Pilot Study Protocol: Cervical Spine Joint Pain and Stiffness - Accuracy of Physical Assessment in Nursing

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Abstract

Background: Cervical spine dysfunction (CSD) is a problem with high personal, social and economic impact worldwide. Although its etiology is described as multifactorial, there is a need for better clarification. Literature has shown the relationship between the cervical condition, the mandibular functioning and the visceral condition. In order to guide and contribute to the accuracy of the physical assessment performed by nurses, we decided to study the influence of the stomatognathic system (SS) and viscerosomatic reflexes (VR) on pain and joint stiffness of the cervical spine.

Objective: Describe the pilot study protocol of the influence of SS and RV on cervical structures.

Methods: Pilot study, with a quasi-experimental design, carried out in 2019, with 50 volunteer participants from the university population of the Academic Federation of Porto, where the influence of the usual intercuspation change, the occlusal deprogramming and the pressure stimulus of the reflex skin region of the ilium/colon in the cervical spine were analyzed. This study was divided into two moments, where we first performed the kinematic and pain analysis in the passive mobilization of the upper cervical spine, using the Motion Capture System® and the Visual Analog Scale. In the second moment, we evaluated the pain threshold on palpation of the erector neck muscles and the structures of the stomatognathic system, using algometry. The influence of viscerosomatic reflexes on the structures of the stomatognathic system was also analyzed.

Results: Selection and preparation of the data collection site, acquisition of materials, constitution of the sample group and data collection were completed. The analysis of the results is being carried out.

Conclusions: The data from this study will allow the observation of the possible influence of SS and VR on pain and range of motion of the upper cervical spine, providing data for future randomized studies. Potential limitations have been identified.

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Pilot Study Protocol: Cervical Spine Joint Pain and Stiffness - Accuracy of Physical Assessment in Nursing

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ABSTRACT

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Keywords: Nursing Process, Nursing Assessment, Pain, Referred Pain, Range of Motion, Neck Pain, Stomatognathic System, Viscerosomatic Reflexes

INTRODUCTION

Cervical spine dysfunction (CSD) is a pathological condition of the spine with high impact worldwide, expected to increase in the future, dramatically impacting the person, family and society. This health problem is characterized by pain phenomena, functional disability, decreased quality of life, affected social activity, mental health, promoting increased mortality and individual and societal costs (Safiri *et al*., 2020; Geneva *et al*., al., 2017; Cohen, 2015; Hoy *et al*., 2014).

According to estimates from the “Global Burden of Disease 2017 Study” (Safiri *et al*., 2020), both the prevalence and the burden on the population are high worldwide, with a global prevalence of 288.7 million of cases, an incidence of 65.3 million and 25.6 million years lived with disability.

Although pain and joint stiffness are characteristics associated with CSD, imaging studies in a population with this condition have not identified any specific lesion, leaving the etiology of these conditions unknown, conditioning accurate diagnoses (Barnsley, 2019; Cheng *et al*., 2017; Meisingset *et al*., 2015; Röijezon *et al*., 2015). This may be the reason why therapeutic interventions have insufficient results (Safiri *et al*., 2020; Brennan-Olsen *et al*., 2017; Geneva *et al*., 2017).

The cervical dysfunction etiology is then described as multifactorial, mediated by central neuronal commands, resulting from complex biological interactions, of the local or distant structures of the cervical segment, creating great variability in the course and clinical severity (Safiri *et al*., 2020; Barnsley, 2019; Ronthal, 2016; Cohen, 2015; Hoy *et al*., 2014).

It is, therefore, important to integrate these components when evaluating the person with CSD, allowing the identification of the mechanisms underlying their health condition and the application of interventions adjusted to their physical condition. In this way, nurses should use scientific methodology strategies in the physical assessment, providing reliability to their approach and aiding their decision-making (Doenges & Moorhouse, 2010; Alexandre & de Moraes, 2001).

The assessment of the person with CSD is assumed to be solid, with an absence of subjectivity and personal interpretations, using a set of measurement methodologies, consisting of Physical Assessment, Specific Pain Analysis and Complementary Means of Diagnosis (Swartz, 2020; Barnsley, 2019; Tinoco *et al*., 2009)

From the multifactorial perspective of CSD and of complex local or distant biological interactions, the condition and activity of the stomatognathic system (SS) has been identified as an influencing factor of the cervical condition, due to the existence of a reciprocal synergistic action, creating interference both with orofacial pathological conditions and with its usual functioning (Amaral *et al*., 2020; Ferreira *et al*., 2019; Fougeront & Fleiter, 2018; Silveira *et al*., 2015).

This co-activation coordination between the SS and the cervical appears to be related to the neuronal networks centers that regulate the muscles of these body segments, being mediated by the cervical motor sensory system and the trigeminal nerve (Fougeront & Fleiter, 2018; Eriksson *et al*., 2007). On the other hand, nociceptive hyperexcitability can promote the development or maintenance of chronic pain, such as triggering painful reflex disorders (Ries *et al*., 2014).

Another neurological phenomenon that seems to influence the relationship is the viscerosomatic reflexes (VR). These are the result of harmful afferent signals of visceral origin that converge in somatic structures by common innervation or by induction of neuronal plasticity of the central, peripheral and autonomous nervous system, involving multiple organs and body structures (Farrell *et al*., 2016; Reynolds, 2016; Shi *et al*., 2015; Yu *et al*., 2014; Hoffman, 2011). Regarding the interdependence of the cervical

and the SS, we verify visceral sensory convergence, through the vagus nerve, at the trigeminal and C1-C2 and spinothalamic tract level has an important role of the upper cervical segments in the integration of the converging entrances of somatic and visceral organs (Takeda et al., 2005), with the potential to interfere with its correct functioning.
Given these connections between different body systems, this study aims to analyze the influence of SS and VR on pain and joint stiffness of the upper cervical spine (UCS). Two research questions were defined in this study:

- What is the influence of the stomatognathic system and viscerosomatic reflexes on pain and joint stiffness in UCS?
- What is the influence of viscerosomatic reflexes on the stomatognathic system?

The main objective of this study is to contribute to the clarification of the Pain and Joint Stiffness etiology of the cervical spine, providing accuracy when performing the physical assessment by nurses.
To achieve the aforementioned major objective, the following specific objectives were defined:

- Identify the influence of the stomatognathic system on pain and cervical mobility;
- Identify the influence of viscerosomatic reflexes on pain and cervical mobility;
- Identify the influence of viscerosomatic reflexes on the stomatognathic system.

Methodology

To our best knowledge and based on the researches carried out, no studies were found that crossed the same variables, with similar methodologies. Therefore, this study presents a preclinical/pilot study profile.
The methodology adopted in this investigation was that of a quasi-experimental study with an interrupted time series design.
The study will consist of two data collection moments:

- Moment I - Kinematic analysis (assessment of the rotational range of motion of the upper cervical spine and pain during mobilization)
- Moment II - Assessment of pain threshold on palpation (algometry).

FROM THE POPULATION UNDER STUDY TO THE CONSTITUTION OF THE SAMPLE

The study took place within the university population of the Academic Federation of Porto, since this group is made up of adults of different age groups, tending to be healthy, with similar behaviors, habits and lifestyles. From this population, a non-probabilistic sample by voluntary response was constituted, composed of 50 volunteers (students, professors and non-professors).
The study was publicized by placing posters on the UCP-Porto premises and a “Call” was made on the UCP-Porto Facebook page. Volunteers registered through the email dornacervical@gmail.com , indicating their name, contact details and declaration of interest in participating in the study.
Afterwards, they were contacted, confirming their interest in participating, applying the inclusion and exclusion criteria, and scheduling the data collection if they were accepted for the sample group, guaranteeing ethical principles and confidentiality.
The criteria for inclusion in the sample were: being aged 18 years or over and accepting to participate in the study.
The exclusion criteria for the formulation of the study sample were:

- Performing pharmacological therapy (analgesics, anti-inflammatory drugs and/or muscle relaxants);

- The existence of neuromuscular pathology, congenital alteration, pathological condition in acute phase, functional disturbances of the cervical and/or mandibular spine that make the application of variables or passive mobilization of the cervical spine unfeasible;
- History of bone fractures, surgery to the cervical spine, skull and/or mandibular, and cancer disease;
- Undergoing physical rehabilitation program.

Operationalization of Variables

- Range of motion of the high cervical spine – variable operationalized using the Motion Capture System®, which allows measurement of the range of motion, varying its range from 0º-90º.
- Pain during mobilization of the upper cervical spine – variable operationalized through an open-ended question, corresponding to a numerical value between “0” and “10”, recommended by the Visual Analog Scale (VAS).
- Pain threshold on palpation of the erector neck muscles – variable operationalized in two dimensions: pain and pressure force. Regarding pain, it will be operationalized through an open-ended question, corresponding to a numerical value between zero and ten, recommended by the VAS; the pressure force will be operationalized through algometry, corresponding to a numerical value between "0" and "44" kg/cm2.

INTERVENTIONS

Occlusal deprogramming

Neuromuscular occlusal deprogramming aims to reduce the action of masticatory muscles on the mandible, promoting its centric position within the temporomandibular joint. In our study, we chose to use cotton rolls, as it is a simple and economical methodology, with an immediate neuromuscular result, allowing the necessary time for the evaluations to be carried out in this study (Elías, 2004). This intervention strategy consists of placing a pair of cotton rolls (bilaterally) at the height of the premolars, asking the participant to vigorously compress the cottons, for approximately 3 to 5 minutes (figure 1).

In order to understand if the change in the usual intercuspation changed the pain and joint stiffness of the UCS, before promoting the occlusal deprogramming, when placing the cotton rolls at the premolar level (figure 2), a kinematic evaluation of the UCS was carried out.

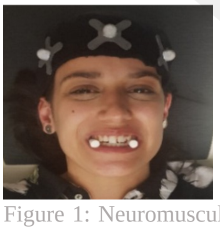

Figure 1: Neuromuscular Occlusal Deprogramming - moment of compression of the cotton rolls by the participant

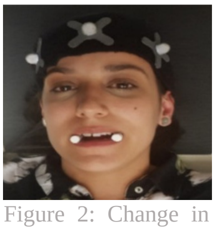

Figure 2: Change in the usual intercuspation with placement of cotton rolls bilaterally at the level of the premolars, avoiding the usual intercuspation

Pressure stimulus of the reflex skin region of the Ilium/Colon

To our best knowledge, no physical assessment methodologies capable of promoting the assessment of the VR influence on musculoskeletal structures were found. In this sense, a pressure stimulus was performed on the abdominal skin region described by Arendt-Nielsen et al. (2008), corresponding to the ilium/colon reflex (figure 3).

The application of a pressure of 2 kg/cm2 in this anatomical region was determined, in order to create stimulus in the superficial tissues, using an algometer (*Force Dial FDK/*

FDN 40 from *Wagner Instruments*®) to ensure accuracy and standardization of the stimulus (Test 3) (figure 4).

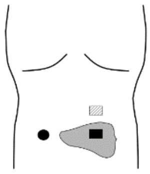

Figure 3: Schematic of thermographic evaluations performed in the study by Arendt-Nielsen *et. al*. 2008. 1

Figure 4: Tactile stimulus of the reflex skin region of the Ilium/Colon

DATA COLLECTION INSTRUMENTS

Motion Capture System®

The *Motion Capture System*® allows the capture of three-dimensional (3D) motion, having been used for the kinematic analysis of the human body, in clinical evaluations and in the study of body biomechanics (figure 5). Data collection is carried out in a computerized room, with data collection cameras around the room, connected to a computer in a control system that allows the visualization of the collected data and its registration. The data collected comes from sensors that are placed on the body of the study participants. To better place the sensors on the participants' bodies, they have to wear a fabric suit that allows for different sensor allocations and the standardization of their placement between different participants (figure 6). The data provided by this assessment methodology becomes more enriching, as it allows data collection in 3D (while in goniometry they are 2D), and does not require the intervention of the researcher/professional to collect the data, allowing them greater freedom to promote interventions (Martinez *et al*., 2018; Yazdifar *et al*., 2013).

This assessment methodology allows for less evaluator interference and the same reliability in relation to goniometry (Yazdifar *et al*., 2013; Leardini *et al*., 2005;), the *Gold Standard* in the KJR assessment (Swartz, 2020; Dale, 2012).

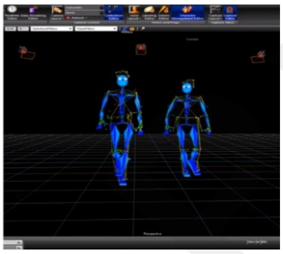

Figure 5: 3D image reproduced as result of sensor data collection

Figure 6: Fabric suits for placing the sensors

The squares (black and dashed) represent the areas where the initial thermographic and blood flow assessments were performed. The black circle represents the stomach area where capsaicin was applied. The gray-shaded area is the region where thermographic and blood flow changes were found, after the capsaicin application in the ilium/colon region (producing evoked pain).

As this is a 3D system, the program allows the collection of movement in the “X”, “Y” and “Z” axes. For this study, only data from the “Z” axis were counted, since the analysis took place on the longitudinal axis of the cervical spine. Data collection was carried out at the Motion Capture Laboratory at UCP-Porto, where the *Motion Capture System*® is located, a laboratory financed by the Foundation for Science and Technology (figures 7 and 8).

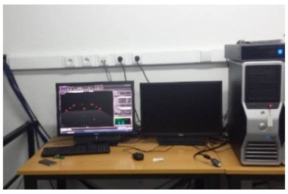
Figure 7: UCP-Porto Motion Capture Room

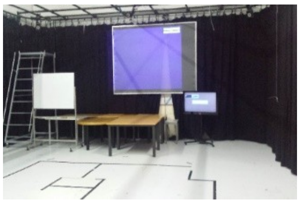
Figure 8: Motion Capture CPU Room

Algometer

The palpation of body structures is one of the methodologies used in physical assessment, allowing the examination and perception of the condition/characteristics of the evaluated structures, the existence of hyper or hyposensitivity, the presence or absence of injury, as well as detailed evaluation of the structure by structure. In applying this methodology, we should start with a minimum pressure, increasing the intensity of its application according to the characteristics of the structures and the tolerance of the participant or patient (Swartz, 2020; Tinoco *et al*., 2009). Algometry allows the measurement of the stimulus produced, being considered a reliable methodology (Silva *et al*, 2003). In this study, the *Force Dial FDK/FDN 40* algometer from *Wagner Instruments*®, from Greenwich, in the state of Connecticut in the United States of America, was used, allowing the measurement of the applied force in kg/cm2 (figure 9).

Figure 9: Wagner Instruments® Force Dial FDK/FDN 40 Algometer

Analog visual scale (AVS)

For the self-assessment of the pain intensity experienced at different moments of by the participants, we used the Visual Analog Pain Scale (VAS) (figure 10).

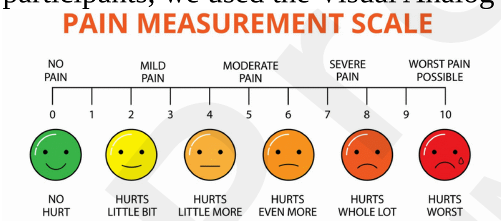

Figure 10: Visual Analog Pain Scale

PERFORMANCE AND DATA COLLECTION PROTOCOLS

To ensure maximum reliability in data collection, the researcher had more than 10 years of experience in manual therapy and assessment of spinal mobility, following the literature guidelines (Walter *et al*., 2008; Devereaux *et al*., 2005). In order to familiarize with the data collection methodology, handling of materials and standardization of the assessment, the researcher performed pre-tests on more than 30 volunteers.

Data collection took place between June and July 2019, and between Moment I and Moment II there was a gap of one week.

Environmental conditions

Data collection took place in two separate rooms. In both rooms the environmental conditions were stabilized using:

- Artificial lighting, allowing stabilization of light intensity
- Heater, allowing the stabilization of the room temperature between 20 and 22°C.

Moment I Procedure

In Moment I, kinematic evaluation and pain during mobilization of the first (C1) and second (C2) cervical vertebrae were performed. The measurement of range of motion was performed using the *Motion Capture System®*.

Upon admission of the participant to the *Motion Capture®* laboratory, we proceeded to collect the following data:

- Name confirmation
- Confirmation of inclusion and exclusion criteria
- Provision of informed consent
- Explanation of all study procedures
- Presentation of data collection materials
- Clarification of doubts
- Signing and delivery of the informed consent in duplicate: one for the participant and one for the researcher
- Completion of the sociodemographic characterization survey. If the participant met the conditions for participation and accepted of their own free will, the procedures for the operationalization of the study would start.

Regarding the preparation of data collection per participant, a cloth helmet with three sensors was applied to the participants' heads (figure 11). Subsequently, the participant was placed in the supine position on a gurney, as this positioning allows for maximum relaxation of the cervical structures (figure 12).

Figure 11: Fabric helmet with sensors for data collection

Figure 12: Data collection position and maximum body relaxation

Data collection involved C1 and C2 passive joint mobilization (figure 13) in five moments: Initial Assessment, Test1, Test 2, Initial Assessment 2 and Test 3 (Table 2). Between Test 2 and Initial Assessment 2, an interval of 15-20 minutes was performed, to promote the wash-out, with the objective of having the participant in his/her usual condition to assess the influence of Test 3.

Table 2: Tests Description

Initial Assessment	Assessment in maximum body relaxation, in its usual condition
Test 1	Change of usual intercuspation with cotton rolls
Test 2	Occlusal Deprogramming
Initial Assessment 2	Assessment in maximum body relaxation, in its usual condition
Test 3	Pressure stimulus of the reflex skin region of the ilium/colon

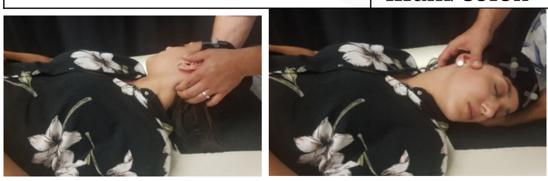

Figure 13: Passive mobilization of the UCS, applying the rotation movement to the right and to the left

Moment I Protocol:

1- Initial Assessment – Passive mobilization of the cervical spine was performed to assess the rotation range of motion and pain perceived at the time of assessment, at C1 and C2 levels, with the teeth in intercuspation without load (antagonistic teeth touching without load exert force). Three measurements were taken to later calculate and average

them. Between each measurement there was a pause of 20 seconds.
2- Test 1 – Cervical passive mobilization was performed to assess the rotation range of motion and pain, at C1 and C2 levels, promoting the alteration of the usual intercuspation with placement of cotton rolls between the dental arches. Three measurements were taken to later calculate and average them. Between each measurement there was a pause of 20 seconds.
3- Test 2 – Cervical passive mobilization was performed to assess the rotation range of motion and pain, at C1 and C2 levels, after performing the procedures for occlusal deprogramming (placement of cotton rolls between the dental arches, vigorous compression of cotton rolls for 3-5 minutes, removal of cotton rolls and placement of the patient in a position of maximum relaxation with intercuspation without load). Three measurements were taken to later calculate and average them. Between each measurement there was a 20-second pause.
4- Pause 15-20 minutes (Wash-Out)
5- Initial Assessment 2 – Cervical passive mobilization was performed to assess the rotation range of motion and pain perceived at the time of assessment, at C1 and C2 levels, with intercuspation without load (antagonistic teeth touching without exerting force). Three measurements were taken to later calculate and average them. Between each measurement there was a pause of 20 seconds.
6 – Test 3 - Cervical passive mobilization was performed to assess the rotation range of motion and pain, at C1 and C2 levels, with the performance of a pressure stimulus in the reflex skin region of the ilium/colon continuously when throughout the evaluation, with a pressure of less than 2kg/cm2. Three measurements were taken to later calculate and average them. Between each measurement there was a pause of 20 seconds.
This evaluation moment lasted 30 minutes per participant.

Moment II Procedures

Data collection took place with a minimum interval of one week in relation to Moment I, in order to rule out any type of influence from previously applied interventions.
At the participant's reception, the procedures to be carried out were reminded, the algometer and the AVS were presented again, enabling them to characterize any type of pain they might experience during data collection. After confirming the willingness to continue the study, the participant was placed in the supine position on a gurney.
The tests and procedures used were the same as in Moment I, with the exception of Test 1. The exclusion of this test is related to the fact that the presence of an object that prevents habitual occlusion can stimulate the muscle contraction of the SS and UCS, altering their “normal” condition and consequently alter their painful sensitivity to palpation.
The erector muscles of the neck and stomatognathic system evaluated (figure 14):

- Trapezius
- Suboccipital musculature
- Sternocleidomastoid
- Temporal (anterior, middle and posterior portion)
- Masseter (Upper - origin, body and insertion)
- Ear-jaw articulation
- Medial Pterygoid Location

Since, due to the anatomical location, it is not possible to use the algometer to assess the Medial Pterygoid Site, it was only evaluated by direct palpation with the finger (figure 15)

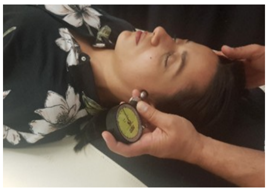

Figure 14: Pain Threshold Assessment on Palpation

Figure 15: Palpation of the Medial Pterygoid Site, taken from Magee, 2017

Moment II Protocol:

1. Initial Assessment – Palpation of the erector neck muscles and of the stomatognathic system structures was performed, using the AVS to characterize the pain, with intercuspation without load, using algometry to measure the pressure performed on the evaluated muscles. Three measurements were taken to later calculate and average them. Between each measurement there was a pause of 20 seconds.
2. Test 2 – Palpation of the erector neck muscles and of the stomatognathic system structures was performed, using the AVS to characterize the pain, after performing the occlusal deprogramming, using algometry to measure the pressure performed on the evaluated muscles. Three measurements were taken to later calculate and average them. Between each measurement there was a pause of 20 seconds.
3. 15-20-minute break (Wash-Out)
4. Initial Assessment 2 – Palpation of the erector neck muscles and of the stomatognathic system structures was performed, using the AVS to characterize the pain, with intercuspation without load, using algometry to measure the pressure performed on the evaluated muscles. Three measurements were taken to later calculate and average them. Between each measurement there was a pause of 20 seconds.
5. Test 3 - Palpation of the erector neck muscles and of the stomatognathic system structures was performed, using AVS to characterize pain, during tactile compression of the reflex region of the ilium/colon (pressure less than 2kg), controlled with algometry. Three measurements were taken to later calculate and average them. Between each measurement there was a pause of 20 seconds.

This evaluation moment lasted 45 minutes per participant.

ETHICAL PROCEDURE

The present study was submitted and approved by the Ethics Committee of the Regional Center of Porto, from the Catholic University of Portugal (ID: CE.219. (11).2018).

In order to guarantee the safety of the participants, the data and information confidentiality about the study, an informed consent containing the purpose of the study and the interventions to which they will be subjected were delivered for reading and signing. This document was signed and delivered to the researcher.

DATA PROCEDURES

After collecting data from our sample, these will be grouped in an Office Excel® (Microsoft) database, and the data will then be transferred to "R", a free software for statistical analysis and graph construction, considered a variant of S language. This program arises from the creation of the *R Foundation for Statistical Computing*, with the aim of creating a free tool for free use.

Descriptive statistics will be used to treat the data relating to the characterization of the sample: analysis of frequency distributions (for qualitative and discrete quantitative variables) and descriptive measures (minimum, maximum, mean, median, quartiles, standard deviation, coefficient of variation and Fisher's asymmetry coefficient for discrete or continuous quantitative variables). This data will also be presented in graphical format, histograms and boxplots, for better visualization of the results.

In the inferential statistics of the variables (range of motion, pain associated with passive mobilization, pressure exerted in the assessment of the pain threshold and pain experienced by the pressure stimulus), the following procedures will be used:

- In order to carry out result comparisons at the time of evaluation, it will be necessary to first check the normal distribution, using the Shapiro-Wilk Normality Test (< 0.001).
- The results will be compared using the Friedman test (< 0.001) (also known as analysis of variance in Friedman orders) because they are related samples, since they are the same participants in the various evaluation moments.
- As a result of the completion of the Friedman test, it will be necessary to proceed with multiple comparisons. As the samples are paired (since they are the same participants in both evaluation moments), the Wilcoxon Test (<0.001) will be used, allowing to identify the differences between the evaluation moments.
- To analyze the relationship between the variables at different moments of evaluation, we will use Spearman's Order Correlation Coefficient (< 0.001).

RESULTS

The selection and preparation of the data collection site, the acquisition of materials, the constitution of the sample group and data collection were completed. The analysis of the results is being carried out.

DISCUSSION AND CONCLUSION

The data from this study will allow the observation of the possible influence of the stomatognathic system and VR on pain and range of motion of the upper cervical spine, providing data for future randomized studies.

STUDY LIMITATIONS

As this is a pilot study, the objective is not to create generalization, but to describe the behavior of the variables and contribute with data for the future development of randomized studies.

No clinical diagnoses were made about the cervical, stomatognathic or visceral system condition, allowing the stratification of the participants.

Tactile stimulation of the reflex skin region of the ilium/colon was a methodology designed for the study, based on the fact that the local physiology of this skin region was correlated with viscerosomatic reflexes. The physiological phenomena of this stimulus must be studied to better understand its mechanism of action.

Acknowledgments

We would like to thank UCP-Porto for the possibility of using the Motion Capture laboratory, the Scientific Council of ICP-Porto for reviewing the study and the Ethics Committee of CUP-Porto for its opinion on the study.

AUTHORS' CONTRIBUTIONS

Bruno Soares, Fátima Fonseca, Patrícia Fonseca and Paulo Alves designed the study, participated in the data collection an wrote the article.

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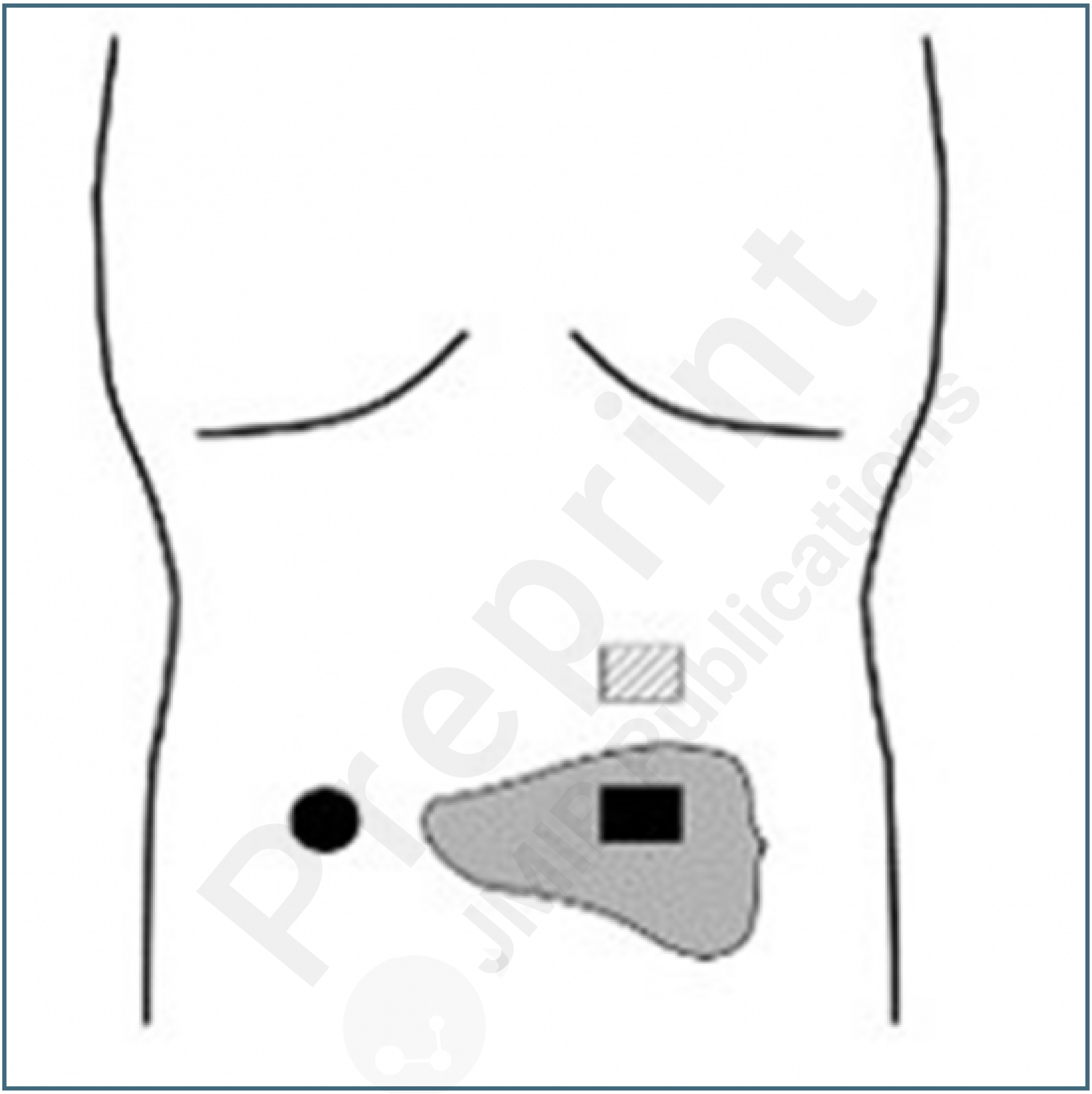
Supplementary Files

Figures

Neuromuscular Occlusal Deprogramming - moment of compression of the cotton rolls by the participant.

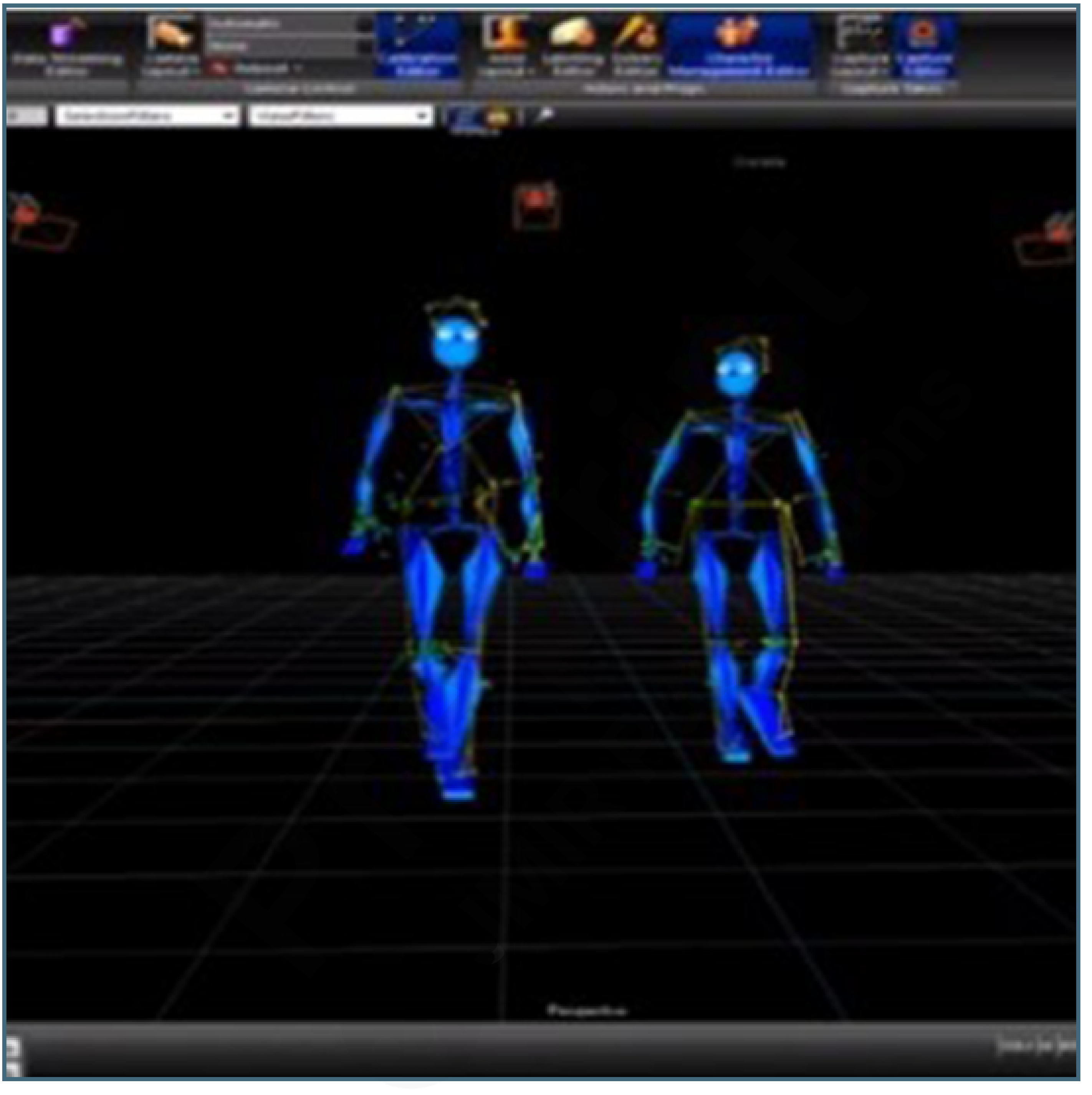
Change in the usual intercuspation with placement of cotton rolls bilaterally at the level of the premolars, avoiding the usual intercuspation.

Schematic of thermographic evaluations performed in the study by Arendt-Nielsen et. al. 2008.



Tactile stimulus of the reflex skin region of the Ilium/Colon.

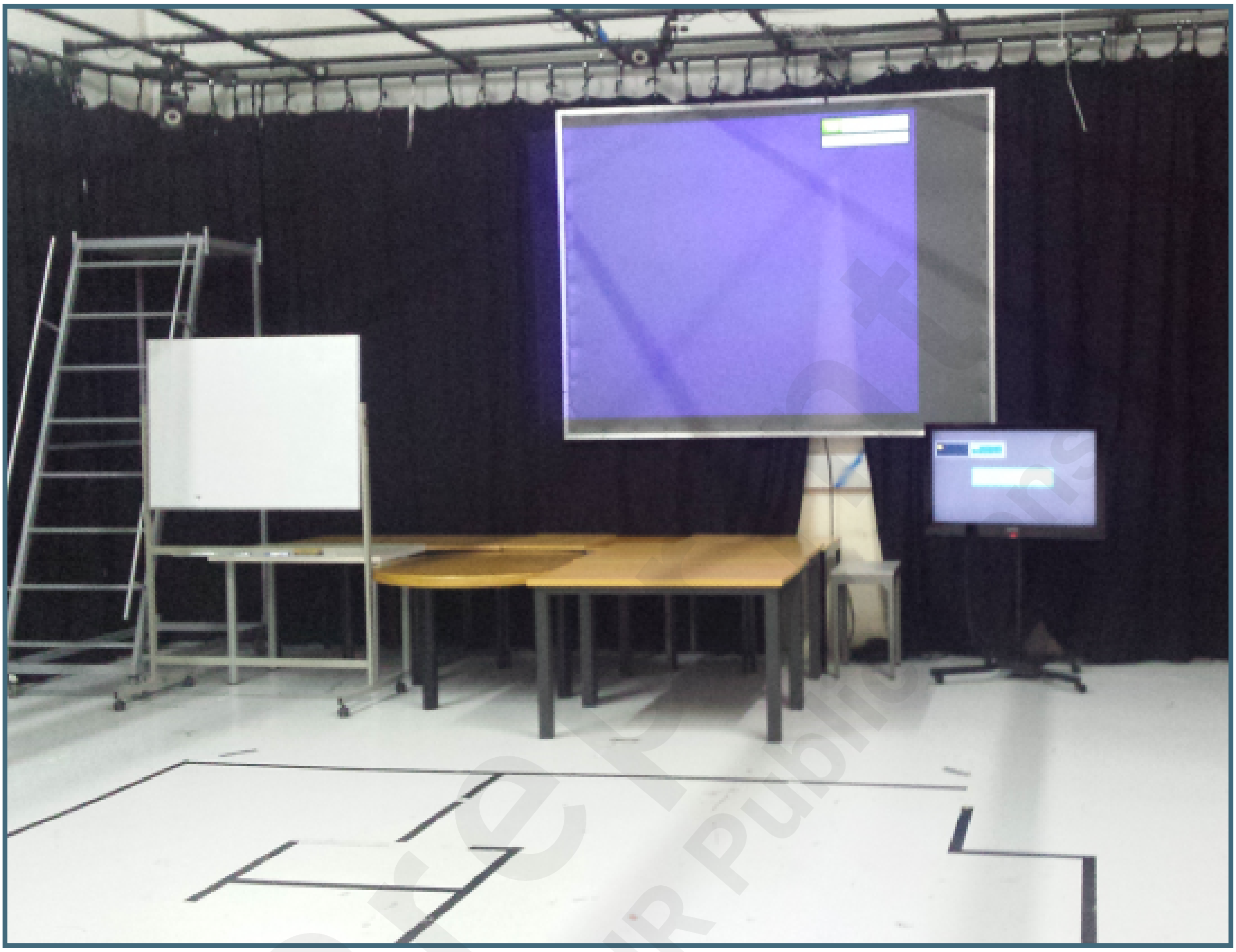
3D image reproduced as result of sensor data collection.



Fabric suits for placing the sensors.

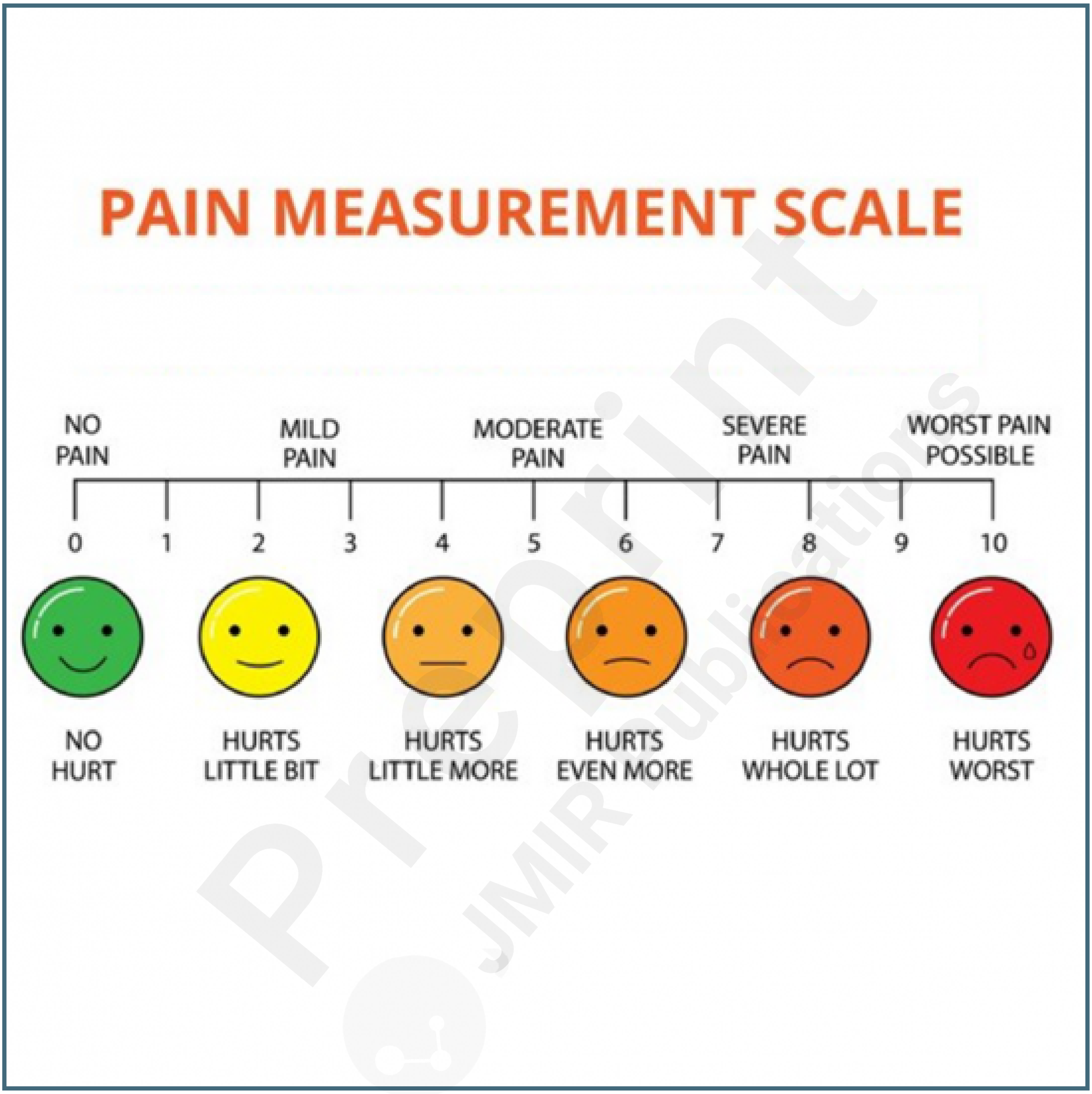
UCP-Porto Motion Capture Room.

UCP-Porto Motion Capture Room.



Wagner Instruments® Force Dial FDK/FDN 40 Algometer.

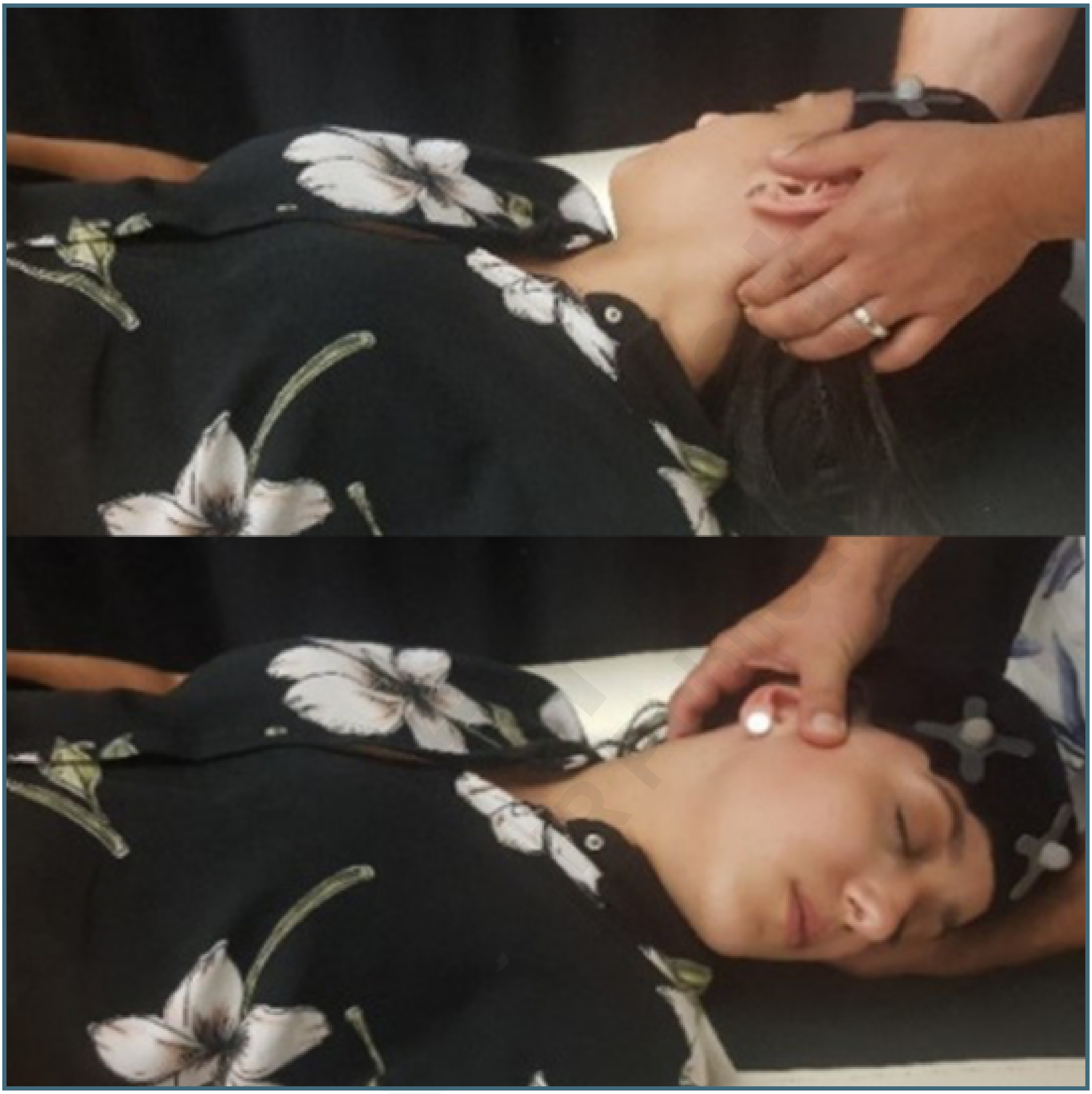
Visual Analog Pain Scale.



Fabric helmet with sensors for data collection.

Data collection position and maximum body relaxation.

Passive mobilization of the UCS, applying the rotation movement to the right and to the left.



Pain Threshold Assessment on Palpation.

Palpation of the Medial Pterygoid Site, taken from Magee, 2017.