The purpose of this pilot study was to pilot and assess the effects of a diet and exercise intervention on disadvantaged older Hispanics with type 2 diabetes.

Methods: Thirty-eight Hispanics that were ≥60 years old were assigned to either an intervention or to a control group based on the congregate meal site/senior center they attended regularly. Participants completed assessments at baseline, 3 and 6 months. The assessments included measuring Hemoglobin A1C levels, diet quality, blood pressure, gait, grip strength, chair stands in 30s, body composition, fear of falls, falls and healthcare use. The intervention group participated twice a week in educational sessions on diet specific to type 2 diabetes (~30 min) and exercise classes (~30 min) based on the evidence-based Otago Exercise Program.

Results: For the intervention group, grip strength was 21±6 kg at baseline, 22±6 kg at 3 months, and 26±9 at 6 months, while the respective values for the control group were 21±6, 21±8, and 22±7. The number of chair stands completed in 30s were 8±4 at baseline, 10±5 at 3 months, and 15±6 at 6 months for the intervention group, and 7±4, 7±4, 8±4 for the control group. Systolic blood pressure at baseline, 3 and 6 months was 148±15, 136±14 and 150±41 mm/Hg in the intervention group, and 134±17, 132±15, and 129±16 mm/Hg in the control group. Diastolic blood pressure was 79±7, 78±9, and 83±21 mm/Hg in the intervention group, and 79±13, 81±9, and 72±9 mm/Hg in the control group. Hemoglobin A1C in the intervention group was 7.1±1% at baseline, 6.7±0.7% at 3 months, and 6.7±0.2% at 6 months, while in the control group the values were 6.6±0.8, 6.5±0.8, and 6.9±0.7%. The percentage of body fat in the intervention group was 7.1±1% at baseline, 6.7±0.7% at 3 months, and 6.7±0.2% at 6 months, while in the control group the values were 6.6±0.8, 6.5±0.8, and 6.9±0.7%. The percentage of body fat in the intervention group was 42±11% at baseline, 36±14% at 3 months, and 37±8% at 6 months. The control group values were 40±10%, 39±9%, and 38±9%.

Discussion/Conclusion: The implementation of a diet and exercise program for disadvantaged older Hispanics with type 2 diabetes resulted in some improvement in A1C, grip strength, body fat percentage, and 30-second sit-to-stand, all of which are important health indicators. Grip strength and 30-second chair stand values continued to improve up to 6 months, while the other variables did not change much. Lower numbers of chair stands completed in 30s is associated with increased risk of falls, and decreased grip strength is associated with increased mortality.
rate in older adults. Reductions in A1C values and body fat percentage are important for managing type 2 diabetes, reducing the incidence of comorbidities, improving overall health and quality of life. The improvement on the performance of these tests and measures indicate reduced risk of falls and death, and improved diabetes management in the older Hispanics that participated in the diet and exercise program.

Limitations/Recommendations: Challenges encountered and limitations of this study include compliance issues and the COVID-19 pandemic that resulted in the cancelation of the intervention and assessments resulting in lower numbers of participants being assessed at 6 months (only 3 in the intervention group and twelve in the control group). Future studies should compare diet only, exercise only, diet+exercise as initially planned and include follow-up assessments at 9 and 12 months to evaluate the sustainability of the effects. Compliance could be improved with greater availability for scheduling intervention classes and increased incentives for participants.
Does History of Back Pain Influence Back Extension Endurance and Muscle Fatigue in Asymptomatic University Students?
Rebecca Freitag, Jennifer Hwee, Christine Marino (Edgar Vieira)

Background: Low back pain affects patients of all ages and is a leading cause of disability globally. University students are often affected by back pain due to poor postures at school and increased time in seated positions for studies. Those who experience back pain demonstrate social, economic, and emotional distress in school and daily activities. The effects of back pain on back extension resistance and fatigue may still be present even when subjects are asymptomatic. To effectively utilize interventions to aid in the management of back pain, it is essential to understand its effects.

Objectives: The objective of this study was to compare back extension endurance time and fatigue between students with and without a history of disabling back pain.

Methods: Eleven asymptomatic participants with history of back pain and eleven participants without history of back pain participated in this study (Age = 27±5 years). The participants completed a back-extension test (Biering-Sorensen test) and the electromyographic (EMG) activity of back-extensor muscles was recorded. The participants’ skin was prepared for electrode placement by shaving the area, abrading the skin, and cleaning using alcohol pads to improve electrode adherence. The electrodes were placed bilaterally at the L1 and L5 lumbar spinal levels to measure the electrical activity of the multifidi and iliocostalis, respectively. During the back-extension test, the participants laid prone with their anterior superior iliac crest on the edge of the table, and their lower extremities were secured to the plinth. A chair was placed in front of the table so that the participants could support their upper body while being strapped onto the table. The straps were then secured over the gluteus maximus, knees and ankles to stabilize the lower extremities. They were instructed to maintain an isometric contraction of their back extensors while holding a neutral position with their shoulders above the line of the plinth and their arms crossed over the chest until they could not maintain that position any longer due to muscle fatigue or recurrence of pain. The test ended when the participant’s shoulders dropped below neutral position and the time was recorded. The EMG activity (room mean square and median frequency) was recorded during the test to assess the rate of fatigue. The median frequency at each 25th percentile was calculated using the Fast Fourier Transform (FFT) with Hamming window with 50% overlap, and windows with 1024 points. Data distribution was assessed using the Shapiro-Wilk test. Two-way analysis of variance (ANOVA) for repeated measures was used compare the fatigue rates between groups (with vs. without back pain history). Bonferroni correction and Tukey’s post-hoc tests were used for even comparisons. The level of significance was set to 0.05. All data were analyzed using SPSS 20.0 (SPSS Inc., Chicago, USA).
Results: The participants without history of back pain maintained back extension much longer than those with history of back pain (135±47s vs. 48±27s, p=0.017). However, there were no significant differences between the groups on the rate of fatigue (F= 0.98, P= 0.45, Figure 1).

Discussion/Conclusion: Our findings demonstrated that participants with no back pain history were able to maintain back extension much longer than those with back pain history, but there were no significant differences between the groups on the rate of muscle fatigue.

Limitations: Limitations of this study include the small sample size, and small age range of the participants. Future studies should evaluate the effects in different age groups controlling for activity levels.
Evaluation of Temporomandibular Joint by Anesthetists in Florida when Conducting Orotracheal Intubation - A Pilot Study

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Background/Purpose: Orotracheal intubation has been considered a risk factor for the development or exacerbation of disorders related to the temporomandibular joint (TMJ)\(^1\). Although some studies show that general anesthesia with intubation can influence the onset and worsening of temporomandibular disorders (TMD), the literature is still very limited in this topic\(^2,3\). Proper TMJ assessment is required both before and after anesthesia in order to avoid or minimize temporomandibular complications\(^2\). This will allow the anesthesia providers to choose the best intubation technique to reduce the risk of TMJ issues\(^4\). The purpose of this interdisciplinary pilot study developed by physical therapy and nursing faculty and students was to evaluate whether anesthetists in Florida evaluate TMJ when conducting orotracheal intubation.

Methods: An online questionnaire was created using Qualtrics\(^\circledR\) online survey software (Qualtrics Labs Inc, Provo, Utah). The survey included 22 questions related to demographics, general anesthesia procedures, TMJ related to anesthesia procedures (including whether current and/or history of TMJ issues/TMD, mouth opening limitations, TMJ palpation, etc. are evaluated), and education/awareness regarding TMJ related to intubation. A contact list of anesthetists was obtained from the Florida Health-care Practitioner Portal. The anesthetists were contacted by email. Descriptive statistics and cross-tabulation analysis were performed.

Results: One hundred and eight providers participated (mean 46 years-old ±12; 59% female). About 50% reported to always evaluate TMJ prior non-emergency intubation. Of those, 56% use alternative intubation technique based on the TMJ status and 71% never/rarely evaluate TMJ post-intubation. Twenty-five percent reported they did not know of possible intubation effects on TMJ and 47% reported they did not receive adequate information/education on TMJ management related to intubation while in school. After the survey participation, 81% reported more aware of the importance of evaluating TMJ regarding intubation.

Discussion/Conclusion: Only half of the providers who frequently perform intubation in Florida always evaluate TMJ status prior intubation. This survey increased the awareness of anesthetists regarding the importance of evaluating TMJ when conducting intubation. This pilot study may contribute to reducing TMJ issues associated with non-emergency intubations. It may also increase collaborations between physical therapists and nurse anesthetists in the management of patients with TMJ issues after intubation since physical therapy is considered one of the most effective conservative treatments for temporomandibular disorders\(^5\).

Limitations/Recommendations: Future studies should include larger sample, include anesthesiologists, and include providers from other States in order to increase generalizability of the study.
Total Knee Arthroplasty and Timed Up and Go
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**Background:** The Timed Up and Go (TUG) is a recommended measure of function, balance, and walking ability for people with knee OA and one of the most used performance-based outcome measures for total knee arthroplasty (TKA). This was an observational pilot study to establish reliability of the TUG and assess for differences in mobility between 3 surgical procedures. The purpose was to determine and compare mobility in individuals who have had unilateral knee replacement (UTKR), individuals who have had simultaneous bilateral total knee replacement (BTKR), and individuals who had a unicompartmental knee replacement (UCKR) with computer aided guidance. Observations were made on first outpatient visit and last outpatient visit.

**Methods:** Twenty-nine TKA candidates completed standard physical therapy protocols consisting of range of motion, gait training, resistive training, pain and swelling control, general mobility, transfer training, patient education and stair negotiation training. Timed Up and Go (TUG) was utilized to compare patient outcomes. An (ICC 3,1) was used to assess for reliability of the TUG. A 2 x 2 ANOVA was used to assess for difference in TUG times between groups over time. Significance was set to 0.05.

**Results:** Based on this current data in this small pilot study, the TUG is a reliable instrument when comparing between these 3 surgical procedures. In this limited sample study, we did find individuals with BTKR were significantly slower in TUG times than the UTKR and UCKR. UTKR and UCKR procedures provide similar mobility outcomes.

**Conclusion:** The completion of a Physical Therapy rehabilitation program following a UTKR, UCKR, and BTKR improved mobility and reduced ambulation assistance required. On average, TUG times significantly improved by discharge from outpatient Physical Therapy services. The potential relationship between slower TUG times for patients with BTKR and future risk for falls needs to be explored.
Evaluating Interlimb Load Bearing Asymmetries During a Squat: A Pilot Study
Andrea Betancur, Cristina Ortiz, Kaylee Placeres, Brandi Strudgeon, Jessica Washburn (Mark Rossi)

Background and Purpose: In many patients with osteoarthritis, in which the joint cartilage becomes damaged and conservative treatments fail, a Total Knee Replacement (TKA) may be warranted. However, many patients with unilateral TKA continue to demonstrate movement asymmetries during functional activities after surgery. There is continued reliance on the non-operated limb and weakness in the surgical limb. Studies have demonstrated that individuals post-unilateral TKR present with an inter-limb WB asymmetry when completing functional tasks such as sit to stand, Walking, Bending to floor, Transferring in/out of a car, Descending stairs, and Transferring on/off a toilet or chair. Thus, a free-standing squat could be an important construct to assess. This small pilot study aimed to evaluate our methodology to assess load bearing symmetry in Healthy individuals during stand and squatting. We observed if a deeper knee flexion angle during a squat would show asymmetries in limb loading.

Case description: Subjects were healthy FIU students with no known knee joint Osteoarthritis. All were right dominant with an average body weight of 144.36±38.76 lbs. Equipment used was a PJB box, Power source cable, AMTI Force Plate Accugait, RJ12 cable, RS 232 cable, USB adaptor, laptop01, Sled, AMTI’s net force software, wood piece, and goniometer. The subject would stand with the dominant LE on the force plate and the non-dominant LE on the wood piece and would be instructed the following cues: “For this test you will be asked to stand and squat to different levels at my command. For the squatting trial I will ask you to Squat then Stop. You will then hold that position for 3 seconds. I will count the 3 seconds out loud. It will go like this: Are you ready? And you will answer yes (if you are), Squat, Stop, 3,2,1, Stand up” “Please report any pain, and remember you can stop all testing at any time. Do you understand the instructions?” While the subject is squatting one tester is measuring knee ROM with the goniometer with tape markers at the bony landmarks to ensure the subject is at exactly 30 degrees and 60 degrees. The other tester is using the computer software to record and cue the subject on their task. The subject task of stand, squat at 30 degrees, and squat at 60 degrees was randomized with a 3x3 latin square.

Outcomes: The average subject results are stand dominant at 49, stand non dominant at 51, squat 30 dominant at 50, squat 30 non dominant at 50, squat 60 dominant at 52, and squat 60 non dominant at 48. This was an interesting finding because as the subject squatted lower their weight was shifting towards the dominant LE.

Discussion: As the healthy subjects went into a 60-degree squat, they began relying on their dominant lower extremity for weight bearing. Future studies could answer the following questions: How would this present in individuals who may be weaker on one side/Knee OA/TKA? Would this pattern continue as the subjects go further into the squat? (90 degrees). The methodology of this study was detailed and reproducible, allowing for further studies to be conducted using the same protocol in order to answer the aforementioned questions.
Use of Diagnostic Ultrasound Imaging of the Vastus Medialis
Richard Christie, Maya Harris, Avery Watson, Ji Woo (Mark Rossi)

**Background and Purpose:** Patients with knee osteoarthritis (OA) commonly have changes in activities of daily living due to painful joints. Total Knee Arthroplasty or total knee replacement (TKA) is the procedure commonly performed to treat these individuals in order to regain their ability to perform functional activities including: Sit to stand, gait, and negotiation of stairs. Diagnostic Ultrasound (US) can be used for a quantitative assessment of the musculoskeletal system to noninvasively measure the Quadriceps Muscle Thickness (QMT) and Fat Thickness (FT). Assessing the quadriceps in these individuals provides further information on muscle morphology. The knee extensors are negatively affected after long periods of disuse. Diagnostic US could provide another valuable piece of information on muscle morphology demonstrating a global representation through objective measures of function, subjective measures, and muscle structure.

**Methods:** With ultrasound technology, the thickness of the vastus medialis muscle is measured from the deepest portion of the muscle to the superficial-most portion of the muscle using a standardized protocol with precise points. Fat Thickness (or Fat Layer Thickness) (FT) over the vastus medialis can also be measured using the same ultrasound techniques. It is imperative that an appropriate standardized protocol is used to measure the muscle and fat thickness in order for the results to be valid and reliable. The probe should be placed on the involved lower extremity at 20% of thigh length, defined as the distance from the greater trochanter to the popliteal crease with the thickness of the VMO measured at 2 cm above the patella. Ultrasound was most commonly taken on the dominant leg if bilateral involvement.

**Implications:** Short term goals for the study are to establish the intra- and inter-rater reliability when using US to measure the VMT and FT of two groups, a population of healthy individuals and a second group with OA and/or TKA VMT FT. The long term goals of the study would utilize the US to establish a relationship between the muscle characteristics and function. Establishing intra- and inter-rater reliability US ability to measure the VMT and FT can assist in furthering research to determine relationship between muscle characteristics and function with the possibility of developing protocols to predict the functional outcomes following TKA.