

Evidence-Based Practice in Knee Osteoarthritis: A Clinical Practice Guideline Proposal for the Portuguese Physical Therapists Context

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KEYWORDS: KNEE OSTEOARTHRITIS; PHYSIOTHERAPY INTERVENTIONS; NON-PHARMACOLOGICAL TREATMENTS; NON-SURGICAL TREATMENTS; INTERVENTION LEVELS.

Dedication

I wish to dedicate this work to all my family, friends and colleagues, in special to my son Hugo Ferreira.

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Abstract

An evidence-based practice helps to ensure that patients receive the best interventions for their condition. However, patients are not always treated according to evidence-based practice concepts. One of the facilitators to overcome the barriers related to evidence-based practice are the clinical practice guidelines. Clinical practice guidelines help clinicians make clinical decisions, by providing recommendations/algorithms for managing their patients. Despite its importance, no Portuguese clinical practice guideline was found for one of the most common pathologies in the society: knee osteoarthritis. Therefore, the purpose of this thesis is to create a clinical practice guideline for Portuguese physical therapists to manage knee osteoarthritis patients. Thus, this thesis was guided according to the “Scandinavian model”, where different studies performed according to the objective, such as: umbrella review; systematic review and meta-analysis; questionnaire translation and validation; two studies with the implementation of a questionnaire and the use of semi-structured interviews. It could be concluded that, for the Portuguese context, the “core” interventions are Nutrition/Weight Loss, Self-Care/Education and Resistance Exercises. If necessary, the following interventions can be added: Aquatic Exercises; Manual Therapy; and/or Stretching. When these interventions fail, the “silver” interventions that can be used are: Aerobic Exercises; Balance Exercises; Thermotherapy; and/or Walking Aids. When these interventions do not respond to the patient's needs neither, “bronze” interventions can be added, namely: Electrotherapy; Kinesio Tape; and/or Ultrasound. Additionally, it was found that Portuguese physical therapists recognize the importance of an evidence-based practice and, whenever possible, use clinical practice guidelines in their daily clinical practice.

KEYWORDS: KNEE OSTEOARTHRITIS; PHYSIOTHERAPY INTERVENTIONS; NON-PHARMOCOLOGICAL TREATMENTS; NON-SURGICAL TREATMENTS; INTERVENTION LEVELS.

Resumo

Uma prática baseada na evidência ajuda a garantir que os pacientes recebem as melhores intervenções para a sua condição. No entanto, nem sempre os pacientes são tratados segundo os conceitos da prática baseada na evidência. Um dos facilitadores para ultrapassar as barreiras relacionadas com a prática baseada na evidência são as *clinical practice guidelines* (em português, normas de orientação clínicas). As *clinical practice guidelines* ajudam os clínicos na toma de decisões, fornecendo recomendações/algoritmos para a gestão das condições dos seus pacientes. Apesar da sua importância, não foi encontrado nenhuma *clinical practice guideline* portuguesa para uma das patologias mais comuns na sociedade: osteoartrose do joelho. Então, o objetivo desta tese é criar uma *clinical practice guideline* para fisioterapeutas portuguesas no tratamento de pacientes com osteoartrose do joelho. Para isso, a tese foi guiada segundo o “modelo Escandinavo” onde foram criados diferentes estudos para responder ao objetivo, nomeadamente: revisão chapéu; revisão sistemática com meta-análise; tradução e validação de um questionário; dois estudos com a implementação de um questionário e a utilização de entrevistas semiestruturadas. Conclui-se que, para o contexto português, as intervenções nível 1 são: Nutrição/Perda de peso; Educação/Autocuidado; e Exercícios Resistidos. Se houver necessidade, a estas intervenções pode ser adicionado: Exercícios em Meio Aquático; Terapia Manual; e/ou Alongamentos. Na falência destas intervenções, pode-se utilizar as intervenções do nível 2: Exercícios Aeróbios; Exercícios de Equilíbrio; Termoterapia; e/ou Auxiliares de Marcha. Quando estas intervenções também não respondem às necessidades do paciente, pode-se adicionar as intervenções nível 3: Eletroterapia; Kinesio Tape; e/ou Ultrassom. Adicionalmente, os fisioterapeutas portuguesas reconhecem a importância de uma prática baseada na evidência e, sempre que possível, utilizam *clinical practice guidelines* na sua prática clínica diária.

PALAVRAS-CHAVE: OSTEOARTROSE DO JOELHO; INTERVENÇÕES DE FISIOTERAPIA; TRATAMENTOS NÃO-FARMACÓGICOS; TRATAMENTOS NÃO-CIRÚRGICOS; NÍVEIS DE INTERVENÇÃO.

Abbreviations and symbols

- AMSTAR – A MeaSurement Tool to Assess systematic Reviews;
- APFISIO – Associação Portuguesa de Fisioterapeutas;
- BMI – Body Mass Index;
- CI – Confidence Interval;
- cm – Centimeter;
- CPG – Clinical Practice Guidelines;
- EBP – Evidence-Based Practice;
- ES – Effect Size;
- ESCEO – European Society for Clinical and Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases;
- EULAR – European Alliance of Associations for Rheumatology;
- GRADE – Grading of Recommendations Assessment Development and Evaluation;
- HLLT – High-Level Laser Therapy;
- Hz – Hertz;
- IBM SPSS – International Business Machines Corporation Statistical Package for Social Sciences;
- ICOAP – Intermittent and Constant OsteoArthritis Pain;
- IFC – Interferential Current;
- Kg – Kilogram;
- KOOS – Knee Injury and Osteoarthritis Outcome Score;
- KT – Kinesio Tape;
- LLLT – Low-Level Laser Therapy;
- m – Meter;
- MHz – Megahertz;
- min – Minutes;
- NMES – Neuromuscular Electrical Stimulation;
- NICE – National Institute for Health and Care Excellence;
- NIN – Noninvasive Interactive Neurostimulation;
- OA – Osteoarthritis;

- OARSI – Osteoarthritis Research Society International;
- OQAAQ – Overview Quality Assessment Questionnaire;
- OR – Odds Ratio;
- PA – Percentage of Agreement;
- PEDro – Physiotherapy Evidence Database;
- PEMF – Pulsed Electromagnetic Fields;
- PhD – Philosophy Doctor;
- PICO – Patients, Intervention, Comparison, Outcomes;
- PRISMA – Preferred Reporting Items for Systematic reviews and Meta-Analyses;
- PT – Physical Therapist;
- QOL – Quality of Life;
- QUOROM – Quality Of Reporting Of Meta-analysis;
- R-AMSTAR – Revised A MeaSurement Tool to Assess systematic Reviews;
- RC – Relative disagreement in Concentration;
- RCT – Randomized Controlled Trial;
- RevMan – Review Manager;
- ROBIS – Risk Of Bias Assessment for Systematic reviews;
- ROM – Range of Motion;
- RP – Relative disagreement in Position;
- RV – Relative rank Variance;
- sec – Seconds;
- SMD – Standardized Mean Difference;
- TENS – Transcutaneous Electrical Nerve Stimulation;
- TLAR – Turkish League Against Rheumatism;
- UK – United Kingdom;
- US – Ultrasound;
- USA – United States of America;
- VAS – Visual Analog Scale;
- W – Watts;

- WBV – Whole-Body Vibration;
- WOMAC – Western Ontario and McMaster Universities Osteoarthritis Index;
- α – Alpha;

Chapter 1 – Introduction

Osteoarthritis (OA) is the most common form of arthritis that can affect movable joint tissues, contributing to functional and social impairment, disability, reduced independence and poorer quality of life (QOL) in older adults ¹⁻⁷. The incidence of new cases is around 200–250/100 000/year ⁸. The reasons are due to the societal trends in the population such as ageing (by 2050, 30% of the European population will be aged >65 years), obesity, and joint injury, estimating that the number of people affected by OA will increase about 50% over the next 20 years and to be the single greatest cause of disability in the general population by 2025 ^{5,9-11}. From all joint that can be affected by OA, the knee is the most prevalent (especially in elderly women), where a third of older adults in the general population shows radiological evidence of knee OA ^{10,12-17}. Worldwide, it is estimated that 250 million individuals suffer from knee OA ¹⁸. Particularly, in Portugal, the knee OA reaches between 11 to 12.4% of the overall population ¹⁹⁻²¹. In order to consider that a person has knee OA it will need to contain radiographic findings (such as, joint space and alignment, cartilage and capsular thickening, bone deformities, osteophytes, cysts, sclerosis, and synovitis), plus clinical signs and symptoms (such as, pain, swelling, range of motion (ROM) limitation, tenderness, reduced proprioceptive acuity, morning stiffness, muscular weakness, joint instability, joint deformity, elevated sensitivity to temperature, and joint crepitus) ²²⁻²⁷.

Nevertheless, the knee OA progression is highly variable ²⁸. Current OA rehabilitation strategy is a complex process that uses surgical and non-surgical (pharmacological and non-pharmacological) interventions ^{5,8,14,29-35}. One staggering statistic is that the cost of OA in the United States of America (USA), Canada, United Kingdom (UK), France and Australia has been estimated to account for between 1% and 2.5% of the gross national product of these countries ³⁶. Translating into currency, it is estimated that, in the USA alone, 185,5 billion dollars are spent in annual insurer expenditures associated with medical care for OA patients ³⁷. As the majority of the non-pharmacological and non-surgical interventions are safe, low cost, low tech, incorporate self-management performed at home or in the community and have a substantial public health impact, they play a critical role in the patients' life as they are nowadays the first

step in the knee OA management ^{5,8,14,30,33-35,38}. Due to their risks, complications and post-outcomes other strategies only are a valid option for patients who failed to respond to these measures ^{5,14,30,34,35}.

There are several non-pharmacological and non-surgical interventions that can be used to manage knee OA patients, the majority physical therapy related ^{23,39-45}. Despite being widely used to manage knee OA patients, physical therapy practice has been subjected to decades of criticism for its lack of research, and is often perceived as a profession that bases its practice largely on anecdotal evidence, using treatment techniques that have little scientific support ⁴⁶. This was identified, as early as 1969, to be a significant issue for the physical therapy profession ⁴⁷. Over the years, many efforts were made to increase physical therapy research ⁴⁸ as researchers stated it is important to ⁴⁹: validate physical therapy services; provide information on the effectiveness of treatments; improve patient care by making intelligent clinical decisions based on research findings; provide answers to physical therapists' (PTs) questions. Highlighting the importance of research in the physical therapy profession as rehabilitation health-care providers and making significant progresses in that issue, one goal will be to shift from the traditional models of practice (guided on the therapist beliefs, faiths, expectations, interests, opinions, values, experiences, tacit knowledge and intuition) to a more evidence-based practice (EBP) overtime ^{46,50-52}.

EBP is nowadays a widely used term by health-care practitioners. Originally developed at the McMaster Medical School in Canada in the 1980s, EBP can be defined as the conscientious, explicit and judicious use of current relevant available evidence combined with the health-care providers' clinical expertise and the patients' preferences, guiding clinical decisions about patients' care ⁵³⁻⁵⁶. Therefore, EBP should include clinical experience, patients' preferences and scientific evidence as main actors. Specifically, in order to have the best evidence at the moment, it is expected that the health-care professionals search, read and critically appraise scientific studies ⁵⁴. From the different studies' type, they should have a practice informed from what is established as higher level in the evidence hierarchy, such as clinical practice guidelines (CPGs), meta-analysis,

systematic reviews or reviews ⁵⁷⁻⁶⁰. In order to help access to research evidence, reduce the time needed to read evidence, understand research evidence, and greater power to gather good quality information, the CPGs are nowadays increasingly important in the clinical quotidian ⁶¹⁻⁶³. CPGs are rigorously synthesized and interpreted by expert clinicians and methodologists, and transformed into practice recommendations, providing an overview of the management of a condition or the use of an intervention ⁶⁴⁻⁶⁶. Therefore, they will provide guidance or advice, rather than instructions, and are aids to and not substitutes for clinical judgment ⁶⁷. So, clinicians may use CPGs to answer specific clinical questions arising out of their day-to-day practice ⁶⁴.

Although there are several studies, recommendations and CPGs for knee OA management ^{35,68-77}, professional organizations identified it as a priority, and influential researchers and clinicians argue that health-care practitioners (such as PTs) have an ethical obligation to base their practice on research findings, many still do not use CPGs and do not perform an EBP ⁷⁸. Overall personal, organizational, cultural, social, environmental, historical, educational, political, financial and demographic factors have being suggested as the main causers of this issue ^{46,50}. Specifically for the OA context, it was found as the main barriers ^{79,80}: poor quality evidence; contradictory CPGs recommendations; poor quality in the information transmission; PTs inability to understand statistical data; lack of skills in searching and critically appraise evidence; lack of data generalization for the patient; and not enough explored OA factors, such as economic aspects of recommendations or the patients' co-morbidities influence. Facilitators may include ^{79,81,82}: regular clinical cases and evidence peers discussion; higher quality studies; CPGs concordance; better information reaching with an user-friendly format; CPGs should become patient-focused rather than disease-driven; written in the mother language and for the national context. Additionally, as the profession is relatively new in Portugal (the first PT Portuguese school is from 1966 – Escola Superior de Saúde de Alcoitão ⁸³), currently little is known about EBP in the Portuguese PTs context and the existing research is scarce to fully understand how the enumerated factors behave as a barrier and how to facilitate them.

Due to this EBP knowledge-gap, wide range of OA information and even uncertainty in some therapies, there is an urgent need to develop a clinical practice guideline for the Portuguese PTs. Therefore, the aim of the present thesis is to develop a clinical practice guideline in managing knee OA patients for Portuguese PTs. To accomplish it, this work will gather the best evidence available at the moment regarding non-pharmacological and non-surgical interventions for knee OA, understand if the Portuguese PTs perform an EBP and what are the main facilitators and barriers, gather the PTs' clinical experiences and know-how in managing this patients, and collect the knee OA patients expectations and preferences.

The present thesis is structured according to the Scandinavian model and is divided in six chapters.

The first chapter concerns the introduction related to OA aetiology, incidence, economic impact, diagnosis and interventions. Additionally, the EBP and CPGs terms and associations are covered. This chapter ends with the thesis objectives. The second chapter – entitled “State of the Art” – encompasses two studies (an umbrella review and a systematic review with meta-analysis) and explores the non-pharmacological and non-surgical interventions to manage knee OA patients. The third chapter is entitled “Original Research Manuscripts” and is composed by three original studies aiming to answer the proposed objectives. In the fourth chapter, the “Discussion” chapter, a general and integrated discussion regarding the results of the original studies is presented, as well as its main limitations and perspectives for future research. The fifth chapter (“Conclusion”) encompasses the main conclusions from the obtained results. The sixth and last chapter presents the bibliographic references that support the first and fourth chapters and is called “References”.

Chapter 2 – State of Art

Chapter 2.1 – Non-pharmacological and non-surgical interventions to manage patients with knee osteoarthritis: An umbrella review

Ferreira, R. M., Duarte, J. A., & Gonçalves, R. S. (2018). Non-pharmacological and non-surgical interventions to manage patients with knee osteoarthritis: an umbrella review. *Acta Reumatologica Portuguesa*, 43(3), 182-200.

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Non-pharmacological and non-surgical interventions to manage patients with knee osteoarthritis: an umbrella review

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ABSTRACT

Objective: Update the last known umbrella review and summarize the available high-quality evidence from systematic reviews on the effectiveness of non-pharmacological and non-surgical interventions for patients with knee osteoarthritis (OA).

Methods: The systematic reviews were identified through electronic databases, such as: MEDLINE, Embase, Physiotherapy Evidence Database (PEDro), The Cochrane Library, SciELO, Science Direct, Google Scholar, Research Gate and B-ON. The studies' selection respected the following terms to guide the search strategy using the P (humans with knee osteoarthritis) I (non-pharmacological and non-surgical treatments) C (pharmacological, surgical, placebo, no intervention, or other non-pharmacological/ non-surgical conservative treatments) O (pain, functional status, stiffness, inflammation, quality of life and patient global assessment) model.

Results: Following the PRISMA statement, 41 systematic reviews were found on the electronic databases that could be included in the umbrella review. After methodical analysis (R-AMSTAR), only 35 had sufficient quality to be included. There is gold evidence that Standard Exercise programs can reduce pain and improve physical function in patients with knee OA. Additionally, there is silver evidence for Acupuncture, Aquatic Exercise, Electroacupuncture, Interferential Current, Kinesio Taping, Manual Therapy, Moxibustion, Pulsed Electromagnetic Fields, Tai Chi, Ultrasound, Yoga, and Whole-Body Vibration. For other interventions, the quality of evidence is low or did not show sufficient effi-

cacy from the systematic reviews to support their use.

Conclusion: Comparing to the last known umbrella review, similar results were achieved on Acupuncture and Exercise interventions to improve the patients' pain, stiffness, function and quality of life, but different results were found regarding the utilization of Transcutaneous Electrical Nerve Stimulation and Low-Level Laser Therapy as they do not improved the patients' pain and physical function.

Keywords: Non-pharmacologic; Non-surgical; Knee; Osteoarthritis

INTRODUCTION

Osteoarthritis (OA) is the most common form of arthritis that can affect all the movable joint tissues and is a major contributor to functional and social impairment, disability, reduced independence and poorer quality of life in older adults¹⁻⁹. From all the joints that can be affected by OA the knee is the most prevalent (especially in elderly women), where a third of older adults in the general population show radiological evidence of knee OA¹⁰⁻¹⁶. Moreover, there is an increasing need for attention to this disease due to the societal trends such as ageing, obesity prevalence and joint injury, which are estimated to increase the number of people affected with OA by 50% over the next 20 years^{7,15,17,18}.

Knee OA evolution is highly variable, with the disease improving in some patients, remaining stable in others and gradually worsening in others^{19,20}. Treatment strategies for OA include pharmacological, non-pharmacological, surgical and non-surgical interventions^{7,12,21-28}. However, as the majority of the non-pharmacological and non-surgical interventions are safe, low cost, low tech, incorporate self-management performed at home or in the community and have a substantial public health impact, they are nowadays the

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first step in the knee OA management and play a critical role in its treatment^{7,12,22, 25-29}.

In the last few years, evidence-based practice has become increasingly popular. Evidence-based practice uses the available literature to guide clinical decision making and assess the strength of clinical recommendations^{30,31}. When diagnosing and treating patients, practitioners employ evidence, frequently from systematic reviews of randomized controlled trials (RCTs), to advocate for or against an intervention³⁰. Although systematic reviews summarize the effects of a specific intervention for a specific condition, an umbrella review typically assesses the quality, collate the results and summarizes the evidence providing a wider picture on the research topic³²⁻³⁹. In 2008 Jamtvedt et al.³², published an umbrella review about knee OA, with very useful results and conclusions that increase the knowledge and evidence-based practice, establishing as well a platform for future investigation in this topic. However, it was shown that at least 10% of all systematic reviews need updating at the publication time because of the length of time taken in preparing a systematic review and the accelerated pace of new evidence scientific production⁴⁰. There is, to our knowledge, no available updated umbrella review on the effectiveness of non-pharmacological and non-surgical interventions for knee OA. Therefore, the aim of this umbrella review is to summarize and update the available high-quality evidence from systematic reviews on the effectiveness of non-pharmacological and non-surgical interventions for patients with knee OA.

METHODS

There is, to our knowledge, no widely accepted guideline to conduct an overview³⁹. Therefore, in an attempt to ensure a high-quality study, this overview was conducted following the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines⁴¹.

DATA SOURCES AND SEARCHES

The literature search aimed to identify systematic reviews that evaluated the effect of non-pharmacological and non-surgical treatments for knee OA. Systematic and comprehensive searches were conducted in electronic databases: MEDLINE, Embase, Physiotherapy Evidence Database (PEDro), The Cochrane Library, SciELO, Science Direct, Google Scholar, Research Gate

and B-ON. Papers were accepted only in English and excluded if duplicated. The search begun in May 2017 and finished in August 2017.

The studies' selection respected the following terms to guide the search strategy using the Population (P) (humans with knee osteoarthritis), Intervention (I) (non-pharmacological and non-surgical treatments), Control (C) (pharmacological, surgical, placebo, no intervention, or other non-pharmacological/non-surgical conservative treatments), Outcome (O) (pain, functional status, stiffness, inflammation, quality of life and patient global assessment) model.

The keywords used in the search were: "Knee"; "Osteoarthritis*"; "Gonarthr*". These keywords were identified after preliminary literature searches and by cross-checking them against previous relevant systematic reviews.

An example of an online search strategy draft used in MEDLINE database is presented: (Systematic Review[ptyp]) AND ("2007/01/01" [Pdat] : "2017/05/29"[Pdat]) AND ("humans"[MeSH Terms]) AND (English[lang]) AND (((("Knee"[All Fields]) AND ("Osteoarthritis*"[All Fields])) OR ("Gonarthr*"[All Fields]))

Additional publications that were not found during the original database search were identified through manual searches in the related articles and reviews reference lists.

STUDY SELECTION

In this paper, the two reviewers independently screened the titles and abstracts yielded by the search against the inclusion and exclusion criteria and selected the potential studies. The inclusion and exclusion criteria applied to this review are described in Table I.

The full versions of the systematic reviews that appeared to meet the inclusion criteria or where there was any uncertainty were obtained. As the last known umbrella review was the Jamtvedt et al.³² study, it was chosen to start the search for systematic reviews of non-pharmacological and non-surgical treatments for knee OA published in the electronic databases after January 2007. Furthermore, due to biomechanical and disease relationship, other systematic reviews exploring hip and knee OA were included, only if the results from patients with knee OA could be extracted separately. The reviewers read the full text versions and decided whether they actually meet the inclusion criteria. When insufficient data was presented, the authors were contacted by email in order to request fur-

TABLE I. INCLUSION AND EXCLUSION CRITERIA

Inclusion	Exclusion
The systematic reviews must include:	The systematic reviews cannot include:
at least one of the keywords;	papers with experimental or control group composed by any kind of animal;
papers with an intervention group that has primary knee OA, either clinical or radiological criteria (or a combination);	papers with participants that do not have a knee OA (healthy subjects) or who have secondary knee OA (traumatic or post-surgical);
with or without meta-analysis exclusively from randomized controlled trials after January 2007;	with or without meta-analysis of randomized controlled trials prior to January 2007;
papers with non-pharmacological and non-surgical interventions	papers with exclusively pharmacological or surgical interventions;
peer-reviewed scientific literature journals;	books, non-randomized controlled trials, case reports, expert opinions, conference papers or academic thesis;
papers that evaluate pain or other knee-related symptoms, functional status or quality of life;	papers with subjects with other illnesses namely cancer, heart diseases, kidney diseases, neurological diseases, respiratory diseases, rheumatoid arthritis, gout arthritis, septic arthritis or Paget's disease;
detailed description of the non-pharmacological and non-surgical intervention;	papers with subjects exclusively with osteoarthritis in the hip, foot, shoulder, elbow, wrist and/or fingers.
their full version, in English.	

ther data. In case of study selection disparities, the reviewers reached an agreement through verbal discussion or arbitration.

DATA EXTRACTION AND QUALITY ASSESSMENT

For this review, the authors independently scored the bias of the studies by using the R-AMSTAR (Revised A MeaSurement Tool to Assess systematic Reviews) 11-item questionnaire. In R-AMSTAR each domain's score ranges between 1 (minimum) and 4 (maximum), and the total score has a range of 11 (minimum) to 44 (maximum) that, posteriorly based on the overall score, can translate in A (high quality: 44-33 score), B (moderate quality: 32-23 score), C (low quality: 22-13 score) and D (very low quality: 12-11 score) quality grade⁴². Considering the recommendations that only total scores of 23/44 are considered to have at least moderate methodological quality, it was established as the cutting-point for include a systematic review in this overview⁴².

Furthermore, principles from GRADE (Grading of Recommendations Assessment, Development, and Evaluation) were used for an overall assessment and integration of the strength of the evidence for each intervention^{43,44}. The GRADE concept is based on an assessment of the following criteria: quality of primary

studies, design of primary studies, consistency, and directness. An overall assessment of the quality of evidence was based on a summary of these 4 criteria, as presented in Table II.

DATA SYNTHESSES AND ANALYSIS

The data that was extracted from the selected publications to assess the effectiveness of non-pharmacological and non-surgical interventions included: title, authors' name, year of publication, knee OA conditions, participants' sample size and their characteristics, objectives, description of the interventions, description of the control groups, studies' outcomes, assessment times, studies' results and studies' conclusions. Also, studies were combined using qualitative best evidence synthesis. Considering the broad scope of clinical conditions, it was decided to restrict the work to pain, functional status, stiffness, inflammation, quality of life and patient global assessment⁴⁵.

RESULTS

SELECTION OF THE STUDIES

A set of 2188 records were identified through database

TABLE II. GRADING QUALITY OF EVIDENCE

Level	Criteria
High-quality evidence (A) (Further research is very unlikely to change our confidence in the estimate of effect)	One or more updated, high-quality systematic review that are based on at least 2 high-quality primary studies with consistent results
Moderate-quality evidence (B) (Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate)	One or more updated systematic reviews of high or moderate quality <ul style="list-style-type: none"> • Based on at least 1 high-quality primary study • Based on at least 2 primary studies of moderate quality with consistent results
Low-quality evidence (C) (Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate)	One or more systematic reviews of variable quality <ul style="list-style-type: none"> • Based on primary studies of moderate quality • Based on inconsistent results in the reviews • Based on inconsistent results in primary studies
Very low-quality evidence (D) (Any estimate of effect is very uncertain)	No high-quality systematic review was identified on this topic

searching. After the application of the inclusion and exclusion criteria, 41 articles have emerged⁴⁶⁻⁸⁶. The selection process is summarized Figure 1.

METHODOLOGICAL QUALITY

After the selection of the studies, the reviewers independently applied the R-AMSTAR to evaluate the methodological quality of the 41 selected papers⁴⁶⁻⁸⁶. After this process, they reached an agreement through verbal discussion or arbitration. The percentage of agreement for individual items ranged from 36.4% to 100%. The methodological quality assessment using the R-AMSTAR revealed a mean score of 32.7 (range 18 – 40). At the end, 6 of the systematic reviews^{46,54,57,66,71,81} were excluded because they did not reach 23/44, raising the mean score to 34.9. The classifications obtained are described in Table III.

STUDY CHARACTERISTICS

Overall, the 35 included systematic reviews^{47-53,55,56,58-65,67-70,72-80,82-86} were published from 2007⁴⁸ to 2017^{59,62,80} and were conducted in America (Canada⁶⁴), Asia (China^{49,53,56,60-63,72,77,79,80,84-86}, Japan⁷³⁻⁷⁵, Saudi Arabia⁸³ and South Korea^{70,78}), Europe (Denmark^{47,55}, England^{65,76}, France^{50,67}, Germany⁵⁸, Ireland⁵², Norway⁴⁸ and Switzerland^{68,69}) and Oceania (Australia^{51,59,82}).

The total RCTs included in the systematic reviews were 571, with an average of 16.3±14.41 studies (maximum=60⁷⁶; minimum=4^{52,60}) per systematic review. Overall, 52,152 subjects were enrolled in the system-

atic reviews, with an average of 1,490.06± 1,797.11 (maximum=8,218⁷⁶; minimum=165⁸³) per systematic review and 82.08±47.2 per RCT. In the studies, several non-pharmacological and non-surgical treatments were found (Figure 2).

Supplementary file Table IV provides a summary of the included systematic reviews characteristics.

DISCUSSION

The discussion will be presented according to the interventions of the selected systematic reviews.

PHYSICAL ACTIVITY

The physical component of 4 different activities were investigated, such as Aquatic Exercise, Standard Exercise, Tai Chi and Yoga.

Aquatic Exercise was only investigated in one study⁴⁷. According to the authors⁴⁷ this type of exercise decreases pain and disability, and increases quality of life. However, this was only found in short-term follow-up (12 weeks), but it could not be confirmed in long-term. Additionally, this data was gathered in knee and hip OA and only moderate-evidence can support these statements.

Regarding land type Standard Exercise, it was explored in 10 systematic reviews^{50,51,55,63,67,73-76,82}. High-evidence shows that Standard Exercise programs are effective in pain and stiffness reduction and in increa-

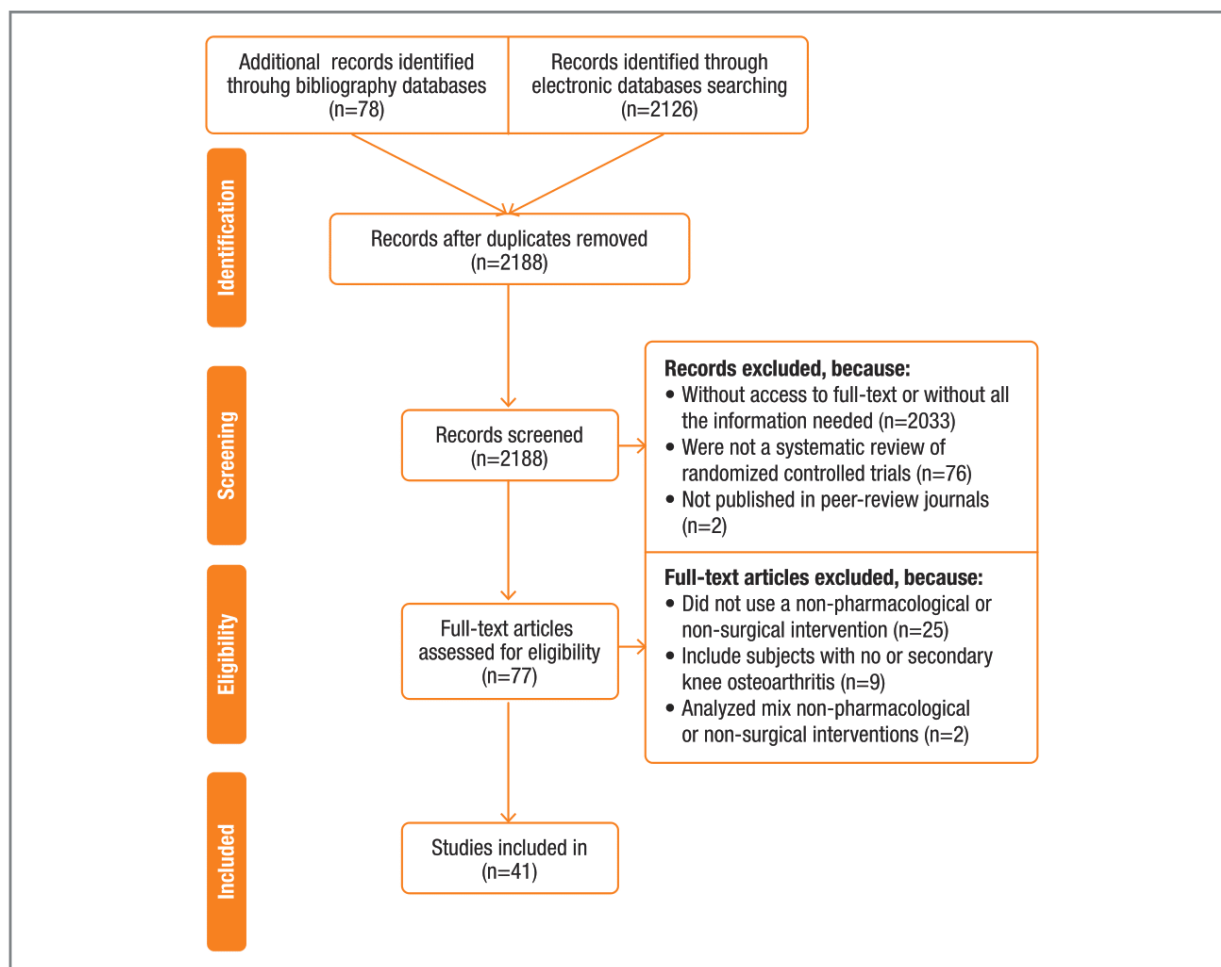


FIGURE 1. Results of the inclusion and exclusion criteria (flow diagram applied in this umbrella review)

sing function and quality of life^{51,55,63,74-76,82}. Also, pain and disability reduction were found in moderate-quality evidence^{50,73}. All types of Standard Exercise programs (aerobic, strengthening or resistance) were found to be beneficial in patients with knee OA. However, there are still some doubts between the low and high-intensity training. Li et al.⁶³ concluded from high-evidence that high-intensity training program was more effective than the low-intensity training, Regnaud et al.⁶⁷ found no differences between low and high-intensity training programs from low to very low-evidence and Zacharias et al.⁸² have shown that both were beneficial to this type of population, however there was high-evidence to support the low-intensity training program and low to moderate-evidence to support the high-intensity training program.

There was only one study⁵⁸ that explored the repeated practice of Tai Chi as a method to treat patients with knee OA. Lauche et al.⁵⁸ perceived, from moderate-evidence, that Tai Chi practice could decrease pain and stiffness, and increase function in these patients, with the best results reached in patients that were intervened at least 2 times/week, 30 or more min/session. Similarly, Kan et al.⁵⁶ analyzed the effectiveness of Yoga regular practice to treat these patients and saw positive effects on pain and mobility, for the most common Yoga protocols (40-90 min/session, every day during at least 8 weeks).

Overall, Activities can be recommended to patients with knee OA, especially aerobic, resistance, strengthening or combined programs to improve pain, stiffness, function and quality of life, regardless of the patient's

TABLE III. METHODOLOGICAL QUALITY OF ELIGIBLE STUDIES (N = 41)

Study (A to Z; Year)	R-AMSTAR Items											R-AMSTAR Score (11 – 44)	GRADE (A – D)
	1	2	3	4	5	6	7	8	9	10	11		
Bjordal et al. (48)	4	1	3	3	3	4	1	2	4	4	3	32	C
Lange et al. (57)	2	1	3	2	1	1	1	1	4	1	1	18	
Rutjes et al. (69)	4	4	4	2	3	4	4	4	4	4	3	40	A
Rutjes et al. (68)	4	4	4	2	3	4	4	4	4	4	3	40	A
French et al. (52)	3	1	4	1	3	4	3	3	1	1	1	25	B
Cao et al. (49)	2	4	4	3	3	4	4	4	4	4	1	37	B
Silva et al. (71)	2	2	2	3	1	4	4	1	1	1	1	22	
Lauche et al. (58)	4	4	4	2	4	4	4	4	2	2	3	37	B
Negm et al. (64)	4	2	4	2	3	4	2	2	4	4	3	34	D
Parkes et al. (65)	2	2	3	2	3	4	4	3	4	4	3	34	B
Tanaka et al. (73)	4	4	1	1	1	4	4	4	4	4	3	34	A
Uthman et al. (76)	3	4	4	3	3	1	3	1	4	4	1	31	B
We et al. (78)	1	4	4	2	3	4	4	4	4	4	1	35	A
Juhl et al. (55)	3	1	4	2	3	4	4	4	4	4	1	34	A
Quintrec et al. (66)	1	1	3	2	1	4	1	1	1	1	2	18	
Tanaka et al. (74)	2	4	4	3	1	4	3	2	4	4	1	32	A
Ye et al. (81)	3	2	4	2	1	4	2	1	1	1	1	22	
Zacharias et al. (82)	3	4	3	2	4	4	4	4	4	4	2	38	A
Zeng et al. (84)	2	4	4	2	3	4	2	2	4	4	2	33	B
Anwer et al. (46)	2	2	3	1	1	4	1	1	1	1	3	20	
Fransen et al. (51)	4	4	4	2	3	4	4	4	4	4	3	40	A
Huang et al. (53)	3	2	3	2	3	4	3	2	4	4	2	32	B
Li et al. (61)	3	4	4	3	3	4	4	4	4	4	3	40	A
Regnaud et al. (67)	4	4	4	2	3	4	4	4	4	4	3	40	D
Tanaka et al. (75)	3	2	4	2	3	4	4	1	4	4	1	32	B
Wang et al. (77)	3	2	4	2	3	4	4	2	4	4	3	35	B
Zafar et al. (83)	2	4	2	2	4	4	4	3	4	4	1	34	B
Zeng et al. (85)	3	4	4	2	2	4	4	3	4	4	3	37	B
Zhang et al. (86)	3	4	4	3	3	4	3	3	4	4	3	38	B
Bartels et al. (47)	4	4	4	2	3	4	4	4	4	4	3	40	B
Coudeyre et al. (50)	3	2	2	2	3	4	3	2	4	4	3	32	B
Kan et al. (56)	3	4	2	2	3	4	3	1	1	1	2	26	B
Li et al. (60)	2	4	2	2	3	4	4	2	4	4	2	33	B
Li et al. (63)	3	4	2	2	3	4	3	3	4	4	3	35	A
Shim et al. (70)	4	4	3	3	3	4	4	4	4	4	1	38	B
Song et al. (72)	4	4	4	4	3	4	4	2	4	4	1	38	B
Xiang et al. (79)	3	3	3	2	3	3	3	1	4	4	1	30	A
Jorge et al. (54)	2	1	2	3	3	4	1	2	1	1	1	21	
Lee et al. (59)	4	1	3	4	3	4	4	2	4	4	3	36	C
Li et al. (62)	4	4	3	1	3	4	4	4	4	4	1	36	B
Xu et al. (80)	2	1	4	4	3	4	3	2	4	4	1	32	B
Average	3	3	3.3	2.3	2.7	3.8	3.2	2.6	3.4	3.4	2	32.7	B

Physical Activity
Aquatic Exercise (47)
Standard Exercise (50, 51, 55, 63, 67, 73-76, 82)
Tai Chi (58)
Yoga (56)
Acupuncture (49)
Clinical Devices
Cupping Therapy (59)
Electrotherapy (85)
Electroacupuncture (70)
Pulsed Electromagnet Fields (64, 78)
Transcutaneous Electrical Nerve Stimulation (69)
Insoles (65)
Low-Level Laser Therapy (53)
Mudpack Therapy (79)
Ultrasound (68, 84, 86)
Whole-Body Vibration (61, 77, 83)
Manual Therapy (52, 80)
Moxibustion (60, 72)
Multimodal (48)
Kinesio Taping (62)

FIGURE 2. The non-pharmacological and non-surgical interventions (n=35)

age, sex, BMI, radiographic status or baseline. This could be explained by the initial neuromuscular response in an attempt to adapt to that specific exercise, usually followed by muscular hypertrophy. Also, the general feeling of well-being, reduced pain and greater ability to perform tasks could be due to the gait control mechanisms or to the central release of endorphins. Definitive conclusion on the best exercise program could not be achieved, because of the lack of differences among several exercise interventions and the small number of included studies. Nevertheless, the studies' evidence pointed out more frequently that, among all, low-intensity isokinetic (concentric-eccentric) muscular strengthening exercises (with special focus in the knee extensor muscles), done 3 or more times/week, with at least 12 supervised sessions, could lead to faster and long lasting results. Aquatic Exercise, Tai Chi and Yoga, despite showing some impact on the knee OA patients' life, cannot be fully recommended because the evidence gathered was of moderate-quality data and from one systematic review from each method of treatment. Therefore, for the treatments mentioned before

there is the need to have more evidence (especially of high-quality).

ACUPUNCTURE

From the Cao et al.⁴⁹ systematic review and based on its high-quality evidence, pain and function can improve with needle Acupuncture in patients with knee OA. However, his recommendation cannot be fully achieved because the RCTs analyzed in the systematic review used different acupuncture points and different protocols for treating these patients. Yet, generally the best results were achieved following acupuncture points based on the Traditional Chinese Medicine meridian theory to treat the knee joint, known as the "Bi" syndrome. These points consisted of 4 local points (Yanglinquan [gall bladder 34], Yinlinquan [spleen 9], Zhusanli [stomach 36], Dubi [stomach 35]) and 4 distal points (Kunlun [urinary-bladder 60], Xuanzhong [gall bladder 39], Sanyinjiao [spleen 6], and Taixi [kidney 3]), done at least 2 times/week, 2 h/session. Yet, apart from being an invasive treatment and the lack of standardization showed, it is imprudent to recommend its use based on just one systematic review. Consequently, it is necessary to develop further high quality systematic reviews that assess this intervention.

CLINICAL DEVICES

Cupping Therapy, Electrotherapy, Insoles, Low-Level Laser Therapy, Mudpack Therapy, Ultrasound and Whole-Body Vibration were the different interventions approached in the included systematic reviews.

The Cupping Therapy was only investigated in one study⁵⁹. Although improvements in pain and physical function on patients with knee OA were found, namely using a protocol of 10-20 min/session, 3-5 times/week, this was only supported by weak-quality evidence. Thus, to recommend its use, further research (of high-quality) is needed to cease any uncertainty that this intervention raised.

Electrotherapy was explored in 5 systematic reviews^{64,69,70,78,85}. Shim et al.⁷⁰ studied the effects of Electroacupuncture in patients with knee OA and saw improvements in pain and quality of life from moderate-quality evidence. However, the Electroacupuncture protocols used in the RCTs varied and comparing with sham Electroacupuncture the results were less significant. Hence, despite the good results in patients with knee OA, its recommendation has to be carefully taken, because they were reached mainly in moderate-quality RCTs, and they were less significant

when comparing with sham Electroacupuncture. Also this intervention is invasive, leading to need to redouble care. So, further investigation on this intervention is needed to increase the quality of RCTs and try to build a standard protocol of treatment. Another paper⁶⁹ studied the effectiveness of Transcutaneous Nerve Stimulation in knee OA individuals and it could not be confirmed that this intervention is beneficial in pain reduction. This conclusion has been reached because only small trials of questionable-quality were included. As this was an A (R-AMSTAR – 40) conducted-quality systematic review, we agree on the authors' conclusions and cannot confirm their fully recommendations. Zeng et al.⁸⁵ not only reached the same conclusion regarding the use of Transcutaneous Nerve Stimulation, but also found similar results in the use of Neuromuscular Electrical Stimulation, Noninvasive Interactive Neurostimulation and Pulsed Electromagnetic Fields. The only Electrotherapy that this systematic review group fully recommended, due to the high-quality RCTs support, is the Interferential Current, where the greatest significant differences comparing with the control group were found. From all Interferential Current protocols, the most promising were those that used 100Hz during 20 min, for 3-5 sessions/week, through 4 weeks. However, Negm et al.⁶⁴ and We et al.⁷⁸ did not agree with the previous author's results regarding the utilization of Pulsed Electromagnetic Fields. Negm et al.⁶⁴ found, from low to very-low quality RCTs, positive results on knee OA patient's physical function but not on pain. Alternatively, We et al.⁷⁸ confirms from high-quality RCTs, not only the increase in the patients' physical function but also in pain. Therefore, the use of Pulsed Electromagnetic Fields in this population is still uncertain though, tendentially, this intervention has shown to be a useful therapy (especially using a frequency of 5-12Hz for 30 min, during at least 3 weeks) based on the most recent high quality systematic reviews and larger RCTs.

Regarding the use of Insoles, it has only been studied by Parkes et al.⁶⁵. Although the overview of all studies showed a statistically significant difference between the use of Lateral Wedges and decreased pain in medial knee OA, when comparing these insoles with neutral insoles no statistical significant or clinically important association were established. Thus, with these B (R-AMSTAR – 34) quality findings, the use of Lateral Wedges for these patients cannot be supported. Similarly, Low-Level Laser Therapy was only studied by one group⁵³ which reached the conclusion, by analyzing

high-quality RCTs, that this therapy did not improve pain or function in patients with knee OA. Therefore, following this B (R-AMSTAR – 32) quality conducted systematic review, the use of this therapy cannot be recommended. Similarly, only Xiang et al.⁷⁹ studied the impact of Mudpack Therapy in patients with knee OA and did not find statistical significant differences between the several experimental and control groups in the functional and pain outcomes. So, it does not exist sufficient support to recommend the use of Mudpack Therapy in this population.

The effectiveness of Ultrasound in patients with knee OA was evaluated in 3 systematic reviews^{68,84,86}. Apparently, the continuous and, even more, the pulsed Ultrasound modes (especially the 1MHz, 2.5 W/cm², 15 min/session, 3 session/week, during 8 weeks protocol) can be effective in the patients' pain and physical function. The raised hypothesis for this positive results is the chondrocyte proliferation and matrix production in human articular cartilage. However, these findings are only supported by moderate to low quality RCTs. So, due to the quality of the RCTs, some prudence is still necessary to recommend its utilization in patients with knee OA. The performance of new high-quality RCTs is also warranted, in order to support the use of ultrasound in these patients.

Finally, the Whole-Body Vibration therapy was explored by Li et al.⁶¹, Wang et al.⁷⁷ and Zafar et al.⁸³, that obtained very disperse results. Whole-body vibration exercises are a strength type exercises that uses vibrations generated by a vibrating platform, in order to stimulate muscles and tendons, by the contact of the human body with the vibrating surfaces^{61,83}. Li et al.⁶¹ saw that Whole-Body Vibration was not different comparing with other forms of exercises in pain, strength and self-reported status. Curiously, when added to squat exercise (namely 20 min session consisting in 6 to 9 reps per session of non-weight bearing squat, 3 sec of isometric at 60° knee flexion and 3 sec of isometric flexion at 10°; plus the vibration plate with frequency of 35 to 40Hz, 20 to 70 s, amplitude of 4 mm, and acceleration that ranged from 2.78 to 3.26G – 3 times per week) it was more efficacious when compared with squat exercises alone, implying that this machine/exercise can be a good complement to more usual and well established exercises. Although Zafar et al.⁸³ also reached the conclusion that this exercise can be beneficial to the patients' pain and function, Wang et al.⁷⁷ only observed positive effects in function, but not in pain, raising more questions than answers regarding

this recent and not well known topic. Thus, besides being safe (only requires the person to be over the vibrating plate) and a good supplement to exercise (especially, in increasing function), there is still some uncertainty about the true influence of this machine on the patients with knee OA.

Overall, as explored above, there is some uncertainty about the effect of clinical devices. It seems that the best clinical devices used to manage knee OA patients are Electroacupuncture, Interferential Current, Pulsed Electromagnetic Fields, Ultrasound and Whole-Body Vibration. On the other hand, Transcutaneous Nerve Stimulation, Neuromuscular Electrical Stimulation, Noninvasive Interactive Neurostimulation, Insoles, Low-Level Laser Therapy and Mudpack Therapy either did not show sufficient efficacy, or did not gather enough high-quality RCTs support, or even did not reach homogeneous results and cannot be recommended.

MANUAL THERAPY

From the available systematic reviews^{52,80} based on moderate-quality evidence, Manual Therapy can be recommended to treat patients with knee OA, because it can improve the pain, stiffness and physical function. But, once again, the protocols used and the interventions varied a lot: Swedish Massage, usual Mobilization, Maitland, Acupressure, Tui Na, Shi Manipulation, usual Manipulation and Myofascial Mobilization. This could be due to the experience of the treatment provider and the individual clinical presentation, where usually the intervener tries to adapt his treatment (type of intervention, dosage, force, amplitude, rate, repetition and duration) according to the patient's case and severity. Nevertheless, the intervention that has shown more consistent positive results was Massage (one of the most widely used intervention in this type of population). Yet, since most measure instruments are self-reported and subjective, sometimes a single touch on the patient may induce him or her to report better results. Therefore, a placebo effect cannot be ruled out. Consequently, although Manual Therapy is a safe and economic way to treat patients with knee OA, more high-quality RCTs and a better exploration of their methods are needed, in an attempt to bring up more standard protocols and improve its recommendation.

MOXIBUSTION

Moxibustion treatments were analyzed in two systematic reviews^{60,72}. Both showed that the Moxibustion intervention was superior to control and sham Moxibus-

tion in quality of life, pain and physical function. The mechanisms that can explain this positive effects might be the generated heat and the stimulation of some specific acupoints that: 1) acts through the local system neural network and releases some neurotransmission, such as opioidergics, β -endorphins, and adenosine triphosphate; 2) modulates the inflammatory reactions through the degranulation of local mastocytes and activation of thermoreceptors; 3) this enhanced activation of the thermoreceptors could also lead to a decrease of the nociceptive painful transmission. The acupoints that were more commonly used and that obtained positive results more often were similar to those used in the acupuncture interventions, such as the gall bladder 34, spleen 9 and 10, stomach 34, 35 and 36, and the 2, 4 and 5 extra lower extremity points, done at least 3 times/week, 15-20 min/session. With the moderate to high-quality evidence gathered in these systematic reviews, it seems that Moxibustion can be a relatively safe intervention (only skin flushing was observed, however it disappeared within 3 days) and a viable alternative to usual care on the knee OA patients' health management.

KINESIO TAPING

A recent systematic review, conducted by Li et al.⁶² evaluated the effects of the elastic therapeutic bandages in patients with knee OA. In this systematic review, based in moderate-quality data, it was found improvements in pain, flexibility, proprioception and knee-related health status. However, identical results were achieved in strength between the experimental and the control group were found. The included RCTs had different experimental protocols, such as the type of cut (I-strip, Y-strip or the combination of several strips), direction (center extremities or extremities center), patient preparation (some placed the knee in full flexion, others the knee in semi-flexion; some paid attention to the presence of sweat and hair removing, others did not) and tension (from 10 to 75%) of the Kinesio Tape. However, the results obtained were, in general, similar. This may indicate that it is not the application that counts, but rather the effect that the Kinesio Tape can induce in patients. Since Kinesio Tape fibers are manufactured with a wave-like pattern, convolutions will appear after the recoil, creating more space between the tissues and providing a tactile input through the skin, stimulating type 2 cutaneous mechanoreceptors. This may result in an improved fluid exchange, muscle function re-education and pain reduction. Although

to recommend its use, some precautions are needed because this conclusion is based on just one study with medium-quality RCTs. Therefore, more information needs to be gathered for recommending its use.

MULTIMODAL

Usually, physiotherapy interventions are multimodal, where a great variety of interventions, especially non-surgical and non-pharmacological are used. Bjordal et al.⁴⁸ analyzed the effectiveness of different treatments in knee OA patients. In this systematic review, Bjordal and his group reached the conclusion that the best treatments to these patients are the Transcutaneous Electrical Nerve Stimulation, Electroacupuncture and Low-Level Laser Therapy. On the other hand, Manual Acupuncture, Pulsed Electromagnetic Field and Static Magnets did not show significant statistical differences compared to the control groups. Conversely, these conclusions were only supported by this umbrella review in the Electroacupuncture intervention. Regarding the Transcutaneous Nerve Stimulation, Low-Level Laser Therapy and Pulsed Electromagnetic Field, the results we found were exactly the opposite, maybe due to the higher amount of information gathered with this type of study.

CONCLUSION

In conclusion, based on the included systematic reviews, there is good evidence that Standard Exercise programs can reduce pain and improve physical function in patients with knee OA. Additionally, there is moderate evidence that Acupuncture, Aquatic Exercise, Electroacupuncture, Interferential Current, Kinesio Taping, Manual Therapy, Moxibustion, Pulsed Electromagnetic Fields, Tai Chi, Ultrasound, Yoga and Whole-Body Vibration (more as a complement of exercise than a single intervention) are effective in the respective evaluated outcomes. For other interventions, the quality of evidence is low or does not show sufficient efficacy from the systematic reviews to support its use. Furthermore, comparing to Jamtvedt et al.³² umbrella review, we confirmed the worthy use of Acupuncture and Exercise but, according to our selected systematic reviews, we found different results regarding the use Transcutaneous Electrical Nerve Stimulation and Low-Level Laser Therapy to reduce the patients' pain and improve physical function. Additionally, there is an urgent need to develop new high-

-quality RCTs and systematic reviews to satisfy the raised uncertainties.

The study had the limitation of only accepted RCTs in English. If the search had been done in other languages, more studies (possibility of high quality) and more interventions probability could have been included, helping in overview of the study aim.

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SUPPLEMENTARY FILE TABLE IV. SYSTEMATIC REVIEWS SUMMARIES (N=35)

Interventions Activities (physical)	Authors (A to Z; year)	Objectives	N° of included RCTs (subjects)	Results/Conclusions
Aquatic Exercise	Bartels et al. (47)	To evaluate the effects of aquatic exercise for people with knee or hip OA, or both, compared to no intervention.	13 (n=1190)	Based upon moderate quality evidence, aquatic exercise has beneficial effects on knee OA people. A small but clinically relevant decrease in pain and disability, and small but clinically relevant increase in QOL. There is a small short-term effect on the knee OA people at the end of an aquatic training program. The long-term effect is unclear due to the paucity of studies.
Standard Exercise	Tanaka et al. (73)	To investigate the differences in the efficacies between strengthening and aerobic exercises for pain relief in knee OA patients.	8 (n=466)	Moderate-evidence show that muscle strengthening exercises with or without weight-bearing and aerobic exercises are effective for pain relief in knee OA people. In particular, for pain relief by short-term exercise intervention, the most effective exercise is non-weight-bearing strengthening exercise.
	Urhman et al. (76)	To determine if exercise interventions are more effective than no exercise control and to compare the effectiveness of different exercise interventions in relieving pain and improving function in lower limb OA patients.	60 (n=8218)	Significant benefits of exercise over no exercise in OA patients were showed. An approach combining exercises to increase strength, flexibility and aerobic capacity is likely to be most effective in the management of lower limb OA.
	Juhl et al. (55)	To identify the optimal exercise program, characterized by type and intensity of exercise, length of program, duration of individual supervised sessions, and number of sessions per week, for reducing pain and patient-reported disability in knee OA.	48 (n=4028)	All exercise (aerobic, resistance, performance and mixed) types are beneficial in reducing pain in knee OA patients. Therefore, optimal exercise programs for knee OA should focus on improving aerobic capacity, quadriceps muscle strength and lower extremity performance. For best results, the program should be supervised and carried out 3 x per week.

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TABLE IV. CONTINUATION

Interventions	Authors (A to Z; year)	Objectives	N° of included RCTs (subjects)	Results/Conclusions
	Tanaka et al. (74)	To investigate the influence of land-based exercise frequency and duration on pain relief for knee OA people.	17 (n=1816)	Although the effect size did not increase over the time, continuous strengthening exercise or aerobic exercise intervention (especially $\geq 4x$ per week) had a significant effect on knee pain of knee OA people after 9 weeks.
	Zacharias et al. (82)	To analyze the effect of exercise-based rehabilitation programs for improving lower limb muscle strength in hip or knee OA individuals.	40 (n=3989)	Both exercises (high and low-intensity) interventions at short-term follow-up are beneficial for strength outcomes in knee OA patients in comparison to a control program. However high-intensity resistance exercise showed low to moderate levels of quality of evidence for greater and more sustained benefits.
	Fransen et al. (51)	To determine whether land-based therapeutic exercise is beneficial for knee OA people in terms of reduced joint pain or improved physical function and QOL.	54 (n=6345)	High-quality evidence indicates that land-based therapeutic exercise provides short-term benefit that is sustained for at least 2 to 6 months after cessation of formal treatment in terms of reduced knee pain and moderate-quality evidence shows improvement in physical function and QOL among knee OA people.
	Regnaud et al. (67)	To determine the benefits and harms of high versus low-intensity physical activity or exercise programs in hip or knee OA people.	6 (n=656)	It was found very low-quality to low-quality evidence for no important clinical benefit of high-intensity compared to low-intensity exercise programs in improving pain and physical function in the short term.
	Tanaka et al. (75)	To examine the effects of exercise therapy on the health-related QOL of knee OA people.	12 (n=1239)	Regardless of its type, high to moderate-quality showed that exercise therapy can improve health-related QOL in knee OA patients.
	Coudeyre et al. (50)	To assess the rehabilitation framework of isokinetic muscle strengthening for knee OA.	9 (n=696)	Moderate-evidence shows that isokinetic muscle strengthening is an effective way to propose dynamic muscle strengthening for knee OA rehabilitation and has a significant effect on pain and disability.
	Li et al. (63)	To analyze the effectiveness of resistance exercise in the treatment of knee OA on pain, stiffness, and physical function.	17 (n=1705)	High-quality evidence shows that both high intensity and low intensity resistance exercise are beneficial in terms of reducing pain, alleviating stiffness and improving physical function in knee OA patients. However, a high intensity program showed to be more effective than a low intensity program.

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TABLE IV. CONTINUATION

Interventions	Authors (A to Z; year)	Objectives	N° of included RCTs (subjects)	Results/Conclusions
Tai Chi	Lauche et al. (58)	To analyze the effectiveness of Tai Chi for knee OA.	5 (n=252)	Moderate-evidence for short-term improvement of pain, physical function and stiffness in knee OA patients practicing Tai Chi.
Yoga	Kan et al. (56)	To assess the effects of yoga on pain, mobility and QOL in knee OA patients.	9 (n=372)	Moderate-evidence shows that yoga might have positive effects in relieving pain and mobility on knee OA patients, but the effects on QOL are unclear.
Acupuncture				
	Cao et al. (49)	To evaluate the efficacy of treatment with acupuncture for knee OA.	14 (n=3835)	Moderate to high-quality evidence shows that acupuncture provides a significantly better relief from knee OA pain and a larger improvement in function than sham acupuncture, standard care treatment, or waiting for further treatment.
Clinical Devices				
Cupping Therapy	Lee et al. (59)	To evaluate the available evidence from RCTs of cupping therapy for treating knee OA patients.	7 (n=661)	Only weak evidence can support the hypothesis that cupping therapy can effectively improve the treatment efficacy and physical function in knee OA patients.
Electrotherapy	Zeng et al. (85)	To investigate the efficacy of different electrical stimulation therapies in pain relief knee OA patients.	27 (n=1249)	IFC seems to be the most promising pain relief treatment for the management of knee OA. Although the recommendation level of the other electrical stimulations therapies is either uncertain (high-frequency TENS) or not appropriate (low- frequency TENS, NMES, PES and NIN) for pain relief, it is likely that none of the interventions is dangerous.
Electroacupuncture				
	Shim et al. (70)	To verify the effects of electroacupuncture treatment on knee OA	31 (n=3187)	Moderate to low-quality evidence shows that electroacupuncture treatment can more significantly improve pain and QOL of knee OA patients than control interventions. However, comparing with sham electroacupuncture, the difference in pain was less significant.

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TABLE IV. CONTINUATION

Interventions	Authors (A to Z, year)	Objectives	N° of included RCTs (subjects)	Results/Conclusions
PEMF	Negm et al. (64)	To determine if low frequency pulsed sensory threshold electrical stimulation produced either through PEMF or PES vs sham PEMF/PES intervention is effective in improving pain and physical function at treatment completion in knee OA adults blinded to treatment.	7 (n=459)	Current evidence of low and very low-quality suggests that low frequency (≤ 100 Hz) pulsed sensory threshold electrical stimulation produced either through PEMF/PES vs sham PEMF/PES is effective in improving physical function but not pain intensity at treatment completion in adults with knee OA blinded to treatment.
	We et al. (78)	To determine the efficacy of PEMF compared with a placebo in knee OA patients.	14 (n=482)	High-quality evidence supports PEMF efficacy in the management of knee OA pain and function.
TENS	Rutjes et al. (69)	To compare TENS with sham or no specific intervention in terms of effects on pain and withdrawals due to adverse events in knee OA patients.	18 (n=813)	It could not be confirmed that TENS is effective for pain relief. The systematic review is inconclusive, hampered by the inclusion of only small trials of questionable quality.
Insoles	Parkes et al. (65)	To evaluate whether lateral wedge insoles reduce pain in medial knee OA patients compared with an appropriate control.	12 (n=885)	Although meta-analytic pooling of all studies showed a statistically significant association between use of lateral wedges and lower pain in medial knee OA, restriction of studies to those using a neutral insole comparator did not show a significant or clinically important association. These findings do not support the use of lateral wedges for this indication.
LLLT	Huang et al. (53)	To investigate the efficacy of LLLT treatment of knee OA.	9 (n=518)	The best available current evidence does not show neither early nor later benefits in reducing pain or improving function, not supporting the use of LLLT as a therapy for knee OA patients.
Mudpack Therapy	Xiang et al. (79)	To evaluate the clinical efficacy of mudpack therapy for the knee OA treatment and identify the likely factors associated with the high heterogeneity of combined studies.	10 (n=1010)	Functional and pain improvements in knee OA patients treated with mudpack therapy was not significantly different from the control subjects at the end of the 4- months follow-up.
US	Rutjes et al. (68)	To compare therapeutic US with sham or no specific intervention in terms of effects on pain and function safety outcomes in knee or hip OA patients.	5 (n=341)	Therapeutic US may be beneficial for patients with OA of the knee. Because of the low quality of the evidence, there is uncertainty about the magnitude of the effects on pain relief and function.

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TABLE IV. CONTINUATION

Interventions	Authors (A to Z, year)	Objectives	N° of included RCTs (subjects)	Results/Conclusions
	Zeng et al. (84)	To investigate the efficacy of continuous and pulsed US in the management of knee OA.	12 (n=814)	Moderate-quality shows that pulsed US has a greater probability of being the preferred mode, as it is more effective in both pain relief and function improvement when compared with the control group. However, continuous US could only be considered as a pain relief treatment in the management of knee OA.
	Zhang et al. (86)	To explore the effects of therapeutic US with sham or no intervention on pain, physical function and safety outcomes in knee OA patients.	10 (n=645)	Both continuous and pulsed therapeutic US modes can be beneficial for reducing knee pain and improving physical functions in knee OA patients, however it has small significant differences.
WBV	Li et al. (61)	To assess the effects of WBV exercise on knee OA patients.	5 (n=168)	No differences were found in decreasing pain intensity or improving self-reported status, in addition to muscle strength enhancement compared with other forms of exercise. However, WBV combined with squat exercise was more efficacious than squat exercise alone in increasing the level of functional performance.
	Wang et al. (77)	To assess the effects of WBV for pain, stiffness and physical functions in knee OA patients.	5 (n=170)	Eight-week and 12-week WBV are beneficial for improving physical functions in knee OA patients, but not in reducing pain.
	Zafar et al. (83)	To examine the current evidence regarding the effects of WBV in knee OA individuals.	5 (n=165)	WBV has demonstrated limited but beneficial therapeutic effects in knee OA individuals in pain and function.
Manual Therapy				
	French et al. (52)	To determine if manual therapy improves pain and/or physical function in hip or knee OA people.	4 (n=280)	There is silver level evidence that manual therapy has a beneficial effect compared with exercise therapy, both in the short and long-term for pain reduction and increased physical function. But manual therapy, in the form of massage therapy, is effective compared to no intervention in knee OA.
	Xu et al. (80)	To evaluate the effectiveness and adverse events of manual therapy compared to other treatments for relieving pain, stiffness and physical dysfunction in knee OA patients.	14 (n=841)	Moderate-quality evidence shows that manual therapy might be an effective and safe treatment for improving pain, stiffness and physical function in knee OA patients.

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TABLE IV. CONTINUATION

Interventions	Authors (A to Z, year)	Objectives	N° of included RCTs (subjects)	Results/Conclusions
Moxibustion				
	Li et al. (60)	To determine whether the administration of moxibustion is an effective treatment for knee OA.	4 (n=746)	Limited evidence shows that moxibustion treatment has small significant differences comparing to control on managing the symptoms and improving the QOL among the selected knee OA patients.
	Song et al. (72)	To critically reassess the effects of moxibustion on knee OA	13 (n=1309)	Moxibustion treatment is superior to usual care and sham moxibustion in pain, QOL and physical function. But the effects of moxibustion on target population are nearly equal to oral drug and intra-articular injection, however with less secondary effects.
Multimodal				
	Bjordal et al. (48)	To assess the efficacy of common non-pharmacological interventions for knee OA.	36 (n=2434)	TENS, electroacupuncture and LLLT administered with optimal doses in an intensive 2–4 weeks treatment regimen seem to offer clinically relevant short-term pain relief for knee OA. Manual acupuncture, PEMF, US and static magnets did not show sufficient clinical significant evidence to recommend their use.
Kinesio Taping				
	Li et al. (62)	To assess the effects of elastic taping on knee OA patients.	11 (n=168)	Significant improvements were found in self-reported pain during activity, knee flexibility, knee-related health status and proprioceptive sensibility compared with other forms of treatments. However, no differences were found between the Kinesio Taping group and control group for knee muscle strength.

Abbreviations: IFC (Interferential Current); LLLT (Low-Level Laser Therapy); NIN (Noninvasive Interactive Neurostimulation); NMES (NeuroMuscular Electrical Stimulation); OA (Osteoarthritis); PEMF (Pulsed Electromagnetic Fields); PES (Pulsed Electrical Stimulation); QOL (Quality of Life); TENS (Transcutaneous Electrical Nerve Stimulation); US (Ultrasound); WBV (Whole Body Vibration).

Chapter 2.2 – Non-pharmacological and non-surgical interventions for knee osteoarthritis: A systematic review and meta-analysis

Ferreira, R. M., Torres, R.T., Duarte, J. A., & Gonçalves, R. S (2019). Non-pharmacological and non-surgical interventions for knee osteoarthritis: a systematic review and meta-analysis. *Acta Reumatologica Portuguesa*, 44(3), 173-217.

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Non-pharmacological and non-surgical interventions for knee osteoarthritis: a systematic review and meta-analysis

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ABSTRACT

Objective: The aim of the present systematic review and meta-analysis is to know, based on the available randomized controlled trials (RCTs), if the non-surgical and non-pharmacological interventions commonly used for knee osteoarthritis (OA) patients are effective and which are the most effective ones.

Material and Methods: RCTs were identified through electronic databases respecting the following terms to guide the search strategy: PICO (Patients – Humans with knee OA; Intervention – Non-surgical and non-pharmacological interventions; Comparison – Pharmacological, surgical, placebo, no intervention, or other non-pharmacological/non-surgical interventions; Outcomes – Pain, physical function and patient global assessment). The methodological quality of the selected publications was evaluated using the PEDro and GRADE scales. Additionally, a meta-analysis was performed using the RevMan. Only studies with similar control group, population characteristics, outcomes, instruments and follow-up, were compared in each analysis.

Results: Initially, 52 RCTs emerge however, after methodological analysis, only 39 had sufficient quality to be included. From those, only 5 studies meet the meta-analysis criteria. Exercise (especially resistance training) had the best positive effects on knee OA patients. Pulsed Electromagnetic Fields and Moxibustion showed to be the most promising interventions from the others. Balance Training, Diet, Diathermy, Hydrotherapy, High Level Laser Therapy, Interferential Current, Mudpack, Neuromuscular Electrical Stimula-

tion, Musculoskeletal Manipulations, Shock Wave Therapy, Focal Muscle Vibration, stood out, however more studies are needed to fully recommend their use. Other interventions did not show to be effective or the results obtained were heterogeneous.

Conclusions: Exercise is the best intervention for knee OA patients. Pulsed Electromagnetic Fields and Moxibustion showed to be the most promising interventions from the others options available.

Keywords: Knee osteoarthritis; Non-surgical; Non-pharmacological; Interventions

INTRODUCTION

Osteoarthritis (OA) is the most common form of arthritis and is a major contributor to functional and social impairment, disability, reduced independence and poorer quality-of-life in older adults¹⁻⁷. There are at least 151,4 million persons worldwide suffering from this disease⁸. Yet, in nowadays these values are for sure higher, since the incidence of new cases is 200–250/100 000/year⁹. Moreover, there is an increasing need for urgent attention to this disease due to the societal trends in the population such as ageing, obesity prevalence and joint injury, estimating that the number of people affected by OA will increase about 50% over the next 20 years^{5,10,11}.

From all joint that can be affected by OA, the knee is the most prevalent (especially in elderly women), where a third of older adults in the general population shows radiological evidence of knee OA¹¹⁻¹⁶. Current OA rehabilitation strategy is a complex process that uses surgical and non-surgical interventions (pharmacological and non-pharmacological)^{5,9,14,17-20}. As the majority of the non-pharmacological and non-surgical interventions are safe, low cost, low tech, incorporate self-management performed at home or in the com-

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munity and have a substantial public health impact, they play a critical role in the patients' life as they are nowadays the first step in the knee OA management^{5,9,14,17-20}. Due to their risks, complications and post-outcomes other strategies are a valid option for patients who failed to respond to these measures^{5,14,17,19,20}.

Although there are several studies, recommendations and guidelines for knee OA management, there is still poor adherence to these interventions by the patients and even by the health professionals. Due to this poor adherence, wide range of treatments and even uncertainty in some therapies, further research seems necessary to clarify which ones are the most efficient evidence-based non-pharmacological and non-surgical treatments to manage knee OA.

Therefore, the aim of the present systematic review and meta-analysis is to find out, based on the available randomized controlled trials, if the non-surgical and non-pharmacological interventions commonly used for knee OA patients are effective and which are the most effective ones.

MATERIAL AND METHODS

DATA SOURCES AND SEARCH

This systematic review was conducted following the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines²¹. Systematic and comprehensive searches were conducted in electronic databases: MEDLINE, Embase, Physiotherapy Evidence Database (PEDro), The Cochrane Library, SciELO, Science Direct, Google Scholar, Research Gate and B-ON. Only English papers were accepted and excluded if duplicated. The search period ran from September 2018 to October 2018.

The studies selection followed the PICO model (Patients – Humans with knee OA; Intervention – Non-surgical and non-pharmacological interventions; Comparison – Pharmacological, surgical, placebo, no intervention, or other non-pharmacological/non-surgical interventions; Outcomes – Pain, physical function and patient global assessment).

The keywords used to search in all databases were identified after preliminary literature searches and by crosschecking them against previous recent and relevant systematic reviews and umbrella reviews²². An example of an online search strategy draft used in MEDLINE database is presented in Figure 1.

```
#1 "Knee*" "Osteoarthr*" OR "Gonarthr*"
#2 elder* OR older* OR oldest OR aged
#3 "Humans"[Mesh]
#4 #2 OR #3
#5 ("Exercise"[Mesh] OR "Low-Level Light Therapy"[Mesh] OR "Transcutaneous Electric Nerve Stimulation"[Mesh] OR "Acupuncture Therapy"[Mesh] OR "Yoga"[Mesh] OR "Tai Ji"[Mesh] OR "Moxibustion"[Mesh] OR "Electroacupuncture"[Mesh] OR "Ultrasound Therapy"[Mesh] OR "Musculoskeletal Manipulations"[Mesh] OR "Electric Stimulation Therapy"[Mesh])
#6 "Treatment*" OR "Therap*" OR "Non-pharmacologic*" OR "Non-surgic*" OR "Conservativ*" OR "Rehab*" OR "Physi*" OR "Manag*"
#7 #5 OR #6
#8 (randomized OR randomised OR controlled OR double-blind OR rct)
#9 (((("Randomized Controlled Trial" [Publication Type] OR "Controlled Clinical Trial" [Publication Type] OR "Randomized Controlled Trials as Topic"[Mesh]) OR "Controlled Clinical Trials as Topic"[Mesh]) OR "Random Allocation"[Mesh]) OR "Double-Blind Method"[Mesh]) OR "Single-Blind Method"[Mesh]) OR ("Clinical Trial" [Publication Type] OR "Clinical Trials as Topic"[Mesh])
#10 #8 OR #9
#11 "2012/01/01"[Pdat] : "2018/09/29"[Pdat]
#12 English[lang]
#13 #1 AND #4 AND #7 AND #10 AND #11 AND #12
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FIGURE 1. Description of an example of online search strategy

Additional publications that were not found during the original database search were identified through manual searches in related articles and reviews reference lists.

STUDY SELECTION

In this study, two independent reviewers screened the titles and abstracts yielded by the search against the inclusion and exclusion criteria and performed the selection of the potential studies. In case of study selection disparities, the reviewers reached an agreement through verbal discussion or arbitration. Full versions for all titles that appeared to meet the inclusion criteria were achieved and then the full text versions were screened by the inclusion criteria. When insufficient data was presented, the corresponding authors were contacted by email in order to request further details. The inclusion and exclusion criteria applied to this review are described in Table 1.

DATA EXTRACTION AND QUALITY ASSESSMENT

The data extracted from the selected publications to assess the effects of non-pharmacological and non-surgical interventions included²³: authors' name, year of publication, study location, participants' sample size and their characteristics, objectives, description of the in-

TABLE I. INCLUSION AND EXCLUSION CRITERIA

Inclusion	Exclusion
<p>The articles must include:</p> <ul style="list-style-type: none"> • at least one of the keywords; • an intervention group that have primary knee OA either clinical or radiological criteria (or both); • randomized controlled trials (RCT); • non-pharmacological and non-surgical intervention; • peer-reviewed scientific literature journals; • pain, physical function and patient global assessment; • detailed description of the non-pharmacological and non-surgical intervention; • full version, in English; • studies that perform a patient global assessment using the Western Ontario and McMaster Universities Osteoarthritis (WOMAC) or Knee injury and Osteoarthritis Outcome Score (KOOS) indexes. 	<p>The articles cannot include:</p> <ul style="list-style-type: none"> • an experimental or control group composed by any specie of animal; • participants that do not have a knee OA (healthy subjects) or have secondary knee OA (traumatic or post-surgical); • RCTs prior to 2012; • exclusively pharmacological or surgical interventions; • books, reviews, meta-analyses, case reports, expert opinions, conference papers or academic thesis; • subjects with other illness namely cancer, heart diseases, kidney diseases, neurological diseases, respiratory diseases, rheumatoid arthritis, gouty arthritis, septic arthritis or Paget's disease; • exclusively subjects with OA in the hip, foot, shoulder, elbow, wrist and fingers.

intervention, description of the control group, study outcomes, assessment times, study results and study conclusions. Furthermore, considering the broad scope of clinical conditions, it was decided to restrict the work to pain, physical function and patient global assessment²⁴.

The reviewers independently scored the methodological quality of the studies by using a validated score, the PEDro 11-items scale²⁵⁻³³. For this review only ratings of at least 6/10 on the PEDro scale were included in the analysis, consistent with previous systematic reviews^{28,29,35,36}. Furthermore, principles from GRADE were used for an overall assessment and integration of the strength of the evidence for each intervention³⁷.

DATA SYNTHESIS AND ANALYSIS

To measure the effect magnitude of the different interventions on knee OA patients, the RevMan (Review Manager version 5.3, The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, 2014) was used to perform the meta-analysis and present the results. In relation to the meta-analysis, only studies with similar control group (sham intervention, waiting list, no intervention, daily life activities or not aware of the study), population characteristics, outcomes, instruments and follow-up, were compared in each analysis.

For the continuous outcomes, Standardized Mean Differences (SMDs) and 95% Confidence Intervals (95% CIs) were used to weigh the Effect Size (ES). The

ES is used to determine the degree of improvement of a specific intervention after accounting for any placebo effect. In our study, a negative ES favored the intervention and consequently a positive ES the control. Moreover, according to Cohen's characteristics, each ES was interpreted as 0.2 (small), 0.5 (medium), and 0.8 (large)³⁸.

The continuous outcomes were calculated with the random-effects model using the inverse variance method. Study heterogeneity was estimated through the Higgins I^2 statistic test, subsequent χ^2 , and Cochran Q test, in accordance with the values of I^2 and P . Heterogeneity was interpreted by guidelines from the Cochrane Collaboration, in which, 25%, 50%, and 75% represent low, moderate and high heterogeneity, respectively³⁹.

RESULTS

SELECTION OF THE STUDIES

A set of 22180 records were identified through database searching. After the application of the inclusion and exclusion criteria, 52 articles have emerged. The diagram in Figure 2 summarizes the selection process.

METHODOLOGICAL QUALITY

After the selection of the studies, the reviewers inde-

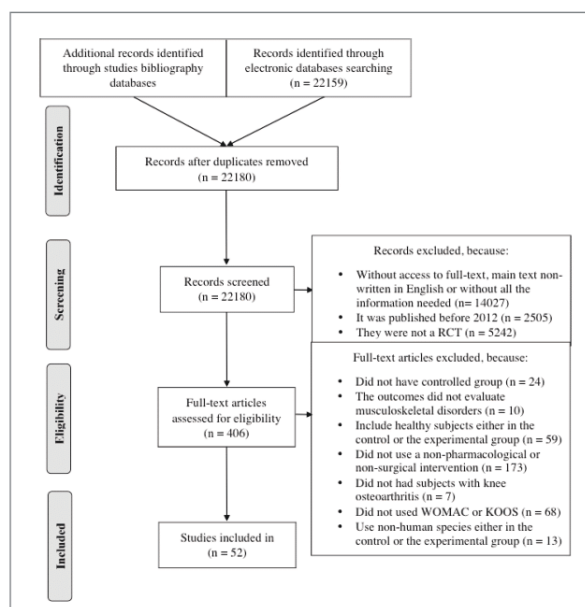


FIGURE 2. Results of the application of the inclusion and exclusion criteria.

Abbreviations: WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; KOOS, Knee injury and Osteoarthritis Outcome Score.

pendently applied the PEDro scale to evaluate the methodological quality of the 52 selected papers⁴⁰⁻⁹¹. After this process, they reached an agreement through verbal discussion or arbitration. The percentage of agreement for individual items ranged from 36.36% to 100%. The methodological quality assessment using the PEDro scale revealed a mean score of 6.69 (range 3⁷⁹ – 10⁹¹). After the exclusion of 13 studies^{42,44,46,51,53,56,63,64,73,79,80,83,90} (as they did not reach a minimum of 6/10), the mean score raised to 7.38. The classifications obtained are described in Table II.

STUDY CHARACTERISTICS

Overall, the 39 included studies^{40,41,43,45,47-50,52,54,55,57-62,65-72,74-78,81,82,84-89,91} were published from 2012^{41,45,58,62,66,74,81,86} to 2018^{60,76,84} and conducted in America (Brazil^{41,59,61,65,69,74,75,84,87} and United States of America^{54,55,60,89}), Asia (China⁹¹, India⁶², Saudi Arabia^{43,70}, South Korea⁷¹ and Turkey^{45,47,52,66,76,77,86}), Europe (Denmark^{57,67}, England⁷⁸, Finland⁸⁸, Hungary⁸⁵, Italy^{48,81,82} and Nederland⁷²) and Oceania (Australia^{49,50,58,68} and New Zealand⁴⁰).

The total number of enrolled subjects was 3907 with an average of 99±69 (maximum=282⁶⁸, mini-

imum=30⁶⁰) and a mean age of 62.7±5 (maximum=74.4⁸², minimum=51.9⁴⁷) years per study. Also the follow-up period time was 20±17 (maximum=68⁴⁰, minimum=3^{47,86,87}) weeks per study.

The average weight and height of all subjects were 79±8.8 (maximum=103.2⁵⁷, minimum=65⁹¹) kilograms and 1.63±0.06 (maximum=1.73⁷⁰, minimum=1.54⁷⁴) meters respectively, with a mean BMI of 29.4±2.6 (maximum=37.3³⁷, minimum=23.9⁶⁵) kg/m². More females were enrolled in the studies, specifically the number of females per study were 77±49 (maximum=179⁷¹, minimum=0⁷⁰), reaching a mean percentage of 72.8±18.7 (maximum=100^{69,88}, minimum=0⁷⁰). Regarding the male gender the number of subjects per study were 32±32 (maximum=143⁶⁸, minimum=0^{69,88}) with a percentage of 27.7±18.5 (maximum=100⁷⁰, minimum=0^{69,88}).

The non-pharmacological and non-surgical treatments used in the analyzed studies were described in Figure 3.

Table III provides a summary of the study characteristics for each of the RCT's included in the review.

META-ANALYSIS

Five studies^{48,61,66,68,91} meet the meta-analysis criteria. Information about different non-pharmacological and non-surgical interventions were collected, namely Acupuncture⁶⁸, Hydrotherapy⁶¹, Interferential Current (IFC)⁶⁶, Laser⁶⁸, Moxibustion⁹¹, Pulsed Electromagnetic Fields (PEMF)⁴⁸ and Resistance Training⁶⁰. Due to the reduced number of studies included in the meta-analysis, only data related to Visual Analogue Scale (VAS)^{48,66} and WOMAC (pain and physical function)^{48,60,61,66,68,91} outcomes were collected.

VAS

Regarding the VAS outcome at week 4 (Figure 4), significant statistical differences were found ($P < 0.0001$), with a mean difference of -28.47 (95% CI: -41.41, -15.53) favoring the experimental groups and a high level of heterogeneity ($\text{Chi}^2 = 22.25$; $I^2 = 87\%$) obtained. The IFC (especially at 40Hz [-36.60; 95% CI: -45.97, -27.23]) was superior to the PEMF (-11.30; 95% CI: -19.17, -3.43) intervention.

WOMAC

Regarding to WOMAC, the pain and physical function scores at week 3, 4, 6 and 12 were extracted to further analysis (Figure 5).

In WOMAC physical function, significant statistical

differences between the groups ($P \leq 0.01$) at week 4, 6 and 12 were found, but not at week 3 ($P=0.1$), with mean differences favorable for the experimental groups (-8.89, -1.51 and -1.25 at week 4, 6 and 12 respectively). The heterogeneity was low at week 4 and 6 ($I^2=24\%$ and $I^2=0\%$, respectively) and moderate at week 3 and 12 ($I^2=26\%$ and $I^2=39\%$, respectively). Overall, between intervention and control it was found significant statistical differences ($P < 0.00001$), being the experimental groups superior to control groups (-4.04; 95% CI: -6.37, -1.7), with a high heterogeneity ($\text{Chi}^2=334.45$; $I^2=96\%$). Concerning the studied interventions, at week 3 and 4 IFC 100 Hz was superior (-5.9; 95% CI: -13.07, 1.27 and -9.4; 95% CI: -10.37, -8.43, respectively) to PEMF; Moxibustion, IFC 40 Hz and IFC 180 Hz; at week 6 Moxibustion was superior (-1.53; 95% CI: -2.73, -0.33) to Hydrotherapy; and at week 12 Resistance Training was superior (-3.69; 95% CI: -6.4, -0.98) to Acupuncture, Laser and Moxibustion.

The WOMAC pain outcome had a slightly different behavior compared to WOMAC physical function. Significant statistical differences between the experimental and control groups ($P < 0.00001$) were found at week 3 and 4, with a mean difference between the groups favoring the experimental ones (-14.24 and -30.68, respectively). On other hand, at week 6 and 12 no significant statistical differences were found between the groups ($P=0.06$ and $P=0.32$, respectively), yet the mean difference between the groups favored the experimental groups (-4.68 and -3.77, respectively). The heterogeneity was high at week 3 and 12 ($I^2=86\%$ and $I^2=87\%$, respectively) and low at week 4 and 12 ($I^2=0\%$). Globally, the experimental group was statically ($P < 0.00001$) superior to the control group (-14.21; 95% CI: -20.96, -7.46), however these results could be achieved by chance ($\text{Chi}^2=330.67$; $I^2=96\%$). Regarding the interventions effects IFC 40 Hz was superior (-19.3; 95% CI: -22.71, -15.89) to IFC 100 Hz, IFC 180 Hz and Moxibustion at week; IFC 100 Hz was superior (-31.6; 95% CI: -35.16, -28.04) to PEMF, IFC 40 Hz and IFC 180 Hz at week 4; Moxibustion was superior (-5.27; 95% CI: -10.69, 0.15) to Hydrotherapy at week 6; and Resistance Training was superior (-14.2; 95% CI: -22.31, -6.09) to Acupuncture, Laser and Moxibustion at week 12.

DISCUSSION

In this systematic review, the interventions had differ-

ent effects on the population: some improved all the outcomes evaluated; some improved only few outcomes; and others did not improve any outcome (even if the results improved comparatively to the baseline, they did not perform better than placebo interventions).

Among all the intervention studied, the results were more consistent, once again^{32,33,92-96}, for the positive influence of Exercise on the knee OA patients' lives. Unfortunately, due to the small number of studies gathered and different protocols used, they could not pinpoint the best type, duration, frequency or intensity of exercise that should be practiced by these patients (although Resistance Training was the one that reached the most interesting results, namely pain, strength and function^{43,50,60,67}). Through analyzing the results obtained, we are lead to think that, apparently: *as long as the person does some type of exercise, he/she could benefit from it*. It has already been documented that the main positive effects of Exercise include muscular hypertrophy and strengthening, and an increase of blood flow and joint lubrication. Regarding the increase of muscular strength, whatever the neuromuscular stimulus given to someone who is not used to doing physical exercises, its short-term effects will be a rapid muscular strength increase and hypertrophy^{97,98}. Therefore, since these OA patients have a more sedentary life style due to pain and functional limitations it is expected that they respond to neuromuscular stimulus in the same way as healthy people, who experience physical activity for the first time⁹⁹. Furthermore, an increase of blood flow, joint lubrication and movement could lead to temperature, electrical and pressure changes, resulting in a decreased pain (by the gait control mechanism or the endogenous opioid system) and increased knee ROM^{93,100,101}. So, the overall idea is to perform some type of physical activity that can benefit a strength increase of the thigh (with more emphasis on the quadriceps muscles) and hip muscles (important due to its biomechanical and disease relationship), adapting the volume (reps x sets x load) to the patient specificities and, at the same time, including soft cyclic movements that can be easy to learn and perform in order to increase joint lubrication. Moreover, different types of exercises should not be mixed. One explanation for the disadvantage of mixing exercises with different goals within the same session may be the molecular response, where resistance training increases the myofibrillar protein response and aerobic exercise increases the content of mitochondria in the muscle⁹³.

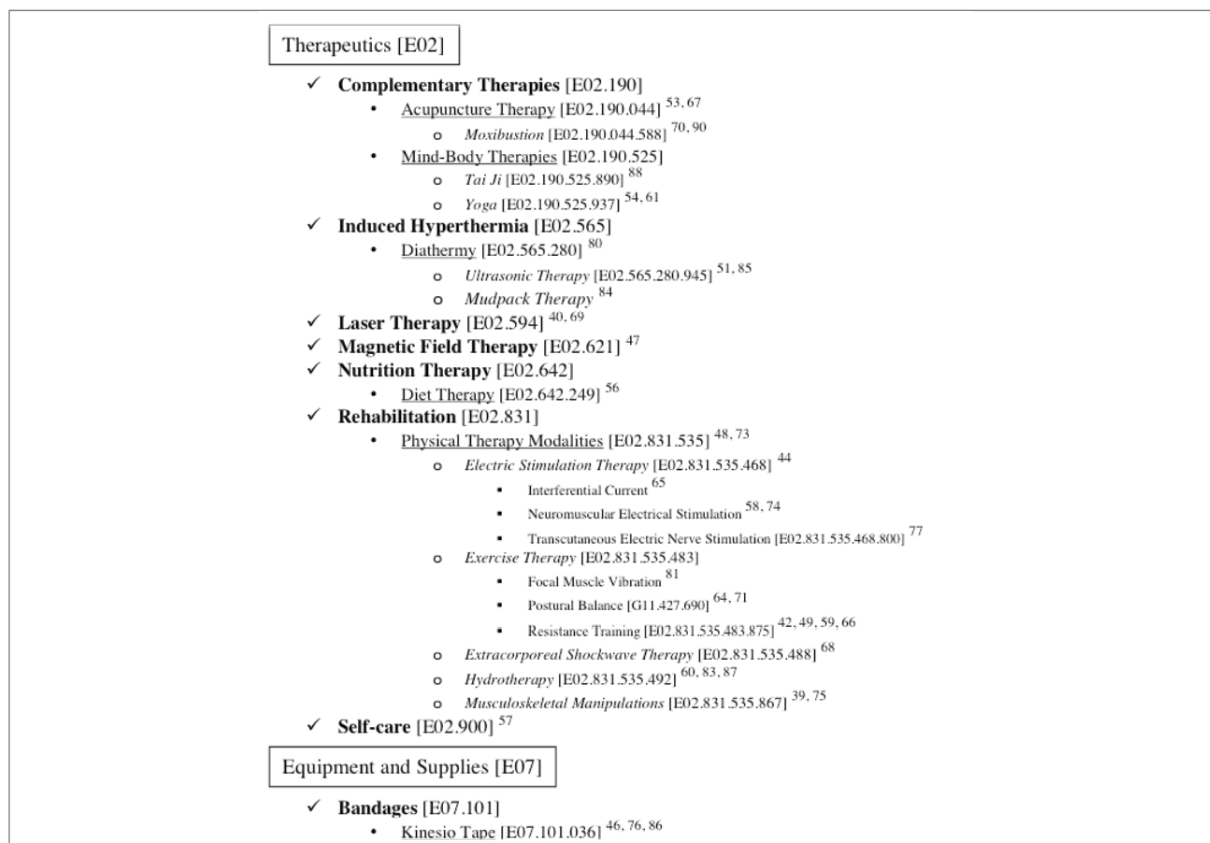


FIGURE 3. Non-pharmacological and non-surgical interventions used (n=39)

This molecular response will decrease when both aerobic and resistance exercises are performed within the same session⁹³. The exercise choice will mainly depend on the pain, functional limitations and morphological characteristics of each patient. For instance, if a patient has a low joint limitation and a great muscular imbalance, strength exercises should be executed (greater strength and muscular growth), but if a patient has a limited knee ROM and is overweight he/she should perform low load, cyclic, aerobic exercises (greater endurance and less joint pressure)⁹⁹. Stabilization exercises could also be added to these strength exercises, since the knee morphological changes, motivated by OA, can lead to biomechanics imbalances and, consequently, instability^{4,65,72,102-104}. However, despite having interesting results, they were not better than the group that only performed strength exercises, implying that knee stability can be improved through strength training, without necessarily adding specific knee stabilization training^{65,72,105,106}. Therefore, its use will depend

on the degree of instability that the patient presents (if he/she has too much instability, he/she will benefit from the exercises; if diminutive instability he/she will not benefit from this type of exercises). Moreover, in some overweight patients with muscular weakness and instability, Aquatic Exercises could be a good first intervention since^{61,84,88}: the possibility of having a serious injury due to fall is minimal; the joint pressure is lighten; there is weight loss; and physical performance based benefits from this type of exercise is similar from those practice on land.

In addition, these patients should preferably be supervised in their exercises as they reach better results relatively to the non-supervised ones⁶⁷. It is important to supervise these patients not only to ensure that the exercises are correctly performed (as they are not used to doing exercises), but also to adapt the exercises to the person concerned (although we expect certain type of patient – overweight elderly woman¹⁰⁷ – each person will present its specific limitations), allowing the crea-

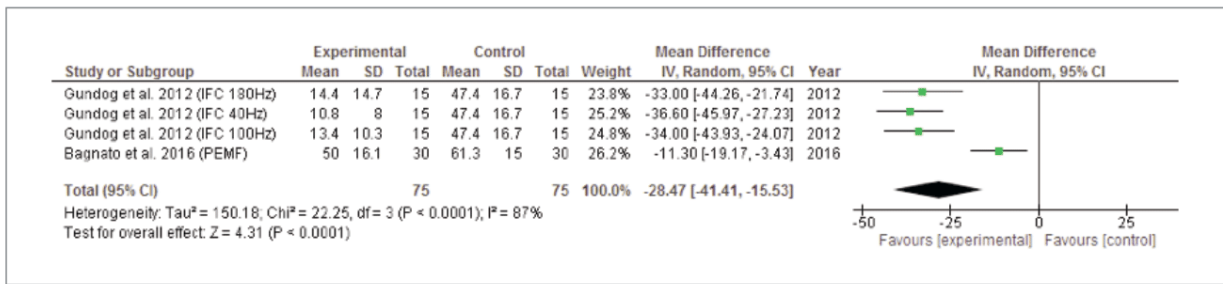


FIGURE 4. Forest plot of the effect of IFC (40, 100 and 180 Hz) and PEMF in VAS, at week 4; The green squares indicate the effect size of each study. The transverse lines show the 95% CI of the study. Black diamond represents the pooled estimate of every subgroup and the total effect; Abbreviations: CI, Confidence Interval; IFC, Interferential Current; IV, Inverse Variance; PEMF, Pulsed Electromagnetic Fields; SD, Standardized Errors; VAS, Visual Analog Scale.

tion of individualized goals and generating a greater impact on the patient's life⁴⁹. Conversely, Bennell et al.⁴⁹ study did not find statistical significant differences (p>0.05) neither pain nor physical function, between those who were supervised by a physiotherapist and those who only did non-supervised home exercises. However, the authors refer that the 2 sessions over 24 weeks may have been insufficient to influence the outcomes⁴⁹. Therefore, we recommend the use of supervision, with better results reached with those who were supervised 3 times per week. However, often these patients are not supervised with the necessary regularity, because: 1) they do not have access to a professional who helps them; or 2) with the positive evolution after treatments, they will slowly leave supervision, becoming more independent, managing in the end their issues alone. So, specific programs should be applied in order to these patients could follow in their communities and still have positive results. From the programs studied, it seems that the Osteoarthritis of the Knee Self-Management Program was the one that globally generated the greatest gains⁵⁸.

Ideally, health professionals should evaluate each patient and create individual goals. The creation of goals adapted to the patient may be important to add other interventions to Exercise. For example, if the patient is obese (a common knee OA patients characteristic) a long-term diet could be added to Exercise. It has been shown that this intervention is more powerful in the reduction of the weight kilogram (kg), weight percentage (%), BMI and fat mass after 68 weeks, in comparison to the short-term diet group plus Exercise or even those that only done Exercise^{57,108}. It is also important to adapt the interventions on those who are not ready to

perform exercises based on their functional limitations (an excessive muscle weakness or an extreme articular deficit) or pain (at movement or at rest). In these situations, it is necessary to perform a multimodal approach in order to improve the patients outcomes. However, due to the limited number of included studies, it is not possible to define which is the best intervention for each situation. For instance, patients that were intervened with Neuromuscular Electrical Stimulation (NMES) plus Exercise improved strength and muscular thickness over time, but were no better than those who have only done Exercise⁷⁵. The authors explain this lack of difference by the fact that the participants had no clinically significant muscle or functional impairment and hypothesized that the greater the muscle impairment is, the greater the NMES effect will be⁷⁵. Reflecting on this statement plus taking in consideration that those who were intervened with NMES showed better improvements in muscle thickness and anatomical cross-sectional area⁵⁹, if a patient has a major muscle deficit and is unable to perform exercise, NMES could be administrated at an early stage in an attempt to increase muscle strength; then, NMES plus some initial smooth exercises could be applied (simple, short and low load), so that the patient can have the gains associated with the exercise, in a second phase; and finally NMES can be progressively left over, focusing the time on executing strength exercises.

For an overall outcomes improvement, Moxibustion showed to be a good adjunctive intervention for knee OA patients^{71,91}. The mechanisms of action of the Moxibustion Therapy remain unclear. Factors such as temperature, smoke, odor, herbs and the stimulation of acupoints are likely to be involved in the possible

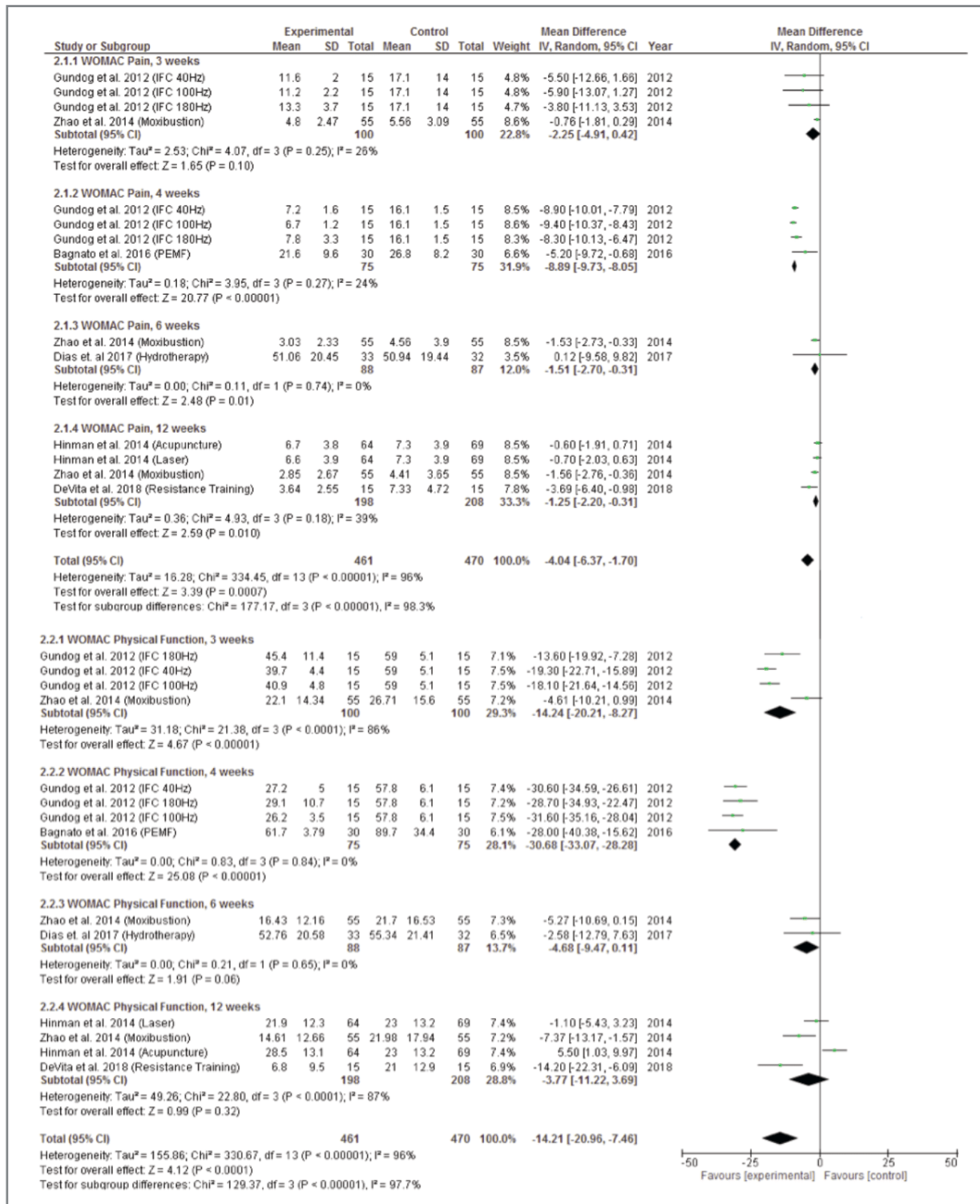


FIGURE 5. Forest plot of the effect of Acupuncture, Hydrotherapy, IFC (40, 100 and 180 Hz), Laser, Moxibustion, PEMF and Resistance Training in WOMAC physical function and pain, at week 3, 4, 6 and 12; The green squares indicate the effect size of each study. The transverse lines show the 95% CI of the study. Black diamond represents the pooled estimate of every subgroup and the total effect; Abbreviations: CI, Confidence Interval; IFC, Interferential Current; IV, Inverse Variance; PEMF, Pulsed Electromagnetic Fields; SD, Standardized Errors; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

mechanisms by which Moxibustion may work^{91,109}. Moxibustion treatment is similar to acupuncture in principle, however the surface of the skin is only stimulated with heat at acupoints^{91,109}. One of the most widely accepted mechanisms responsible for reaching positive results is the correct stimulation of acupoints, where a 2012 systematic review already confirmed that the stimulation of acupoints with needles relieves pain and improves function in knee OA patients¹¹⁰. However, in our study, acupuncture reaches mixed results, since the Hinman et al.⁶⁸ study showed significant statistical differences ($P < 0.05$) between the needle group and the control group in the pain (short and long-term) and WOMAC (short-term) outcomes, while in the Chen et al.⁵⁴ no significant statistical differences ($P > 0.05$) between the needle group and the sham needle group were found in all evaluated outcomes. Although the results point to a positive effect, their use cannot be fully recommended. The other Moxibustion mechanism that also creates consensus is the thermal stimulation, which might activate the sensory nervous system (thermoreceptors) through peripheral nerves such as C fibers and A delta fibers, transmitting sensory input to the central nerve system, which activates neurons to release beta endorphins and other neurotransmitters^{91,109}. Meanwhile, the afferent sensory input triggers the descending inhibitory pathway to the spinal level to intercept the pain signal^{91,109,111}. Also, the heat might dilate blood vessels, increase blood circulation and degranulate local mast cells^{91,109}. These may be the same mechanisms that explain the effects (pain and joint stiffness decreasing, and joint function improving) achieved by Mudpack⁸⁵ and deep heat⁸¹ interventions. Additionally, Moxibustion is a relatively safe intervention (only skin flushing is observed, however it disappeared within 3 days), so its use can be recommended, following previous systematic reviews^{109,112}.

Electrotherapy interventions exhibited diverse effects. After the IFC intervention, patients improved the outcomes overtime, especially pain and function^{45,66}, even when compared to their placebo intervention⁶⁶. However, compared to its placebo intervention plus Exercise, IFC did not show significant statistical differences ($P > 0.05$)⁴⁵. The same study⁴⁵ and the Palmer et al.⁷⁸ study also reinforced the positive impact of exercise on the patient life, as the TENS intervention obtained the same pattern as IFC, where the active TENS group, although the evaluated outcomes have improved overtime, it did not show significant statistical differences ($P > 0.05$) comparing with sham TENS plus

Exercise or even with Exercise alone. Furthermore, the Mascarin et al.⁷⁴ study also confirms that including TENS to Exercise is not more beneficial than Exercise alone, and even comparing with a group that was intervened with US plus Exercise, the TENS group was only better in the WOMAC physical function and total scores ($P < 0.05$). This lack of positive effects using US is reinforced by the Anwer et al.⁴³, Ulus et al.⁸⁶ and Cakir et al.⁵² studies, as active US was not better than the sham US or the control groups. Similarly, Mutlu et al.⁷⁶ compared different Musculoskeletal Manipulations (MM) (active and passive mobilization) against Electrotherapy (TENS plus US) as an adjunct interventions to Exercise and find that 12 sessions of active or passive mobilizations had a better long-term results (1 year) that just Electrotherapy, especially in knee flexion and extension ($P < 0.05$). Abbott et al.⁴⁰ also confirms this long-term results however, of all evaluated outcomes, significant statistical differences ($P < 0.05$) were only obtained in WOMAC comparing with the other groups (the differences between the authors may be explained by the protocols used and the physical therapists years of experience³⁶). Other systematic reviews confirm the positive effects of MM in knee OA patients and propose that the neurophysiological effects through activating type II mechanoreceptors (inhibiting of type IV nociceptors, resulting in pain reduction) and the enhance of the Golgi tendon organ activity (causing muscle relaxation via reflex inhibition) are the main responsible mechanisms for reaching positive results^{36,113,114}.

Shock Wave Therapy⁶⁹, Focal Muscle Vibration⁸² and Pulsed Electromagnetic Field Therapy (PEMF)⁴⁸, showed to be powerful interventions ($P < 0.05$) comparing with their placebo version. However, despite these effects, it is imprudent to recommend their use based on just one RCT on each intervention. None of the studies compared its use with Exercise or as a complement therapy to Exercise, so it is necessary to develop more high-quality studies that approach these interventions. Taking into consideration other systematic reviews^{28,115}, from the earlier mentioned interventions, the PEMF seems to be the most promising and consistent therapy in order to improve the patient's outcomes¹¹⁵. The explanation to these positive results relays on the subsensory-threshold pulsed electric potentials that stimulate intrinsic potentials, which alter the homeostatic balance of cartilage matrix degradation and synthesis in favor of cartilage repair¹¹⁵. This electrical stimulation increases cartilage synthesis by

down regulation of interleukin-1 and up regulation of transforming growth factor beta which lead to increased aggrecan, type II collagen, and proteoglycan content in the cartilage matrix and enhanced chondrocyte proliferation¹¹⁵. Regarding the use of Laser Therapy, the studies point out the benefit of High Level Laser Therapy compared to Low Level Laser Therapy (LLLT)⁷⁰ which, as well, did not show a long-term efficacy^{41,68}, confirming the results of earlier systematic reviews^{116,117}.

Kinesio Taping (KT) obtained poor effects, with the intervention group not being significantly better ($P>0.05$) compared to the control group^{47,87} in all evaluated outcomes (except for pain)⁷⁷. Those poor and dispersed results were similar to those reported in an earlier systematic review¹¹⁸.

Compared to the previous known umbrella review regarding the use of non-surgical and non-pharmacological interventions for knee OA patients²², our systematic review confirms that Exercise (especially Resistance Training) is a useful intervention on these patients and reinforces the use of Moxibustion, IFC, PEMF and MM. Acupuncture, US, LLLT, Mudpack Therapy, KT and TENS achieved heterogeneous results, which may be explained by the larger number of studies and enrolled patients.

The main limitation of this systematic review was the small number of high-quality studies founded for each intervention, with different protocols.

CONCLUSION

This systematic review and meta-analysis demonstrated that Exercise had the best positive effects on knee OA patients. Besides Exercise, PEMF and Moxibustion showed to be the most promising intervention relatively to the others. Balance Training, Diet, Diathermy, Hydrotherapy, High Level Laser Therapy, IFC, Mudpack, NEMS, MM, Shock Wave Therapy, Focal Muscle Vibration, stood out, however more studies are needed to fully recommend their use. Other interventions did not show to be effective or the results obtained were heterogeneous.

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TABLE II. METHODOLOGICAL QUALITY OF ELIGIBLE STUDIES (N = 52)

Study (A to Z and year)	PEDro Scale Items											PEDro Score (0 – 10)	GRADE (A to D)	
	1a	2	3	4	5	6	7	8	9	10	11			
Alfredo et al. ⁴¹	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	11	8	B
Atamaz et al. ⁴⁵	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	9	5	A
Bruce-Brand et al. ³¹	Y	Y	N	Y	N	N	N	N	N	Y	Y	4		
Chang et al. ⁵³	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B
Coleman et al. ⁵⁸	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Ebnezar et al. ⁶²	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	6	6	C
Gundog et al. ⁶⁶	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	6	6	C
Mascarin et al. ⁷⁴	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B
Rabini et al. ⁸¹	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	7	7	B
Ulus et al. ⁸⁶	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	4		
Alkins et al. ⁴⁶	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	8	8	B
Chen et al. ³⁴	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	5		
Elboim-Gabyzon et al. ⁶³	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	8	8	B
Knoop et al. ⁷²	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B
Mizusaki et al. ⁷³	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B
Tefner et al. ⁸⁵	N	Y	N	Y	N	Y	Y	Y	Y	Y	Y	6	6	C
Anwer et al. ⁴³	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Bennell et al. ⁴⁹	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Bennell et al. ⁵⁰	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Cakir et al. ³²	N	Y	N	Y	N	Y	Y	Y	Y	Y	Y	8	8	B
Cheung et al. ³⁵	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	5		
Fazaa et al. ⁶⁴	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	5		
Henriksen et al. ⁶⁷	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	6	6	C
Hinman et al. ⁶⁸	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Hinman et al. ⁷⁰	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Kheshie et al. ⁷¹	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Lauter et al. ⁷³	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	5		
Palmer et al. ³⁸	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B
Peungsuwan et al. ⁸⁰	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	4		
Zhao et al. ⁹¹	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10	10	A
Abbott et al. ⁴⁰	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B
Cho et al. ⁵⁶	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	5		
Christensen et al. ³⁷	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	6	6	C
Rabini et al. ⁸²	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	9	A
Bagnato et al. ⁴⁸	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	9	A
de Oliveira et al. ⁵⁹	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Wageck et al. ⁸⁷	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B
Wang et al. ⁸⁹	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Apparao et al. ⁴⁴	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	5		
Aydogdu et al. ⁴⁷	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	6	6	C
Dias et al. ⁶¹	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Inamura et al. ⁶⁹	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	9	9	A
Gomiero et al. ⁶⁵	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Mutlu et al. ⁷⁷	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	8	8	B

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TABLE II. CONTINUATION

Study (A to Z and year)	PEDro Scale Items											PEDro Score (0 – 10)	GRADE (A to D)	
	1a	2	3	4	5	6	7	8	9	10	11			
Waller et al. ⁸⁸	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6	6	C
Yeğin et al. ⁹⁰	Y	Y	N	Y	N	N	N	Y	Y	N	Y	5		
Altımbek et al. ⁴²	Y	Y	Y	Y	N	N	Y	Y	N	N	Y	5		
DeVita et al. ⁶⁰	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	6	6	C
Mutlu et al. ⁷⁶	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	7	7	B
Parekh et al. ⁷⁹	Y	Y	N	Y	N	N	N	N	N	N	Y	3		
Rahf et al. ⁸³	Y	Y	Y	Y	N	N	N	N	N	N	Y	5		
Taglietti et al. ⁸⁴	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	7	7	B
Mode	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	7	7	B

1 – Eligibility criteria; 2 – Random allocation; 3 – Concealed allocation; 4 – Baseline comparability; 5 – Blind subjects; 6 – Blind therapists; 7 – Blind assessors; 8 – Adequate follow-up; 9 – Intention-to-treat analysis; 10 – Between-group comparisons; 11 – Point estimates and variability;

a – Item do not contribute to the total score;

Y – Yes; N – No.

TABLE III. INCLUDE RCT'S SUMMARIES (N = 39)

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Acupuncture Chen et al. ²⁴	<ul style="list-style-type: none"> To compare the efficacy and safety of integrating a standardized true acupuncture protocol versus non-penetrating acupuncture into exercise-based physical therapy. 	<ul style="list-style-type: none"> n_{total} = 214 Gender: 51.4% (110) female; 48.6% (104) male; n_{Non-penetrating acupuncture} = 109 Age: 60.4±11.7 years BMI: 32.6 kg/m² Gender: 52.3% (57) female; 47.7% (52) male; n_{Acupuncture} = 104 Age: 60.5±11.1 years BMI: 33.3 kg/m² Gender: 51% (53) female; 49% (52) male. 	<ul style="list-style-type: none"> Acupuncture – Exercise (ROM exercises + muscle strengthening + aerobic conditioning (bike and/or treadmill apparatus)) – 10-20 min, 1-2 x per week, 12 total treatments + Acupuncture (penetrating needles placed in the knee GB 34, SP 9, ST 36, ST 35 and Xiyian, and distal points UB 60, GB 39, SP 6, and KI 3) –20 min, 1-2x per week, 12 total treatments; Non-penetrating acupuncture – Exercise (ROM exercises + muscle strengthening + aerobic conditioning (bike and/or treadmill apparatus)) – 10-20 min, 1-2 x per week, 12 total treatments + Non-penetrating Acupuncture (same procedures and 9 points described in the acupuncture group, however without penetrating) –20 min, 1-2x per week, 12 total treatments. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – 6 min walk test; Pain – BPI; Perception of change – PGIC; QOL – SF-36. 	<ul style="list-style-type: none"> Intra-group and inter-group comparisons showed no significantly differences (P>0.05) in all evaluated variables.
Hinman et al. ⁶⁸	<ul style="list-style-type: none"> To determine the efficacy of laser and needle acupuncture for KOA. 	<ul style="list-style-type: none"> n_{total} = 282 Gender: 49.3% (139) female; 50.7% (143) male; n_{needle} = 70 Age: 64.3±8.6 years Weight: 86.3±17.7 kg Height: 1.71±0.1 m BMI: 29.8±5.8 kg/m² Gender: 46% (32) female; 54% (38) male; n_{laser acupuncture} = 71 Age: 63.4±8.7 years Weight: 89.3±20.2 kg Height: 1.71±0.1 m BMI: 30.7±6.1 kg/m² Gender: 39% (28) female; 61% (43) male; n_{Sham laser acupuncture} = 70 Age: 63.8±7.5 years Weight: 84.7±19.3 kg Height: 1.71±0.1 m BMI: 28.8±5.4 kg/m² Gender: 56% (39) female; 44% (31) male; n_{control} = 71 Age: 62.7±8.7 years Weight: 85.6±20.8 kg Height: 1.7±0.11 m BMI: 29.3±5.8 kg/m² Gender: 56% (40) female; 44% (31) male. 	<ul style="list-style-type: none"> Needle – Acupuncture needle (usual practice using a standardized set of acupuncture points, applied a max of 6 needles (0.25x40 mm) around the knee as well as distal points) – 20 min, 1-2x per week, 12 weeks; Laser acupuncture – LLIT (applied in the same places has the needle group (10mW and energy 0.2 J/point output)) – 20 min, 1-2x per week, 12 weeks; Sham laser acupuncture – The same procedures has the laser acupuncture group however without the laser functioning – 20 min, 1-2x per week, 12 weeks; Control – The control participants were unaware of the experiment. 	<ul style="list-style-type: none"> Disability – WOMAC; Pain – NPRS. 	<ul style="list-style-type: none"> Pain: Pain was decrease significantly (P<0.05) in all groups, in comparison to the control, except for the Sham laser acupuncture group (P=0.07) at week 12. However, at 1 year it was not found any differences (P>0.05) between control and the other groups. Additionally, it was not found significant differences in between-group comparisons (P>0.05) at week 12 and 1 year; WOMAC: From all groups, only the needle group had statistical differences in comparison to the control (P=0.04) at week 12. However, at 1 year it was not found any differences (P>0.05) between control and the other groups. Additionally, it was not found significant differences in between-group comparisons (P>0.05) at week 12 and 1 year.

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Moxibustion Kim et al. ⁷¹	<ul style="list-style-type: none"> To test the effect of moxibustion on the pain and function of chronic KOA patients. 	<ul style="list-style-type: none"> n_{total} = 212 Gender: 84.4% (179) female; 15.6% (33) male; $n_{experimental}$ = 102 Age: 56 years BMI: 24.8±2.6 kg/m² Gender: 83.3% (85) female; 16.7% (17) male; $n_{control}$ = 110 Age: 57 years BMI: 24.1±2.9 kg/m² Gender: 85.5% (94) female; 14.5% (16) male. 	<ul style="list-style-type: none"> Experimental – Moxibustion (moxibustion; burning mug wort devices over 6 acupoints (ST36, ST35, ST34, SP9, EXLE04 and SP10) and 2 Ashi points in the affected knee) + Educational leaflet (containing basic information about KOA such as definition, pathology, current treatment options including drug therapy, supplements and hyaluronic acid or steroid injection and recommendations on the principles of self-exercise, good postures and rules for daily activities avoiding exacerbating symptoms) + Stretching (hamstring + calf) – 3x per week, during 4 weeks; Control – Usual care – 4 weeks 	<ul style="list-style-type: none"> Depression – BDI; Disability – WOMAC; Function – Timed-stand test, standing-balance test and 6 min walk test; Pain – NPRS; QOL – SF-36. 	<ul style="list-style-type: none"> WOMAC: The global score showed significant differences between-groups at week 5 and 13 (P<0.01) in favor for the moxibustion group. Additionally, all subcategories of WOMAC showed significant improvement following moxibustion treatment at week 5 and 13 (P<0.01); Pain: Moxibustion treatment improved the pain significantly compared with usual care at week 5 and 13 (P<0.01); Function: Moxibustion significantly improved knee function for standing and sitting in a chair compared to usual care at week 5 (P=0.0486) and 13 (P=0.0006). No significant improvement was observed in the standing-balance test (P=0.52 at week 5 and P=0.26 at week 13) or six-minute walk test (P=0.51 at week 5 and P=0.68 at week 13); BDI: There was no significant difference between-groups at week 5 (P=0.34) and 13 (P=0.64); SF-36: The physical component summary showed significant improvement following moxibustion treatment at week 5 (P=0.0299) and 13 (P=0.0023). There was no significant difference between groups in mental component summary at week 5 (P=0.2124) and 13 (P=0.3129). Bodily pain showed significant improvement following moxibustion both at week 5 (P=0.0003) and 13 (P=0.005). Physical functioning and social functioning also showed better results at week 5 (P=0.0025 and P=0.0418 respectively), but not at 13 (P=0.1214 and P=0.4487 respectively). In the role-physical, general health, vitality, role-emotional and mental health did not show any significant differences at week 5 or 13 (P<0.05). The WOMAC pain scores showed greater improvement in the active treatment group than in control at week 3 (P=0.012), 6 (P<0.001), 12 (P=0.002), and 24 (P=0.002) as did WOMAC physical function scores of the experimental group at week 3 (P=0.002), 6 (P=0.015), and 12 (P<0.001) but not 24 (P=0.058).
Zhao et al. ⁹¹	<ul style="list-style-type: none"> To compare the effectiveness and safety of moxibustion vs sham moxibustion in pain of KOA patients. 	<ul style="list-style-type: none"> n_{total} = 110 Age: 65.2±7.9 years Weight: 65±6.3 kg Height: 1.62±7.98 m BMI: 24.6±5.5 kg/m² Gender: 66% (73) female; 34% (37) male; $n_{experimental}$ = 55 Age: 65.8±7.45 years Weight: 64.1±9 kg Height: 1.63±5.28 m BMI: 24.1±1.1 kg/m² Gender: 71% (39) female; 29% (16) male; $n_{control}$ = 55 Age: 64.6±8.4 years Weight: 66±5.2 kg Height: 1.62±1.45 m BMI: 25.2±2.4 kg/m² Gender: 62% (34) female; 38% (21) male. 	<ul style="list-style-type: none"> Experimental – Moxibustion (acupoints Dubi (ST 35), extra-point Neixiyan (EX-LE 4), and an Ashi) – 20 min, 3x per week, during 6 weeks; Control – Sham Moxibustion (same procedures as the experimental group, however without active moxibustion) – 20 min, 3x per week, during 6 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC. 	

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Mind Body Therapies Tai Ji Wang et al. ⁸⁹	<ul style="list-style-type: none"> To compare Tai Ji with standard physical therapy for KOA patients. 	<ul style="list-style-type: none"> n_{total}= 204; Age: 60 years BMI: 33 kg/m² Gender: 70% (143) female; 30% (61) male; n_{Experimental}= 102; n_{Control}= 102. 	<ul style="list-style-type: none"> Experimental – Tai Ji (warm-up + Tai Ji principles and movements + breathing techniques + relaxation methods) – 60 min, 2x per week, during 12 weeks; Control – Standard Physical therapy (manual therapy or exercise) – 30 min, 2x per week, during 6 weeks + Home exercises – 30 min, 4x per week, during 6 weeks. 	<ul style="list-style-type: none"> Depression – BDI; Disability – WOMAC; Function – 6 min walk test and 20 m walk test; Meditation – ASES; QOL – SF-36. 	<ul style="list-style-type: none"> There were no statistical differences (P>0.05) between groups in all time and evaluated outcomes except for the BDI overall score (P=0.012) and at week 12 (P=0.002).
Yoga Ebnezar et al. ⁶²	<ul style="list-style-type: none"> To evaluate the efficacy of integrating Hatha Yoga therapy with therapeutic exercises for KOA patients. 	<ul style="list-style-type: none"> n_{total}= 250 Gender: 69.6% (174) female; 30.4% (76) male; n_{total}= 125 Age: 59.6±8.18 years Gender: 70.4% (88) female; 29.6% (37) male; n_{Control}= 125 Age: 59.4±10.66 years Gender: 68.8% (86) female; 31.2% (39) male. 	<ul style="list-style-type: none"> Yoga – Hatha Yoga (yogic sukshama vyayamas + asanas + pranayama + meditation + relaxation techniques + counseling) – 40 min per day, during 2 weeks + Physiotherapy (TENS + US) – 10 + 10 min per day, during 2 weeks; Control – Exercise (loosening and strengthening to upper and lower limb + specific knee practices + supine rest) – 40 min per day, during 2 weeks + Physiotherapy (TENS + US) – 10 + 10 min per day, during 2 weeks. 	<ul style="list-style-type: none"> Creptus – Palpation; Disability – WOMAC; Edema – Palpation; Function – 50 m time walk; Pain – NPRS; ROM – Goniometer; Tenderness – Palpation. 	<ul style="list-style-type: none"> Pain: There was a significant difference in pain within (P<0.001) and between the groups (P<0.001) after the intervention with higher effect size in the yoga than in the control group; WOMAC: There was a significant difference in knee disability within (P<0.001) and between the groups (P<0.001) after the intervention with higher effect size in the yoga than in the control group; ROM: There was a significant difference within (P<0.001) and between the groups (P<0.001) in the flexion of right and left knee joints after the intervention with higher effect size in the yoga than in the control group; Tenderness, swelling, and creptus: Showed a significant difference within (P<0.001) and between the groups (P<0.001) after the intervention with higher effect size in the yoga than in the control group; Function: There was a significant reduction in time within (P<0.001) and between the groups (P<0.001) after the intervention with higher effect size in the yoga than in the control group;
Cheung et al. ²⁵	<ul style="list-style-type: none"> To assess the feasibility and potential efficacy of a Hatha Yoga in managing osteoarthritis related symptoms in older women with KOA. 	<ul style="list-style-type: none"> n_{total}= 36; Age: 72 years BMI: 29 kg/m²; n_{total}= 18 Age: 71.9 years BMI: 29.1 kg/m²; n_{Control}= 18 Age: 71.9 years BMI: 28.8 kg/m². 	<ul style="list-style-type: none"> Yoga – Hatha Yoga (pranas + asanas + pranayama + meditation) – 60 min per day, 1x per week, during 8 weeks + Home Yoga – 30 min, 4x per week, during 8 weeks; Control – Wait list (no intervention) – during 8 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Physical Performance – SPPB; QOL – SF-12; Sleep – PSQI; Weight – BMI. 	<ul style="list-style-type: none"> WOMAC: There was only found significant differences in pain (P=0.01) and stiffness (P=0.002) comparing to the control group. No significant differences (P>0.05) were found for other outcome measures after 8 weeks in the between-group analysis. In within group analysis there was found significant differences in pain (T1 vs T2 – P=0.04 and T1 vs T3 – P=0.008) and total (T1 vs T2 – P=0.046 and T1 vs T3 – P=0.007). No other significant differences (P>0.05) were found within outcome measures at T1 (week 4), T2 (week 8) and T3 (week 20); SPPB: Only repeated chair stand had between-group differences (P=0.03). No significant differences (P>0.05) were found for other outcome measures after 8 weeks in the between-group analysis. In within group analysis there was

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
<p>Diathermy Rabini et al.⁶¹</p>	<ul style="list-style-type: none"> To compare the effects of DHT and SHT in patients with symptomatic KOA, and to determine the long-term effects of heat therapy. 	<ul style="list-style-type: none"> n_{total} = 54 Gender: 83.4% (45) female; 16.6% (9) male; n_{SHT} = 27 Age: 66.3±11.6 years BMI: 27±3.9 kg/m² Gender: 81.5% (22) female; 18.5% (5) male; n_{HT} = 27 Age: 64±9.8 years BMI: 27.4±4.8 kg/m² Gender: 85.2% (23) female; 14.8% (4) male. 	<ul style="list-style-type: none"> SHT – Diathermy (pad of the hyperthermia device kept warm at 38°C, without switching on the microwave generator) – 30 min, 3x per week, during 4 weeks; DHT – Diathermy (pad placed 2 cm above the patella, with the knee at 30° of flexion. The output power was set at 40W and the silicone pad water temperature kept at 38°C. The skin pilot temperature was set to a value aimed at achieving a 1.5°C ΔT) – 30 min, 3x per week, during 4 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Pain – VAS; Strength – BMRC. 	<ul style="list-style-type: none"> WOMAC: In between group comparison the DHT group was significantly better than the SHT group in all evaluated times (at least P<0.015). Furthermore, in intra-group comparisons the scores in the SHT group did not showed statically differences between times (P>0.05), yet the DHT group showed improvements (at least P<0.003) between T0 and T1, T2, T3 and T4, but not (P>0.05) in the others evaluated times intervals; Strength: The BMRC scores did not showed a significant group effect in comparison DHT and SHT group (P>0.05). Furthermore, in intra-group comparisons the scores in the SHT group did not showed statically differences between times (P>0.05), yet the DHT group showed improvements (at least P<0.041) between T0-T2, T0-T3, T0-T4, T1-T2, T1-T3 and T1-T4, but not (P>0.05) in the others evaluated times intervals; Pain: In between group comparison the DHT group was significantly better than the SHT group in all evaluated times (at least P<0.016). Moreover, in intra-group comparisons the scores in the SHT group did not showed statically differences between times (P>0.05), yet the DHT group showed improvements (at least P<0.004) between T0 and T1, T2, T3 and T4, but not (P>0.05) in the others evaluated times intervals.
<p>US Ulus et al.⁶⁶</p>	<ul style="list-style-type: none"> To evaluate the short-term effectiveness of US therapy on pain, physical function, ambulation activity, disability and psychological status in patients with KOA. 	<ul style="list-style-type: none"> n_{total} = 40; n_{physical} = 20 Age: 60.7±10.1 years Weight: 80.7±11.6 kg Height: 1.60±0.68 m BMI: 31.6±4.4 kg/m²; n_{control} = 20 Age: 60.3±8.8 years Weight: 78±10.7 kg Height: 1.60±0.78 m BMI: 31.1±4.7 kg/m². 	<ul style="list-style-type: none"> Experimental – US (1-MHz US head, continuous mode, with intensity of 1 W/cm², for 10 min) + Hot packs (20 min) + IFC (10 min) + Quadriceps Isometric Exercises (15 min) – 5 x per week, during 3 weeks; Control – Sham US (same procedure described earlier but without a functional US, for 10 min) + Hot packs (20 min) + IFC (10 min) + Quadriceps Isometric Exercises (15 min) – 5 x per week, during 3 weeks. 	<ul style="list-style-type: none"> Ambulation – 50-m walking speed; Disability – Lequesne Index; Functional – WOMAC; Pain – VAS; Psychological status – HADS. 	<ul style="list-style-type: none"> There was not found significant statistical differences (P>0.05) in all evaluated outcomes between-group. On other hand, pre vs post treatment, all outcomes showed statistical differences (P<0.05) in both groups.

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Cakir et al. ³²	<ul style="list-style-type: none"> To compare whether the effectiveness of continuous US was superior against pulsed US and against sham US in KOA. 	<ul style="list-style-type: none"> n_{total}= 60 Gender: 78.3% (47) female; 21.7% (13) male; n_{Continuous US}= 20 Age: 56.9±8.8 years BMI: 27.9±4.4 kg/m² Gender: 70% (14) female; 30% (6) male; n_{Pulsed US}= 20 Age: 58.2±9.9 years BMI: 30.9±4.0 kg/m² Gender: 80% (16) female; 20% (4) male; n_{Sham US}= 20 Age: 57.1±7.8 years BMI: 29.5±5.9 kg/m² Gender: 85% (17) female; 15% (3) male. 	<ul style="list-style-type: none"> Continuous US – US (5-MHz US head, continuous mode, with intensity of 1 W/cm², for 12 min) + Home Exercises (Quadriceps Isometric Exercises + Muscle Strength Exercises + Stretching Exercises) – 5 x per week, during 2 weeks; Pulsed US – US (5-MHz US head, 1:4 pulse, with intensity of 1 W/cm², for 12 min) + Home Exercises (Quadriceps Isometric Exercises + Muscle Strength Exercises + Stretching Exercises) – 5 x per week, during 2 weeks; Sham US – Sham US (same procedure described earlier but without a functional US, for 12 min) + Home Exercises (Quadriceps Isometric Exercises + Muscle Strength Exercises + Stretching Exercises) – 5 x per week, during 2 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – 20-m walking time; Pain – VAS. 	<ul style="list-style-type: none"> All groups showed a statistically significant improvement in all outcomes in pre vs post treatment (P<0.05); However, there was no significant difference between-groups (P>0.05).
Mudpack Tefner et al. ⁸⁵	<ul style="list-style-type: none"> To evaluate the effects of Neydharthar mud-pack therapy on the clinical parameters and QOL in patients with KOA. 	<ul style="list-style-type: none"> n_{total}= 53 Gender: 85% (45) female; 15% (8) male; n_{Experimental}= 27; n_{Control}= 26. 	<ul style="list-style-type: none"> Experimental – Neydharthar hot mudpack-therapy – 30 min each session, 5 x per week, during 2 weeks; Control – Hot packs – 30 min each session, 5 x per week, during 2 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Pain – VAS; QOL – EuroQOL-5D. 	<ul style="list-style-type: none"> In between-group comparison, none of the outcomes showed significant (P>0.05) statistical differences; Within group analysis both groups showed significant statistical differences (P<0.001) in all outcomes.
Laser Alfredo et al. ⁴¹	<ul style="list-style-type: none"> Evaluate the effects of LLLT in combination with exercises on pain, functionality, ROM, muscular strength and QOL in KOA patients. 	<ul style="list-style-type: none"> n_{total}= 40 Gender: 77.5% (31) female; 22.5% (9) male; n_{LLLT}= 20 Age: 61.2±7.5 years Weight: 76.3±10.3 kg Height: 1.59±0.08 m BMI: 30.2±4.1 kg/m² Gender: 75% (15) female; 25% (5) male; n_{Placebo}= 20 Age: 62.3±6.87 years Weight: 74.9±15.7 kg Height: 1.59±0.09 m BMI: 29.2±5 kg/m² Gender: 80% (16) female; 20% (4) male. 	<ul style="list-style-type: none"> Experimental (LLLT) – LLLT (5 points at the medial side of the knee and in 4 points at the lateral side, at 3 J per point – wave length of 904 nm, frequency of 700 Hz, average power of 60 mW, peak power of 20W, pulse duration 4.3 ms, 50 sec per point) – 3 x per week, during 3 weeks + Exercises (10 min warm-up (treadmill, ergometer bike or rowing machine) + 30 min, 2-3 sets of exercises (to increase ROM, motor learning, balance coordination and strengthening)) + 5 min stretching (hamstrings, quadriceps adductors and gastrocnemius)) – 3 x per week, during 8 weeks; Control (Placebo LLLT) – Placebo LLLT (same procedures as the experimental group however the laser was not functioning) – 3 x per week, during 3 weeks + Exercises (10 min warm-up (treadmill, ergometer bike or rowing machine) + 30 min, 2-3 sets of exercises (to increase ROM, motor learning, balance coordination and/or strengthening)) + 5 min lower limb stretching) – 3 x per week, during 8 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – Lesquene questionnaire; Pain – VAS; ROM – Goniometer; Strength – Dynamometer. 	<ul style="list-style-type: none"> WOMAC: Laser group showed significant improvement in intergroup analysis in pain (P=0.033), function (P=0.002) and total score (P=0.008) at T2 compared to T1 and pain (P=0.001), function (P=0.002) and total score (P=0.003) in T3 compared to T1. Laser group showed significant improvement in intragroup analysis in pain scores (P<0.05) and activity (P<0.001) between T1 and T2 and between T2 and T3 (P=0.001). No other statistically significant differences were found in the other variables in the laser group (P>0.05) neither the placebo group showed significant improvements for any of the variables (P>0.05); Pain: Laser group showed significant improvement (P=0.001) in intragroup analysis between T1 and T2. No significant improvement in intergroup analysis (P>0.05), neither the placebo group showed any significant improvement in other variables; Functionality: Laser group showed significant improvement (P=0.001) in intragroup analysis between T2 and T3. No significant improvement in intergroup analysis (P>0.05), neither the placebo group showed any significant

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Kheshtie et al. ⁷⁰	<ul style="list-style-type: none"> To compare the effects of LLLT and HLLT on pain relief and functional improvement in KOA patients. 	<ul style="list-style-type: none"> n_{total}= 53 Age: 54.6±8.5 years Weight: 87±10.2 kg Height: 1.73±5.57 m BMI: 29.1±4.1 kg/m² Gender: 100% male; n_{LLLT}= 18 Age: 56.6±7.9 years Weight: 85.2±14 kg Height: 1.73±4.92 m BMI: 28.6±5.2 kg/m²; n_{HLLT}= 20 Age: 52.1±6.5 years Weight: 88.6±7.5 kg Height: 1.72±5.49 m BMI: 30±3.4 kg/m²; n_{placebo}= 15 Age: 55.6±11 years Weight: 87±7.8 kg Height: 1.75±6.3 m BMI: 28.5±3.4 kg/m². 	<ul style="list-style-type: none"> LLLT – LLLT (wavelength of 830 nm, output power of 800 mW, average energy density of 50 J/cm², frequency of 1 KHz, and duty cycle of 80 % – 32 min, 2x per week, 12 weeks + Exercise (10 min warm-up on a treadmill + ROM exercises (hip, knee, and ankle joints) + muscle strengthening (10 times/set, for 3x with a 2-min rest interval in the form of straight leg raising exercise) + flexibility exercises (5 min of self-stretching for the hamstring and calf muscles)); HLLT – HLLT (initial phase with fast manual scanning with a total of 500 J + two successive sub phases of 710 and 810 mJ/cm² for a total of 500 J + in the joint line just proximal to the medial and lateral tibial condyles with 25 J, a fluency of 610 mJ/cm² + same as the initial phase except that scanning was slow manual scanning with a time of 14 sec for each point and a total of 250 J) – 15 min, 2x per week, 12 during weeks + Exercise (10 min warm-up on a treadmill + ROM exercises (hip, knee, and ankle joints) + muscle strengthening (10 times/set, for 3x with a 2-min rest interval in the form of straight leg raising exercise) + flexibility exercises (5 min of self-stretching for the hamstring and calf muscles)); Placebo – <i>Placebo Laser</i> (equal to the others groups, however using sham laser) + Exercise (10 min warm-up on a treadmill + ROM exercises (hip, knee, and ankle joints) + muscle strengthening (10 times/set, for 3x with a 2-min rest interval in the form of straight leg raising exercise) + flexibility exercises (5 min of self-stretching for the hamstring and calf muscles)). 	<ul style="list-style-type: none"> Disability – WOMAC; Pain – VAS; 	<ul style="list-style-type: none"> Improvement in other variables; ROM: Laser group showed significant improvement (P=0.01) in intragroup analysis between T2 and T3. No significant improvement in intergroup analysis (P>0.05), neither the placebo group showed any significant improvement in other variables; Strength: No significant improvement in intergroup and intragroup analysis in both groups (P>0.05). Both treatments (HLLT and LLLT) combined with exercise were effective (P<0.05) modalities in decreasing the VAS and WOMAC scores after 6 weeks of treatment; HLLT combined with exercises was more effective than LLLT combined with exercises, and both treatment modalities were better than exercises alone in the treatment of patients with KOA (P<0.05).
PEMF Bagnato et al. ⁴⁶	<ul style="list-style-type: none"> To test the effectiveness of a wearable PEMF device in the management of pain in KOA patients. 	<ul style="list-style-type: none"> n_{total}=60 Age: 67.7±10.9 years BMI: 27.4±4.3 kg/m² Gender: 72% (43) female; 28% (17) male; n_{Experimental}= 30 Age: 68.6±11.9 years BMI: 27.7±4.6 kg/m² Gender: 70% (21) female; 30% (9) male; n_{Control}= 30 Age: 66.9±10 years BMI: 27.1±4.1 kg/m² Gender: 87% (22) female; 13% (8) male. 	<ul style="list-style-type: none"> Experimental – PEMF (frequency is 27.12MHz, pulse rate of 1000Hz and a 100 s burst width with a peak burst output power of the 12 cm antenna of -0.0098W that covers a surface area of -103cm²) – 12h per day, during 1 month; Control – <i>Placebo</i> PEMF (same procedures as in the experimental group, however without a functional electromagnetic device) – 12h per day, during 1 month. 	<ul style="list-style-type: none"> Disability – WOMAC; NSAID and analgesic intake – Self-reported; Pain – VAS; PPT – Tight pressure algometry; QOL – SF-36. 	<ul style="list-style-type: none"> After 1 month, PEMF induced significant improvements (P<0.05), all evaluated outcomes, except for the SF-36 mental health (P=0.6). Also, after 1 month, PEMF induced a significant reduction (P<0.05) in VAS pain and WOMAC scores compared with placebo.

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Diet Christensen et al. ³⁷	<ul style="list-style-type: none"> To compare results of obese KOA patients who, after an intensive weight loss regimen, received 1 year of either dietary support, a knee exercise program, or "no attention". 	<ul style="list-style-type: none"> $n_{\text{total}}=192$ Age: 62.5 years Weight: 103.2 kg Gender: 81% (156) female; 9% (36) male; $n_{\text{diet}}=64$ Age: 63±6.5 years Weight: 103.6±14.8 kg Height: 1.66±0.08 m BMI: 37.6±4.5 kg/m² Gender: 81% (52) female; 19% (12) male; $n_{\text{exercise}}=64$ Age: 62.9±5.8 years Weight: 101±14 kg Height: 1.66±0.08 m BMI: 36.5±4.4 kg/m² Gender: 81% (52) female; 19% (12) male; $n_{\text{control}}=64$ Age: 61.7±6.8 years Weight: 105±16.1 kg Height: 1.66±0.09 m BMI: 37.9±5.3 kg/m² Gender: 80% (51) female; 20% (13) male. 	<ul style="list-style-type: none"> Diet – Initial diet (8 week of low-energy diet 810 kcal/day plus 8 weeks of hypo-energy diet 1,250 kcal/day) + Long-term diet (participants met weekly at the dietary unit, attending sessions that lasted approximately 1 hour – 1x per week, during 52 weeks; Exercise – Initial diet (8 week of low-energy diet 810 kcal/day plus 8 weeks of hypo-energy diet 1,250 kcal/day) + Exercises (participants underwent an exercise program consisting of a warm-up phase (10 minutes), a circuit-training phase (45 minutes), and a cool down/stretching phase (5 minutes)) – 3 x, per week, during 52 weeks; Control – Initial diet (8 week of low-energy diet 810 kcal/day plus 8 weeks of hypo-energy diet 1,250 kcal/day). 	<ul style="list-style-type: none"> Body composition – X-ray absorptiometry; Disability – KOOS; Function – 6 min walk test; Pain – VAS; QOL – SF-36. 	<ul style="list-style-type: none"> The diet group showed to be more powerful in reduction the weight kg (P=0.002), weight % (P=0.001), weight loss (P=0.002), BMI (P=0.003) and fat mass (P=0.001) after 68 weeks follow up, in comparison to the other 2 groups. In the other evaluated outcomes there was not found any statistical differences (P>0.05).
PT Modalities Mascarin et al. ³⁸	<ul style="list-style-type: none"> To evaluate the effects of kinesiotherapy, US and TENS in management of bilateral KOA. 	<ul style="list-style-type: none"> $n_{\text{total}}=40$; $n_{\text{kinesiotherapy}}=16$ Age: 59.6±7.2 years Weight: 71.1±10.8 kg Height: 1.55±0.06 m; $n_{\text{TENS}}=12$ Age: 64.8±7.0 years Weight: 73.9±13.7 kg Height: 1.53±0.07 m; $n_{\text{US}}=12$ Age: 62.8±7.6 years Weight: 71.3±10.0 kg Height: 1.54±0.06 m. 	<ul style="list-style-type: none"> Kinesiotherapy – Stretching (done actively in all lower limb using static method – 3x each muscular group 30 sec) + Isometric exercises (strengthen adductor muscles + strengthen quadriceps muscles + strengthen hamstring muscles + strengthen abductor muscles – 30 reps each exercise 6 sec in max contraction and 3 sec rest between reps) – 20 min, 2x per week, 12 weeks; TENS – TENS (100Hz frequency pulse width of 50 μs, intensity set at the individual subject's sensorial threshold, modulation up to 50% of variation frequency, quadratic biphasic symmetrical pulse – by self-adhesive 5x5 cm percutaneous electrodes, during 20 min) + Kinesiotherapy (same process described earlier) – 40 min, 2x per week, 12 weeks; US – US (continuous waves of 1 MHz frequency and 0.8 W/cm² – by a 5 cm diameter applicator, during 3 to 4 min) + Kinesiotherapy (same process described earlier) – 25 min, 2x per week, 12 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – 6 min walking test; Pain – VAS; ROM – Goniometer. 	<ul style="list-style-type: none"> Pain: In the intra-group comparisons (before vs. after) a significant decrease (at least P<0.009) was observed in the VAS in all groups for both knees except for the left knee in the US group (P=0.54). There were not found differences between groups (P>0.05); ROM: In the intra-group comparisons, for extension, increases (at least P<0.003) were found in the Kinesiotherapy and TENS groups for both knees, but not in the US group (at least P>0.21). There were not significant differences in the flexion in all groups (P>0.05). There were not found differences between groups (P>0.05); WOMAC: The WOMAC total scores and the score for each dimension improve significantly (at least P<0.01) in all groups in the intra-group comparisons. In between group comparisons the Kinesiotherapy and TENS group were better in Physical Function and Total Score (P<0.05) in comparison with US;

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Bennell et al. ⁴⁹	<ul style="list-style-type: none"> To investigate whether 2 additional physiotherapy visits improve the outcomes with continued home exercise over KOA patients. 	<ul style="list-style-type: none"> n_{total} = 100 Age: 62.4±7.3 years Weight: 82.7±14.3 kg Height: 1.66±0.07 m BMI: 29.6±4.1 kg/m² Gender: 52% (52) female; 48% (48) male; $n_{physiotherapist}$ = 40 Age: 60.5±6.6 years Weight: 81.6±15.1 kg Height: 1.66±0.1 m BMI: 29.4±3.8 kg/m² Gender: 60% (24) female; 40% (16) male; $n_{control}$ = 38 Age: 63.7±7 years Weight: 82.2±13.8 Kg Height: 1.66±0.09 m BMI: 29.6±4.3 kg/m² Gender: 47% (18) female; 53% (20) male. 	<ul style="list-style-type: none"> Experimental – Home exercises (weight-bearing neuromuscular exercises + non-weight-bearing quadriceps strengthening exercises) + 2 Physiotherapy supervised sessions (performed at 8 and 16 weeks) – 30 to 40 min, 4 x per week, during 24 weeks; Control – Home exercises (weight-bearing neuromuscular exercises + non-weight-bearing quadriceps strengthening exercises) – 30 to 40 min, 4 x per week, during 24 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Pain – VAS. 	<ul style="list-style-type: none"> Function: In the intra-group comparisons it was found improvements in the Kinesiotherapy and US groups (P=0.003 and P=0.04 respectively), but not in the TENS group (P>0.05). There was no significant difference between groups for pain or WOMAC (P>0.05).
Electric Stimulation Atamaz et al. ⁴⁵	<ul style="list-style-type: none"> To compare the effectiveness of TENS, IFCs, and SWD against each other and sham intervention with exercise training and education as a multimodal package. 	<ul style="list-style-type: none"> n_{total} = 203 Gender: 82.3% (167) female; 17.7% (36) male; n_{TENS} = 37 Age: 61.9±6.9 years BMI: 28.4±3.5 kg/m² Gender: 83.8% (31) female; 16.2% (6) male; $n_{TENS\ sham}$ = 37 Age: 60.7±6.5 years BMI: 29.4±4.1 kg/m² Gender: 73% (27) female; 27% (10) male; n_{IFC} = 31 Age: 62±7.9 years BMI: 29.8±3.4 kg/m² Gender: 87.1% (27) female; 12.9% (4) male; $n_{IFC\ sham}$ = 35 Age: 61.3±7.8 years 	<ul style="list-style-type: none"> TENS – TENS (80Hz frequency with 10 to 30mA intensity for 20 min – 4 surface electrodes (5x5 cm) placed over the painful area) – 5 x per week, during 3 weeks Exercises (warm-up (5 to 6 min jogging period + 10 min stretching exercises) + strengthening exercises (isometric quadriceps + chair lift + minisquats) – 3 x per week, during 3 weeks; TENS Sham – TENS Sham (same procedures as TENS group however the machine was not working) – 5 x per week, during 3 weeks + Exercises (warm-up (5 to 6 min jogging period + 10 min stretching exercises) + strengthening exercises (isometric quadriceps + chair lift + minisquats) – 3 x per week, during 3 weeks; IFC – IFC (100Hz frequency generated by 4kHz sinusoidal waves for 20 min – 2 electrodes (8x6 cm) were placed onto the knee region) – 5 x per week, during 3 weeks + Exercises (warm-up (5 to 6 min jogging period + 10 min stretching exercises) + strengthening exercises (isometric quadriceps + chair lift + minisquats) – 3 x per week, during 3 weeks; IFC-Sham – IFC-Sham (same procedures as IFC group however the machine was not working) – 5 x per week, during 3 weeks + Exercises (warm-up (5 to 6 min jogging period + 10 min stretching exercises) + strengthening exercises (isometric quadriceps + chair lift + minisquats) – 3 x per week, during 3 weeks; SWD – SWD (27.12MHz frequency, an input of 300W and a mean output of 3.2W) – 5 x per week, during 3 weeks + Exercises (warm-up (5 to 6 min jogging period + 	<ul style="list-style-type: none"> Disability – WOMAC and NHP; Function – 15 m time to walk; Pain – VAS; ROM – Goniometer. 	<ul style="list-style-type: none"> A significant improvement (P<0.05) was found in VAS, WOMAC (function), NHP and 15 m time to walk in all treatment groups over time, yet without a significant difference among the groups (P>0.05); In paired comparison (treatment vs sham) no significant differences (P>0.05) were found in all group within the variables studied.

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
IFC Gundog et al. ⁶⁶	<ul style="list-style-type: none"> To compare the effectiveness of different amplitude-modulated frequencies of IFC and sham IFC on KOA. 	<p>BMI: 30.4±4.9 kg/m² Gender: 80% (26) female; 20% (7) male; • $n_{\text{IFC}}=31$ Age: 61.6±7.4 years BMI: 28.5±4.2 kg/m² Gender: 87.1% (27) female; 12.9% (4) male; • $n_{\text{sham}}=32$ Age: 61.4±8.2 years BMI: 29.5±3.4 kg/m² Gender: 84.4% (27) female; 15.6% (5) male.</p> <p>• $n_{\text{total}}=60$ Gender: 80% (48) female; 20% (12) male; • $n_{\text{IFC}}=15$ Age: 59.6±8.4 years BMI: 28.1±3.5 kg/m² Gender: 80% (12) female; 20% (3) male; • $n_{\text{sham}}=15$ Age: 59.6±8.1 years BMI: 29.5±4.3 kg/m² Gender: 80% (12) female; 20% (3) male; • $n_{\text{IFC}}=15$ Age: 60.2±8.6 years BMI: 28.7±4.5 kg/m² Gender: 80% (12) female; 20% (3) male; • $n_{\text{sham IFC}}=15$ Age: 60.5±8.6 years BMI: 28.8±2.7 kg/m² Gender: 80% (12) female; 20% (3) male.</p>	<ul style="list-style-type: none"> 10 min stretching exercises + strengthening exercises (isometric quadriceps + chair lift + minisquats) – 3 x per week, during 3 weeks; SWD Sham – SWD Sham (same procedures as SWD group however the machine was not working) – 5 x per week, during 3 weeks + Exercises (warm-up (5 to 6 min jogging period + 10 min stretching exercises) + strengthening exercises (isometric quadriceps + chair lift + minisquats) – 3 x per week, during 3 weeks. IFC 40 – IFC (40Hz frequency generated by bipolar 4kHz applied by two electrodes (8x6 cm) placed laterally on the patella) – 20 min each session, 5x per week, during 3 weeks; IFC 100 – IFC (100Hz frequency generated by bipolar 4kHz applied by two electrodes (8x6 cm) placed laterally on the patella) – 20 min each session, 5x per week, during 3 weeks; IFC 180 – IFC (180Hz frequency generated by bipolar 4kHz applied by two electrodes (8x6 cm) placed laterally on the patella) – 20 min each session, 5x per week, during 3 weeks; Sham IFC – (pads in the same location described earlier, but no electrical stimulation was applied to the probes) – 20 min each session, 5x per week, during 3 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – 15m walking time; Pain – VAS; ROM – Goniometer. 	<ul style="list-style-type: none"> All variables of all groups improved significantly (P<0.05), comparing with their baseline, immediately after treatment and at 1 month follow-up. The only exception was in WOMAC stiffness in the IFC 180 and Sham IFC groups, after treatment and at 1 month.
NMES Mizusaki et al. ⁷⁵	<ul style="list-style-type: none"> To investigate the effect NMES plus Exercise on pain and functional improvement in KOA patients compared to exercise alone. 	<p>• $n_{\text{total}}=100$ Gender: 86% (86) female; 14% (14) male; • $n_{\text{Experimental}}=50$ Age: 60.6±6.7 years BMI: 30.1±3.8 kg/m² Gender: 92% (46) female; 8% (4) male; • $n_{\text{Control}}=50$ Age: 61.5±6.9 years BMI: 29.7±4.1 kg/m² Gender: 80% (40) female; 20% (10) male.</p>	<ul style="list-style-type: none"> Experimental – NMES (two 7.5 x 13 cm self-adhesive electrodes placed over the quadriceps) pulsed current, biphasic, asymmetrical, rectangular waveform, frequency 50Hz, pulse duration 250 s, contraction time 10 sec, rest time 30 sec every 20 min + Exercise (10 min on a stationary bicycle + stretching of hamstring muscles (3 reps of 30 sec) with the aid of an elastic band + loaded quadriceps strengthening exercises combined with NMES) – 2x per week, 8 weeks, 40 min each session; Control – Exercise (10 min on a stationary bicycle + stretching of hamstring muscles (3 reps of 30 sec) with the aid of an elastic band + knee extension exercises performed for 3 sets of 15 reps with rest intervals of 30-45 sec between set) – 2x per week, 8 weeks, 40 min each session; 	<ul style="list-style-type: none"> Disability – WOMAC; Function – TUG; Pain – NPRS. 	<ul style="list-style-type: none"> Both groups improve significantly (P<0.05) in comparison with the baseline in all evaluated variables. However, there were not significant different (P>0.05) in between-group comparison in all evaluated variables.

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
de Oliveira et al. ³⁹	<ul style="list-style-type: none"> To determine the effects of NEMS and LLLT on neuromuscular parameters and health status in KOA patients. 	<ul style="list-style-type: none"> $n_{total}=44$; $n_{NEMS}=15$ Age: 69.3±5.5 years Height: 1.52±0.1 m Weight: 77.5±13.7 kg; $n_{LLLT}=15$ Age: 67.7±4.7 years Height: 1.59±0.1 m Weight: 74.7±11.1 kg; $n_{combined}=14$ Age: 69.6±4.7 years Height: 1.55±0.15 m Weight: 70.9±8.9 kg. $n_{LLLT}=224$ 	<ul style="list-style-type: none"> NEMS – NEMS (pulsed current, stimulation frequency 80 Hz, pulse duration 400 s, stimulation intensity 40% of maximal isometric voluntary contraction) – 18–32 min, 2x per week, during 8 weeks; LLLT – Laser (dose 4–6 J per point, 6 points at the knee joint, 30 sec per point) – 2–3 min, 2x per week, during 8 weeks; Combined – NEMS (pulsed current, stimulation frequency 80 Hz, pulse duration 400 s, stimulation intensity 40% of maximal isometric voluntary contraction) + Laser (dose 4–6 J per point, 6 points at the knee joint) – 20–35 min, 2x per week, during 8 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Knee extensors' electrical activity – Electromyography; Knee extensors' strength – Dynamometry; Muscle thickness and anatomical cross-sectional area – Ultrasonography. 	<ul style="list-style-type: none"> Knee extensors' electrical activity and strength: All groups had significant improvements in comparison with the baseline (P<0.05). However in between-group comparison there was not found any differences (P>0.05); Muscle thickness and anatomical cross-sectional area: There was found significant improvements in comparison with the baseline in all groups (P<0.05) except for the LLLT group (P>0.05). Additionally, both NMES and Combined group had significant differences in comparison with the LLLT group (P<0.05); WOMAC: All groups had significant improvements in comparison with the baseline (P<0.05).
TENS Palmer et al. ⁷⁶	<ul style="list-style-type: none"> To determine the additional effects of TENS for KOA when combined with a group education and exercise program. 	<ul style="list-style-type: none"> $n_{total}=83$ male; $n_{TENS\ and\ knee}=73$ Age: 61.2±11.4 years BMI: 24.8±2.6 kg/m² Gender: 64.4% (47) female; 35.6% (26) male; $n_{TENS\ and\ knee}=74$ Age: 60.9±10.8 years BMI: 29.1±9 kg/m² Gender: 66.2% (49) female; 33.8% (25) male; $n_{TENS}=77$ Age: 62±9.4 years BMI: 29.8±7.4 kg/m² Gender: 49.4% (38) female; 50.6% (39) male. 	<ul style="list-style-type: none"> TENS and Knee – TENS (electrical pulses asymmetric and biphasic in continuous mode at 110Hz and 50 s with 2 electrodes on the medial and other 2 on the lateral aspect on either side of the joint line) – 20 min, 6 weeks + Exercise (education (personal objectives + pacing + managing flares + diet + medical management of KOA + local community exercise opportunities + long-term exercise adherence) + exercises (5 min warm-up + improving lower extremity strength + proprioception + function) – 1h, 6 weeks); Sham TENS and Knee – TENS dummy device (same procedures described in the active TENS) + Exercise (education (personal objectives + pacing + managing flares + diet + medical management of KOA + local community exercise opportunities + long-term exercise adherence) + exercises (5 min warm-up + improving lower extremity strength + proprioception + function) – 1h, 6 weeks); Knee – Exercise (education) personal objectives + pacing + managing flares + medical management of KOA + local community exercise opportunities + long-term exercise adherence) + exercises (5 min warm-up + improving lower extremity strength + proprioception + function) – 1h, 6 weeks. 	<ul style="list-style-type: none"> Adherence – 5-point Likert scale; Change – 7-point Likert scale; Disability – WOMAC; Self-efficacy – 5-point Likert scale. Strength – Digital myometer. 	<ul style="list-style-type: none"> All outcomes improved over time (P<0.05). However, there were no differences between trial arms and time x trial arms (P>0.05) in the outcomes.
Exercise FMV Rabin et al. ⁶⁵	<ul style="list-style-type: none"> To evaluate the effects of FMV on physical functioning in symptomatic KOA patients. 	<ul style="list-style-type: none"> $n_{total}=50$ Gender: 78% (39) female; 22% (11) male; $n_{experimental}=25$ Age: 73.7±5.2 years Gender: 92% (22) female; 6% (3) male; $n_{control}=25$ Age: 75.1±5.7 years Gender: 84% (17) female; 16% (8) male. 	<ul style="list-style-type: none"> Experimental – Focal Muscles Vibration (applied bilaterally with a fixed frequency of 100 Hz and an amplitude of approximately 0.2–0.5 mm on the distal part of the quadriceps, in the insertion of the intermedius femoris, rectus femoris, vastus femoris and vastus lateralis muscles) – 10 min, 3 applications per day, during 3 consecutive days; Control – Sham intervention (the same procedure has the experimental group, however without the machine touching the skin) – 10 min, 3 applications per day, during 3 consecutive days. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – SPPB and POMA. 	<ul style="list-style-type: none"> WOMAC: There were found a statistically significant difference between the groups at 3 months (P=0.0263) and 6 months (P=0.0001). There was not found any statistical differences (P>0.05) in other evaluated times; Function: There were found a statistically significant difference between the groups at the end of the treatment (SPPB and POMA; P=0.0172 and P=0.0029) and after 3 months (SPPB and POMA; P=0.0036 and P=0.0000). There was not found any statistical differences (P>0.05) in other evaluated times.
Balance Training Knoop et al. ⁷²	<ul style="list-style-type: none"> To investigate whether stabilization, muscle strength and performance of daily activities 	<ul style="list-style-type: none"> $n_{total}=159$ Gender: 61% (97) female; 39% (62) male; 	<ul style="list-style-type: none"> Experimental – Exercises (joint stabilization + strength + daily activities performance) – 2x per week, 12 weeks with a 60 min duration + Home exercise program – 5 x per week, 12 weeks; 	<ul style="list-style-type: none"> Disability – WOMAC; Function – TUG, PSFL, WQ35, CSQ15 and QR&S39; 	<ul style="list-style-type: none"> No significantly differences (P>0.05) were found in both groups in almost all evaluated variables, except in GPE were it was significantly higher (P=0.04) in the experimental group in

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Gomiero et al. ⁶⁵	<p>exercises are more effective than just strength and performance of daily activities exercises in KOA patients.</p> <p>To compare the effectiveness of sensory-motor training vs resistance training among KOA patients.</p>	<p>n_{Experimental}= 80 Age: 62.1±7.6 years BMI: 28.8±4.8 kg/m² Gender: 66% (53) female; 47% (27) male;</p> <p>n_{Control}= 79 Age: 61.8±6.6 years BMI: 28.3±4.5 kg/m² Gender: 56% (44) female; 44% (35) male.</p> <p>n_{total}= 64; Gender: 93.3% (61) female; 4.7% (3) male;</p> <p>n_{Resistant}= 32 Age: 61.6±6.8 years Weight: 75.7±13 kg Height: 1.57±0.08 m BMI: 24.1±3.8 kg/m² Gender: 93.8% (30) female; 6.3% (2) male;</p> <p>n_{Resistance}= 32 Age: 61.8±6.4 years Weight: 75.5±12.7 Kg Height: 1.59±0.07 m BMI: 23.6±3.5 kg/m² Gender: 96.9% (31) female; 3.1% (1) male.</p>	<p>Control – Exercises (strength + daily activities performance) – 2x per week, 12 weeks with a 60 min duration + Home exercises program – 5 x per week, 12 weeks.</p> <p>Sensory-motor – Warm-up (stationary bicycle for 10 minutes) + Exercises (agility, coordination and balance (walking in different directions following verbal commands from the therapist + crossing steps while walking + crossing steps while walking back-wards + implementing sudden changes of direction; walking on several types of surfaces + maintaining posture during use of a balance board + using a mini-trampoline to expose individuals to potentially destabilizing loads) + stretching of the quadriceps, hamstrings and triceps surae) – 2x per week, 16 weeks;</p> <p>Resistance – Warm-up (stationary bicycle for 10 minutes) + Exercises (quadriceps and hamstring strengthening using ankle weights + isometric exercises for the quadriceps + stretching of the quadriceps, hamstrings and triceps surae – 10 rep x 3 sets) – 2x per week, 16 weeks.</p>	<p>Instability – Self-reported; Pain – NPRS; Proprioception – knee joint motion detection device; Strength – Isokinetic dynamometer.</p> <p>Balance – Tinetti balance; Disability – WOMAC; Function – TUG; Pain – VAS; QOL – SF-36; Strength – Isokinetic dynamometer.</p>	<p>No significantly differences (P>0.05) were found in VAS, WOMAC, TUG, strength and balance in between-group comparison. SF-36 followed the same pattern in all items except in the physical role functioning where it was obtained P=0.034;</p> <p>Intra-group comparison showed significantly differences with a P<0.001 in VAS, WOMAC, TUG, strength and balance. SF-36 followed the same pattern in all items except in the bodily pain (P=0.06), general health perceptions (P=0.098), social role functioning (P=0.932) and mental health (P=0.006).</p>
Resistance Training Anwer et al. ⁶³	To investigate the effects of isometric quadriceps exercise on muscle strength, pain, and function in KOA.	<p>n_{total}= 42 Gender: 69% (29) female; 31% (13) male;</p> <p>n_{Experimental}= 21 Age: 60.6±6.72 years Weight: 65±5 Kg Height: 1.57±0.43 m BMI: 26.5±1.8 kg/m²;</p> <p>n_{Control}= 21 Age: 61.5±6.94 years Weight: 65.6±4.5 Kg Height: 1.55±0.34 m BMI: 27.1±1.3 kg/m²;</p> <p>n_{total}= 100 Gender: 52% (52) female; 48% (48) male;</p> <p>n_{Experimental}= 50 Age: 62.7±7.3 years Weight: 83.8±13.5 kg Height: 1.68±0.09 m BMI: 29.6±3.9 kg/m² Gender: 52% (26) female;</p>	<p>Experimental – US (1.5W/cm², continuous mode, during 7 min) + Exercises (isometric quadriceps + straight leg raising + isometric hip adduction) – 5x per week, for 5 weeks;</p> <p>Control – US (1.5W/cm², continuous mode, during 7 min) – 5x per week, for 5 weeks.</p>	<p>Disability – WOMAC; Pain – NPRS; Strength – Gauge device.</p>	<p>In between-group comparisons, the maximum isometric quadriceps strength, the pain intensity and function in the isometric exercise group at the end of the 5th week were significantly greater than those of the control group (P<0.05).</p> <p>Additionally, in intra-group (baseline vs 5th week) comparisons it was found significantly improvements (P<0.05) in all evaluated outcomes in the exercise group, but not for the control group (P>0.05).</p>
Bennell et al. ⁶⁰	To compare the effects of neuromuscular and quadriceps strengthening on the knee adduction moment, pain and physical function in patients with medial KOA and varus malalignment.	<p>n_{total}= 100 Gender: 52% (52) female; 48% (48) male;</p> <p>n_{Experimental}= 50 Age: 62.7±7.3 years Weight: 83.8±13.5 kg Height: 1.68±0.09 m BMI: 29.6±3.9 kg/m² Gender: 52% (26) female;</p>	<p>Experimental – Neuromuscular strengthening (forward and backward sliding or stepping + sideways exercises + functional hip muscle strengthening + functional knee muscle strengthening + step-ups and down + balance) – 30 to 40 min, 4 x per week, during 12 weeks;</p> <p>Control – Quadriceps strengthening (quads over a roll + knee extension in sitting + knee extension with hold at 30° knee flexion + straight leg raise + outer range knee extension) – 30 to 40 min, 4 x per week, during 12 weeks.</p>	<p>Alignment – 3D gait analysis; Disability – WOMAC; Pain – VAS.</p>	<p>There was no significant between-group difference in the change in the peak knee adduction moment, pain or WOMAC (P>0.05).</p>

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TABLE III. CONTINUATION

Interventions (Authors)	Subjects	Cohorts	Outcome Measures	Results
Henriksen et al. ⁶⁷	<p>Objectives</p> <p>48% (24) male;</p> <ul style="list-style-type: none"> n_{total}= 50 <p>Age: 62.2±7.4 years</p> <p>Weight: 81.6±15.1 kg</p> <p>Height: 1.65±0.1 m</p> <p>BMI: 29.7±4.3 kg/m²</p> <p>Gender: 52% (26) female;</p> <p>48% (24) male.</p> <ul style="list-style-type: none"> To investigate the effects of exercise on pressure-pain sensitivity in KOA patients. 	<ul style="list-style-type: none"> Experimental – Supervised exercises therapy (10 min warm-up in a bicycle ergometer + circuit training program focusing on strength + coordination exercises of the trunk, hips, and knees) – 60 min, 3x per week, during 12 weeks; Control – Daily life activities – during 12 weeks. 	<ul style="list-style-type: none"> Disability – KOOS; PPT and temporal summation – Cuff pressure algometry. 	<ul style="list-style-type: none"> Statistical differences (P<0.05) were found from baseline for the PPT, temporal summation and KOOS pain, all in favor for the experimental group. The KOOS symptoms, daily living sports/recreation and QOL did not showed any statistical differences (P>0.05).
DeVita et al. ⁶⁸	<ul style="list-style-type: none"> To assess the effect of quadriceps strengthening on quadriceps muscle force, power, and work and tibiofemoral compressive loads during walking in KOA adults. <p>n_{total}= 30</p> <p>Age: 57.1±7.7 years</p> <p>BMI: 27.1±4.7 kg/m²</p> <p>Gender: 60% (18) female;</p> <p>40% (12) male;</p> <ul style="list-style-type: none"> n_{experimental}= 15 <p>Age: 58.1±6.5 years</p> <p>Height: 1.73±0.07 m</p> <p>Weight: 79.4±14.8 kg</p> <p>BMI: 26.4±4 kg/m²</p> <p>Gender: 66.7% (10) female;</p> <p>33.3% (5) male;</p> <ul style="list-style-type: none"> n_{control}= 15 <p>Age: 56.2±8.9 years</p> <p>Height: 1.73±0.11 m</p> <p>Weight: 83.8±18.7 kg</p> <p>BMI: 27.9±3.9 kg/m²</p> <p>Gender: 53.3% (8) female;</p> <p>46.7% (7) male;</p> <ul style="list-style-type: none"> n_{total}= 105 <p>Gender: 100% (105) female;</p> <ul style="list-style-type: none"> n_{experimental}= 52 <p>Age: 70±6.5 years;</p> <ul style="list-style-type: none"> n_{control}= 53 <p>Age: 72.4±6.5 years.</p>	<ul style="list-style-type: none"> Experimental – Resistance training (warm-up (stationary bicycle or treadmill – 5 to 10 min) + leg extension, leg press and forward lunge exercises each performed - 3 sets of 10 repetitions with loads, wherein the initial two weeks were performed at 60% 3RM, the following two weeks at 70% 3RM and the remaining 8 weeks at 85% 3RM) – 60 min, 3 x per week, during 12 weeks; Control – No attention 	<ul style="list-style-type: none"> Disability – WOMAC; Gait analysis (muscle forces and joint compressive forces) – infrared 3D motion analysis system in combination with reflective markers and force platform; Strength – Isokinetic dynamometer. 	<ul style="list-style-type: none"> Between-group comparison showed significant statistical differences (P<0.037) in WOMAC (pain, function and total), isokinetic quadriceps muscle strength and some Gait variables (maximum negative quadriceps power and walking velocity). The other Gait variables did not show significant statistical differences (P>0.05).
SWI Imamura et al. ⁶⁹	<ul style="list-style-type: none"> To assess the efficacy and safety of SWT for disabling pain due to primary KOA. <p>n_{total}= 52</p> <p>Age: 70±6.5 years;</p> <ul style="list-style-type: none"> n_{control}= 53 <p>Age: 72.4±6.5 years.</p>	<ul style="list-style-type: none"> Experimental – SWT (2,000 RESWT impulses per session, positive energy flux density 0.10–0.16 mJ/mm² and impulses with a frequency of 8 Hz) – 1 x per week, during 3 weeks; Control – Placebo SWT (same procedure as the experimental group, however without a functional device) – 1 x per week, during 3 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Pain – VAS; PPT – Lumbar, thigh and calf pressure algometry. 	<ul style="list-style-type: none"> Compared with placebo treatment, SWT had a statistically significant improvement only in WOMAC scores for pain and a few of the PPT measurements (P<0.05).

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Hydrotherapy Dias et al. ⁶¹	<ul style="list-style-type: none"> To assess the impact of hydrotherapy on pain, function, and muscle function in KOA patients. 	<ul style="list-style-type: none"> n_{total} = 75 Gender: 100% (75) female; $n_{experimental}$ = 33 Age: 70.8±5 years BMI: 30.5±4.3 kg/m² $n_{control}$ = 32 Age: 71±5.2 years BMI: 30±5.2 kg/m² n_{total} = 87 Gender: 100% (87) female; $n_{experimental}$ = 43 Age: 63.8±2.4 years Height: 1.62±0.05 m Weight: 69.6±10.3 kg BMI: 26.6±3.8 kg/m² $n_{control}$ = 44 Age: 63.9±2.4 years Height: 1.62±0.05 m Weight: 71±11.2 kg BMI: 27.1±3.5 kg/m² n_{total} = 60 Gender: 68.3% (41) female; 31.7% (19) male; $n_{experimental}$ = 31 Age: 67.3±5.9 years BMI: 29.2±0.8 kg/m² Gender: 74.2% (23) female; 25.8% (8) male; $n_{control}$ = 29 Age: 68.7±6.7 years BMI: 30.4±0.9 kg/m² Gender: 37.9% (18) female; 62.1% (11) male. 	<ul style="list-style-type: none"> Experimental – Warm-up (walking in the water increasing velocity + lower limb stretching exercises – 5 min) + Strengthening exercises (closed kinetic chain exercises using floats + multidirectional walking tasks – 30 min) + Cool-down (light walking + breathing exercises – 5 min) – 2 x per week, during 6 weeks + Educational program (face to face information about the diagnosis, symptoms, prognosis, and basic care of KOA during daily activities) – 1 x per week, during 6 weeks; Control – Educational program (face to face information about the diagnosis, symptoms, prognosis, and basic care of KOA during daily activities) – 1 x per week, during 6 weeks. Experimental – Aquatic resistance training (barefoot + small resistance fins + large resistance boots) – 1 h, 3 x per week, during 6 weeks; Control – Usual leisure activities. 	<ul style="list-style-type: none"> Disability – WOMAC; Strength, power, and resistance – Isokinetic dynamometer. Body composition – X-ray absorptiometry; Strength, power, and resistance – Isokinetic dynamometer; Walking speed – UKK 2 km walking test. 	<ul style="list-style-type: none"> Between-group comparison showed significant statistical differences ($P \leq 0.05$) at WOMAC (pain and function), Strength (extension and flexion), flexion Power and extension Resistance. However, no significant statistical differences ($P > 0.05$) were found at extension Power and flexion Resistance. After the 4-month intervention there was a significant decrease ($P \leq 0.004$) in BMI, fat and body mass, and increase ($P = 0.002$) in walking speed in favor of the intervention group. In contrast, lean mass and KOOS showed no change ($P > 0.05$).
Taglietti et al. ⁶⁰	<ul style="list-style-type: none"> To compare the effectiveness of aquatic exercises with patient-education in KOA patients. 	<ul style="list-style-type: none"> n_{total} = 60 Gender: 68.3% (41) female; 31.7% (19) male; $n_{experimental}$ = 31 Age: 67.3±5.9 years BMI: 29.2±0.8 kg/m² Gender: 74.2% (23) female; 25.8% (8) male; $n_{control}$ = 29 Age: 68.7±6.7 years BMI: 30.4±0.9 kg/m² Gender: 37.9% (18) female; 62.1% (11) male. 	<ul style="list-style-type: none"> Experimental – Aquatic resistance training (Warm-up (walking + patellar mobilization + stretching the leg muscles) – 5 min + Knee and hip isometric and dynamic exercises with elastic bands (gluteus, adductors and abductors, quadriceps, hamstrings, and triceps surae) – 15 min + Aerobic exercises (stationary running or deep water-running) – 20 min + Proprioceptive exercises – 10 min + Cool down (massage + relaxation) – 10 min) – 1 h, 2 x per week, during 8 weeks; Control – Educational program (guidance on the disease and its complications were included strategies for pain control (cognitive and pharmacological), physical exercise, nutrition, and weight control, medications (type, interactions, side effects, and updates), balance, proprioception, preventing falls, and how to deal with chronic pain) – 2h, 1 x per week, during 8 weeks + Home exercises (warm-up + self-stretching + isometric and dynamic exercises + proprioceptive and functional exercises of the lower limbs + cool down) – 3 x per week, during 8 weeks. 	<ul style="list-style-type: none"> Depression – YGDS; Disability – WOMAC; Function – TUG; Pain – VAS; QOL – SF-36. 	<ul style="list-style-type: none"> In intra-group analysis (Aquatic Resistance Training group) the outcomes that showed significant statistical differences ($P < 0.05$) were SF-36 (physical function) and WOMAC (total and pain) between the baseline and the week 8 and at 3 months; In between-group analysis showed significant statistical differences ($P < 0.05$) in the WOMAC total at week 8 and at month 3, and WOMAC pain at week 8. Additionally, YGDS showed a $P < 0.05$ at the baseline; Other outcomes did not show significant statistical differences ($P > 0.05$) neither in intra-group analysis nor in between-group analysis in all evaluated time period.
Musculoskeletal Manipulations Abbott et al. ⁶⁰	<ul style="list-style-type: none"> To investigate the addition of manual therapy to exercise therapy for the reduction of pain and increase of physical function in people with KOA, and whether “booster sessions” compared to consecutive sessions. 	<ul style="list-style-type: none"> n_{total} = 75 Gender: 61.3% (46) female; 38.7% (29) male; n_{total} = 19 Age: 64±10 years BMI: 29.2±6.1 kg/m² Gender: 58% (11) female; 41% (8) male; n_{total} = 19 Age: 65±10 years BMI: 30.2±5.6 kg/m² Gender: 58% (11) female; 41% (8) male; n_{total} = 18 Age: 61±12 years 	<ul style="list-style-type: none"> Exercise consecutive sessions – Exercise (aerobic + strengthening + neuromuscular coordination control exercises) – 45 min, 12 sessions in the first 9 weeks Exercise booster sessions – Exercise (aerobic + strengthening + neuromuscular coordination control exercises) – 45 min, 12 sessions in the first 9 weeks plus 8 consecutive sessions in the first 9 weeks, 2 booster sessions at 5 months, 1 booster session at 8 months, and 1 booster session at 11 months, also for a total of 12 sessions; Manual therapy with exercise consecutive sessions – Exercise (aerobic + strengthening + neuromuscular coordination control exercises) – 45 min, 12 sessions in the first 9 weeks + Manual Therapy (knee flexion + anteroposterior-directed force to the tibiofemoral joint + knee extension + posterioanterior-directed force to the tibiofemoral joint + patellar gliding force + manual stretch to quadriceps, hamstrings, triceps surae muscles + soft tissue manipulation) – 30 to 45 min, 12 sessions; Manual therapy with exercise booster sessions – Exercise (aerobic + strengthening + neuromuscular coordination control exercises) – 45 min, 12 sessions in the first 9 weeks plus 8 consecutive sessions in the first 9 weeks, 2 booster sessions at 5 months, 	<ul style="list-style-type: none"> Disability – WOMAC; Function – TUG test, the 30 sec sit-to-stand test, and the 40-meter fast-paced walk test; Pain – NPRS. 	<ul style="list-style-type: none"> In the primary outcome (WOMAC) there was found significant benefit from booster sessions ($P = 0.009$) and manual therapy ($P = 0.023$) over exercise therapy alone after 9 weeks that maintained at 1-year follow-up ($P = 0.005$ and $P = 0.021$, respectively). Pain and function it was not found statistically significant differences ($P > 0.05$) in between-groups comparison.

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Murthi et al. ⁷⁶	<ul style="list-style-type: none"> To compare long-term results between mobilization with movements, passive joint mobilization and electrotherapy in KOA patients. 	<p>Subjects</p> <p>BMI: 27.64±7.7 kg/m² Gender: 67% (12) female; 33% (6) male; • $n_{\text{total}} = 19$ Age: 64±10.2 years BMI: 29.84±6.6 kg/m² Gender: 63% (12) female; 37% (7) male. • $n_{\text{mob}} = 64$; Gender: 87.5% (56) female; 12.5% (8) male; • $n_{\text{active mobilization}} = 21$ Age: 54.2±7.3 years BMI: 30.8±5 kg/m² Gender: 100% (21) female; • $n_{\text{passive mobilization}} = 21$ Age: 56.3±6.6 years BMI: 30.7±4.3 kg/m² Gender: 76.2% (16) female; 23.8% (5) male; • $n_{\text{electrotherapy}} = 22$ Age: 57.8±6.2 years BMI: 32.6±5.7 kg/m² Gender: 86.4% (19) female; 13.6% (3) male;</p>	<p>I booster session at 8 months, and 1 booster session at 11 months, also for a total of 12 sessions + <i>Manual Therapy</i> (knee flexion + anteroposterior-directed force to the tibiofemoral joint + knee extension + posteromedial-directed force to the tibiofemoral joint + patellar gliding force + manual stretch to quadriceps, hamstrings, triceps surae muscles + soft tissue manipulation) – 30 to 45 min, 12 sessions.</p> <ul style="list-style-type: none"> Mobilization with movement – Exercise (Aerobic (static cycle – 10 min) + Active ROM (knee in extension to full-flexion + knee in flexion to full-extension exercises – 10 reps) + Strength (quadriceps isometric contractions – 10 sec, 10 reps) + Stretching (gastrocnemius-soleus + hamstring muscle stretching exercises – 30 sec; 3 reps) – 20 min, 3x per week, during 4 weeks + <i>Active mobilization</i> (Sustained manual glide of the tibia (medial, lateral, or rotation) during active knee flexion and extension (10 reps; 3 sets)) – 30 min, 3x per week, during 4 weeks + <i>Home exercises</i> (same exercises described earlier) – 2 x per day, every day, 52 weeks; Passive Mobilization – Exercise (Aerobic (static cycle – 10 min) + Active ROM (knee in extension to full-flexion + knee in flexion to full-extension exercises – 10 reps) + Strength (quadriceps isometric contractions – 10 sec, 10 reps) + Stretching (gastrocnemius-soleus + hamstring muscle stretching exercises – 30 sec; 3 reps) – 20 min, 3x per week, during 4 weeks + <i>Passive mobilization</i> (Knee distraction and dorsal glides, ventral glides and patellar glides in all directions (2–5 oscillations per sec, for 1–2 min)) – 2 x per week, during 4 weeks + <i>Home exercises</i> (same exercises described earlier) – 2 x per day, every day, 52 weeks; Electrotherapy – Exercise (Aerobic (static cycle – 10 min) + Active ROM (knee in extension to full-flexion + knee in flexion to full-extension exercises – 10 reps) + Strength (quadriceps isometric contractions – 10 sec, 10 reps) + Stretching (gastrocnemius-soleus + hamstring muscle stretching exercises – 30 sec; 3 reps) – 20 min, 3x per week, during 4 weeks + <i>TENS</i> (4 electrodes in continuous mode, with 110 Hz and 50 s) – 20 min, 3x per week, during 4 weeks + <i>US</i> (1-MHz frequency, 0.8 W/cm² power, applied at the medial and lateral knee compartments) – 5 min, 3x per week, during 4 weeks + <i>Home exercises</i> (same exercises described earlier) – 2 x per day, every day, 52 weeks; Experimental – <i>Self-management</i> OAK (holistic approach including osteoarthritis explanation and implications, self-management skills (goal-setting, problem-solving, modelling, positive thinking and improving self-efficacy), medications (types, interactions and current trends), correct use of analgesia (use, therapeutic dosing, types and side effects), pain management strategies (cognitive and pharmacologic), fitness and exercise (strength, flexibility, aerobic and balance), joint protection, nutrition and weight control, fall prevention (balance and proprioception), environmental risks, poly-pharmacy and coping negative emotions) – 2.5 h per week, during 6 weeks; Control – <i>Self-management</i> ASMP (holistic approach including osteoarthritis general overview, self-management skills (goal-setting, problem-solving, modelling, positive thinking and improving self-efficacy), medications general overview, pain management strategies (cognitive and pharmacologic), fitness and exercise general information, joint protection, nutrition and weight control, fall prevention (balance and proprioception), environmental risks, poly-pharmacy and coping negative emotions) – 2.5 h per week, during 6 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; ROM – Goniometer; PPT – Knee pressure algometry; Pain – VAS; Strength – Dynamometer; Function – ALF. 	<ul style="list-style-type: none"> After 4 weeks of treatment no significant statistical differences (P>0.05) were found between the three groups in all evaluated outcomes; In 1 year, follow-up there were found significant statistical differences (P<0.05) between Active and Passive Mobilizations vs Electrotherapy groups in all outcomes, except in the WOMAC stiffness and in the right and left hamstring strength (P>0.05).
Self-care Coleman et al. ³⁶	To compare the effectiveness of two self-management programs in KOA patients.	<p>• $n_{\text{total}} = 146$ Gender: 75.7% (109) female; 24.3% (37) male; • $n_{\text{experimental}} = 71$ Age: 65±7.9 years Gender: 80.3% (57) female; 19.7% (14) male; • $n_{\text{control}} = 75$ Age: 65±8.7 years Gender: 69.3% (52) female; 30.7% (23) male.</p>	<ul style="list-style-type: none"> Experimental – <i>Self-management</i> OAK (holistic approach including osteoarthritis explanation and implications, self-management skills (goal-setting, problem-solving, modelling, positive thinking and improving self-efficacy), medications (types, interactions and current trends), correct use of analgesia (use, therapeutic dosing, types and side effects), pain management strategies (cognitive and pharmacologic), fitness and exercise (strength, flexibility, aerobic and balance), joint protection, nutrition and weight control, fall prevention (balance and proprioception), environmental risks, poly-pharmacy and coping negative emotions) – 2.5 h per week, during 6 weeks; Control – <i>Self-management</i> ASMP (holistic approach including osteoarthritis general overview, self-management skills (goal-setting, problem-solving, modelling, positive thinking and improving self-efficacy), medications general overview, pain management strategies (cognitive and pharmacologic), fitness and exercise general information, joint protection, nutrition and weight control, fall prevention (balance and proprioception), environmental risks, poly-pharmacy and coping negative emotions) – 2.5 h per week, during 6 weeks. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – TUG; Pain – VAS; QOL – SF-36; ROM – Goniometer; Strength – Dynamometer. 	<ul style="list-style-type: none"> WOMAC: Pain, Physical Function and Total scores improved more significantly (P<0.05) in the OAK group than in the control group in 6-month follow-up; QOL: There were improvements (P<0.05) from baseline to 8 weeks and 6 months in the SF-36 scales Physical Function, Role Physical, Body Pain, Vitality and Social Function in the OAK group compared with the control group. Pain: Decreased either for the OAK and control group during the 8-week intervention phase (P<0.001); Function: The TUG test results showed a significant improvement (P<0.05) in the OAK group compared with the control group postintervention and at 6 months; Strength: Hamstring strength improved (P<0.05) in both right and left legs in the OAK group compared with the control group at 6 months. There was no significant difference between groups in quadriceps strength in either the left or right legs; ROM: OAK group improved significantly (P<0.05) compared with the control group the ROM in extension in both knees and flexion of the left knee.

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TABLE III. CONTINUATION

Interventions (Authors)	Objectives	Subjects	Cohorts	Outcome Measures	Results
Wageck et al. ⁶⁷ KT	<ul style="list-style-type: none"> To analyze the effects of KT in pain, swelling, strength, function and knee-related health status in KOA patients. 	<ul style="list-style-type: none"> $n_{total}=76$ Gender: 86.8% (66) female; 13.2% (10) male; $n_{experimental}=38$ Age: 69.6±6.9 years Height: 1.61±0.09 m Weight: 77.8±15 kg BMI: 30.4±9 kg/m² Gender: 92% (35) female; 8% (3) male; $n_{control}=38$ Age: 68.6±6.3 years Height: 1.6±0.08 m Weight: 79.9±10.2 kg BMI: 31.3±4.1 kg/m² Gender: 82% (31) female; 18% (7) male. 	<ul style="list-style-type: none"> Experimental – KT (KT techniques to treat pain, strength and swelling) – 4 days with the tape; Control – Sham KT (2 KT I-shaped strips without any tension, across the quadriceps muscle group) – 4 days with the tape. 	<ul style="list-style-type: none"> Function – LKSS; Pain – WOMAC and Lysholm; PPT – Knee pressure algometry; Strength – Isokinetic dynamometer; Swelling – Volumetry and perimetry. 	<ul style="list-style-type: none"> There was found no significant differences (P>0.05) between the experimental group and control group for any of the outcomes investigated at the end of the 4-day intervention period, or 15 days later.
Aydoğanlı et al. ⁶⁷	<ul style="list-style-type: none"> To compare KT along with conventional treatment to treatment in KOA patients. 	<ul style="list-style-type: none"> $n_{total}=54$; $n_{experimental}=28$ Age: 52.5±9.7 years Height: 1.61±0.07 m Weight: 80.8±13.1 kg BMI: 31.2±5.1 kg/m²; $n_{control}=26$ Age: 51.2±8.9 years Height: 1.6±0.08 m Weight: 80.5±14.2 kg BMI: 31.5±4.7 kg/m²; 	<ul style="list-style-type: none"> Experimental – Usual Treatment (Hot-packs – 20 min + US – 5min + TENS – 20 min + Exercises (stretching hamstring and quadriceps muscles and isometric and isotonic exercises for quadriceps, hip adductors, gluteus medius and maximus, open chain and closed chain exercises – 10x each exercise, during 60 min)) + KT (KT Y-shaped on the quadriceps femoris with 50-70% tension, proximal to distal + KT Y-shaped on the hamstring with 50-70% tension, proximal to distal) – 5x per week, during 3 weeks; Control – Usual Treatment (Hot-packs – 20 min + US – 5min + TENS – 20 min + Exercises (stretching hamstring and quadriceps muscles and isometric and isotonic exercises for quadriceps, hip adductors, gluteus medius and maximus, open chain and closed chain exercises – 60 min)) – 5x per week, during 3 weeks. 	<ul style="list-style-type: none"> Disability – KOOS; Pain – VAS; ROM – Goniometer; Strength – Dynamometer. 	<ul style="list-style-type: none"> Comparing with the baseline the Usual Treatment group showed significant statistical differences (P<0.019) in all evaluated outcomes; Comparing with the baseline the KT group showed significant statistical differences (P<0.026) in all evaluated outcomes, except in the hamstring strength that showed a P=0.097; Between-group analysis showed that KT group did not perform better than Usual Treatment alone in the evaluated outcomes, since all outcomes reached a P>0.05.
Mutlu et al. ⁷⁷	<ul style="list-style-type: none"> To compare the effect of KT and placebo KT in KOA patients. 	<ul style="list-style-type: none"> $n_{total}=39$; Gender: 89.7% (35) female; 10.3% (3) male; $n_{experimental}=20$ Age: 54.3±6 years BMI: 30.2±3.8 kg/m² Gender: 80% (16) female; 20% (4) male; $n_{control}=19$ Age: 57.1±6.3 years BMI: 31.3±6.2 kg/m² Gender: 89.5% (17) female; 10.5% (2) male. 	<ul style="list-style-type: none"> Experimental – KT (KT Y-shaped on the quadriceps femoris with 25% tension, proximal to distal + KT Y-shaped on the hamstring with 25% tension, proximal to distal) – 3 to 4-day interval between each application, total duration from 12 to 16 days; Control – Sham KT (KT applied transverse to the muscle groups of the quadriceps and hamstring) – 3 to 4-day interval between each application, total duration from 12 to 16 days. 	<ul style="list-style-type: none"> Disability – WOMAC; Function – ALF; Pain – VAS; ROM – Goniometer; Strength – Dynamometer. 	<ul style="list-style-type: none"> Short-term (week 3) between-group comparison showed that KT was significantly superior (P<0.05) to Sham KT at walking and pain at activity and night, Pain at rest, stair up and down, transfers and WOMAC did not showed significantly statistical differences (P>0.05); Long-term (1 month) between-group comparison showed that KT was significantly superior (P<0.05) to Sham KT at walking, pain at activity and knee flexion ROM, Pain at rest and night, stair up and down, transfers, WOMAC, muscular strength, knee extension and hip ROM did not show significantly statistical differences (P>0.05).

Abbreviations: ALF, Aggregated Locomotor Function; ASES, Arthritis Self-Efficacy Scale; ASPM, Stanford University's Arthritis Self-Management Program; BDI, Beck Depression Inventory; BMRC, British Medical Research Council; BPI, Brief Pain Inventory; cm, centimeter; CSHQ15, Climbing Stairs Questionnaire; DHT, Deep Heating Therapy; FMV, Focal Muscle Vibration; GPE, Global Perceived Effect; h, hour; HADS, Hospital Anxiety and Depression Scale; HLLT, High-Level Laser Therapy; Hz, Hertz; IFC, Interferential Current; J, Joule; Kg, Kilogram; kHz, Kilohertz; KOA, Knee Osteoarthritis; KOOS, Knee Injury and Osteoarthritis Outcome Score; KT, Kinesio Tape®; LKSS, Lysholm Knee Scoring Scale; LLLT, Low-Level Laser Therapy; m, Meter; mA, Milliamp; MHz, Megahertz; min, Minutes; mm, Milliliter; ms, Millisecond; mW, Milliwatt; mm, Milliliter; mmHg, Millimeter of Mercury; mmHg, Millimeter of Mercury; NEM, Neurovascular Electrical Stimulation; NPRS, Numeric Pain Rating Scale; NSAID, Non-steroid Anti-inflammatory Drug; OAK, Osteoarthritis of the Knee Self-Management Program; P, Significance level; PEMF, Pulsed Electromagnetic Fields; PGIG, Patient Global Impression of Change; POMA, Performance-Oriented Mobility Assessment; PPT, Pressure Pain Threshold; PSQI, Pittsburgh Sleep Quality Index; PSFL, Patient Specific Functioning List; PT, Physical Therapy; QOL, Quality of Life; QR&S39, Questionnaire Raising and Sitting Down; ROM, Range of Motion; sec, Second; SF-36, Short Form 36 Health Survey; SHT, Superficial Heating Therapy; SPPB, Short Physical Performance Battery; SWD, Shortwave Diathermy; SWT, Shock Wave Therapy; TENS, Transcutaneous Electrical Nerve Stimulation; TUG, Timed Up and Go; US, Ultrasound; VAS, Visual Analog Scale; W, Watts; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; WQ35, Walking Questionnaire; YGDS, Yesavage Geriatric Depression Scale; μ s, Microsecond.

Chapter 3 – Original Research Manuscripts

Chapter 3.1 – Evidence-based practice questionnaire for physical therapists: Portuguese translation, adaptation, validity, and reliability

Ferreira, R. M., Ferreira, P. L., Cavalheiro, L., Duarte, J. A., & Gonçalves, R. S. (2019). Evidence-based practice questionnaire for physical therapists: Portuguese translation, adaptation, validity, and reliability. *Journal of Evidence-Based Healthcare*, 1(2), 83-98.

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Evidence-based practice questionnaire for physical therapists: Portuguese translation, adaptation, validity, and reliability

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ABSTRACT | INTRODUCTION: Evidence-Based Practice (EBP) is becoming increasingly important in Physical Therapy (PT). For proper designing, implementing, disseminating and evaluating EBP in PT, a valid and reliable questionnaire measuring attitudes, knowledge, behavior, prerequisites, and barriers related to EBP and guidelines is needed. One questionnaire that could be used to collect this information is the "EBP Questionnaire", developed by Jette et al. 2003. However, to our knowledge, no Portuguese version or published study with the Portuguese PT population was performed using this questionnaire. **OBJECTIVE:** The aim of this study was to translate, cross-culturally adapt and validate the "EBP Questionnaire" to European Portuguese and for the PT population. **MATERIAL AND METHODS:** A draft version was pilot tested for content validity (n=17), and a revised version was tested for test-retest reliability (n=72). The percentage of agreement and the Kappa coefficients between the 2 tests were analyzed. Additionally, the internal consistency was calculated. **RESULTS:** The preliminary final version of the European Portuguese EBP questionnaire was well accepted (only the items 22, 23, 45-51 needed to be reviewed). The mean average percentage of agreement was 82% (ranged 58-97%), and the Kappa coefficients were 0.658 (ranged 0.336-0.844). In the internal consistency, the mean average Cronbach's α coefficients were 0.665 (ranged 0.365-0.879). **CONCLUSION:** The results suggested that this questionnaire can be a useful instrument for measuring self-reported beliefs, attitudes, knowledge, and behaviors related to EBP in the Portuguese PT's context.

KEYWORDS: Evidence-based practice. Physical therapy. Questionnaire. European portuguese.

Introduction

Access to proper health-care is a fundamental human right¹. Globally, billions of dollars are spent each year in both public and private sectors on biomedical, clinical, health services research, undergraduate healthcare professional training, continuing professional development, quality improvement, patient safety, and risk management². So, it is expected that health-care systems, organizations, and professionals use the best practice available to treat patients. To achieve the best practice possible, it is essential to include³: firstly, the patient's clinical, emotional, psychological, social and physical circumstances in order to establish what is wrong and what treatment options are available; secondly, this factors to be tempered by research evidence concerning the efficacy, effectiveness, and efficiency of the interventions; thirdly, given the likely consequences associated with each option, the clinician must consider the patient's preferences and likely actions (in terms of what interventions she or he is ready and able to accept); fourthly, what are the available resources for accommodating patient's needs; and finally, clinical expertise is needed to bring these considerations together and recommend the treatment that the patient is able to accept. When all of those considerations are successfully balanced a paradigm called evidence-based practice (EBP) could be achieved.

Originally developed in the 80's, EBP can be defined as the conscientious, explicit and judicious use of current relevant available evidence combined with the health-care providers' clinical expertise and the patients' preferences, guiding clinical decisions about patients' care^{4,7}. The concept of EBP marks a shift among health-care professionals from a traditional emphasis on "eminence-based" practice (actions based on the opinions to guide clinical practice) to a more evidence practice (emphasis on data-based, systematic reviewed, clinically relevant studies and research)^{8,9}. The rise of EBP was prompted in part by the existence of unexplained wide variations in clinical practice patterns, the poor uptake of therapies of known effectiveness, and the use of technologies/interventions that were known to be ineffective, by several health-care professionals, such as Physical Therapists (PT)^{10,11}.

To obtain the main variables and relationships associated with EBP, for designing interventions to support the implementation of EBP, to evaluate if EBP changes have been successfully implemented, to measure and compare relevant EBP outcomes, and constantly increase the quality-of-care, PT's beliefs, attitudes, knowledge and behaviors about EBP have to be studied. One instrument that can be used to gather this information is the "Evidence-Based Practice Questionnaire", developed originally in 2003 by Jette et al.⁸. This questionnaire has already been used in several studies^{8,12,19} and has been successfully translated to Spanish²⁰ and Swedish²¹. However, to our knowledge, no Portuguese version or published study with the Portuguese PT population were performed using this questionnaire. So, the aim of this study is to translate, cross-culturally adapt and validate Jette et al.⁸ questionnaire to European Portuguese and for the Portuguese PT population.

Methods

The questionnaire development process was conducted by a 4 member expert panel. Formal permission to use and adapt the questionnaire to survey Portuguese PTs was granted from its developers. Translation, cross-cultural adaptation and validation were performed in several stages according to established guidelines^{22,24}.

Description of the Evidence-Based Practice Questionnaire

The questionnaire is self-administered and have a total of 51 items, divided into 4 main sections⁸: personal attitudes toward, use of, and perceived benefits and limitations of EBP (14 items); personal use and understanding of clinical practice guidelines (6 items); availability of resources to access information and personal skills in using those resources (12 items); and demographic information (19 items). The questionnaire explores the respondents' attitudes and beliefs about EBP (survey items 1, 2, 4, and 6-11);

interest in and motivation to engage in EBP (survey items 3 and 5); educational background, knowledge and skills related to accessing and interpreting information (survey items 25–31); level of attention to and use of the literature (survey items 12–14); access to and availability of information to promote EBP (survey items 18, 19, and 21–24); access to practice guidelines (survey items 15–20); their perceived barriers to using evidence in practice (survey item 32); and demographic information (survey items 33–51)⁸. Responses to most items were addressed using a 5-point Likert scale with “Strongly Disagree”, “Disagree”, “Neutral”, “Agree” and “Strongly Agree”⁸. Other items that collect data on access to information use a dichotomous “Yes” or “No” answer⁸. The questions about the understanding of scientific terms related to EBP require multiple choice answers with 3 possible choices⁸: “Understand Completely”, “Understand Somewhat” or “Do Not Understand”. Also, the questions linked to the barriers related to the use of EBP, require multiple choice answers with a 1 to 3 ranking scheme (1 as the most important barrier)⁸.

Questionnaire Development and Cross-Cultural Adaptation

The original questionnaire version was first translated and cross-culturally adapted from English to Portuguese independently by 2 translators who were native Portuguese speakers and had English as their second language. The two obtained translations were discussed in a first consensus panel and synthesized into one Portuguese preliminary version. Also, in this first consensus, the first preliminary version of the questionnaire was analyzed to determine whether it covered all aspects of the content or domains intended to be measured and contained no irrelevant items. Then, this consensus version was translated back to English by another translator (one English native professional translator) without prior knowledge of the original version. The Portuguese preliminary version and the back translation were compared with the questionnaire’s original version and discussed in a second consensus panel to achieve a second Portuguese preliminary version. Next, this second Portuguese preliminary version was evaluated by 2 health care experts to comment on the quality of the translation and suggest improvements to the current version. The suggestions gathered were discussed in a third consensus panel and synthesized into a preliminary Portuguese final version.

Validity

Content’s validity was established in consensus discussions by the expert panel members. The preliminary Portuguese final version was pilot tested by 17 PTs who completed the questionnaire and were asked to, through individual interviews, comment on the items, instructions and response options in: clarity; length; readability; comprehensiveness; understandability; redundancy; relevance; included all the expected concepts; completion time; and whether they were reluctant to answer any of the questions. The PTs’ comments were reviewed and discussed in a fourth consensus panel, which analyzed the possibility of rephrasing, changing of the items’ order and/or adding clarifications. Also, responses from the pilot testing were analyzed with regard to missing responses and distribution patterns. After, the information was synthesized into the Portuguese final version of the questionnaire.

Reliability

For assessment of test-retest reliability, the Portuguese final version of the questionnaire was distributed to PTs working in health care units. A sample of 122 PTs comprising a strategic mix of sex, age, and other demographic, working and educational factors was used. The questionnaire was administered on 2 occasions, separated by 2-weeks interval. The time interval was chosen to minimize the probability of occurrence of relevant changes in the PT work context. To participate in the questionnaire, the PTs had to be able to read and write Portuguese; need to have a valid PT working license; and work or have worked (in the last 6 months) as a PT in Portugal. The PTs were excluded of participation if: have another profession than PT; do not work as a PT in Portugal; be a PT bachelor student. To decrease the risk of bias, the participating PTs had no personal relationship with the expert panel members. Before filling the questionnaire, in the first page, information of the questionnaire purpose and context; the data protection rights and how the results will be used; the criteria for selecting the participants and the reasons for non-participation; and the possibility to terminate the questionnaire at any time was given. Additionally, this study followed the basic ethical principles set by the Declaration of Helsinki and received prior approval from the Ethic Commission

(CEFADE24-19). All PTs signed a written informed consent, and received no compensation. Data collected was analyzed anonymously and confidentially, used only for statistical information in an academic environment. As the questionnaire is anonymous, in the first page a serial number was created to recognize the PT for the assessment of the test-retest.

The test-retest reliability was analyzed for the individual items in the questionnaire. Also, the sub-group items were evaluated in their internal consistency. Demographic and workplace data were not included in the analysis. After the data analysis, all items with poor reliability were revised in further consensus discussions by the expert panel members, for additional clarity and specificity.

Data Analysis

Data from a psychometric test was analyzed with respect to response distribution. Data quality was assessed with an analysis for missing data. Test-retest reliability for ordinal data was analyzed in terms of the percentage of agreement (PA) between the 2 test occasions with the Svensson method²⁵. Items with poor agreement, defined as a PA of less than 60%, were revised. Also, systematic and individual disagreements were calculated. These calculations included systematic relative disagreement in position (RP) and in concentration (RC). Values for RP and RC can range from - 1 to 1, with a value closed to 0 representing a small systematic disagreement (i.e., a high level of reliability) of the analyzed item. These were considered statistical significant when they did not include the value 0. Additionally, the so-called relative rank variance (RV), was calculated. Values for RV can range from 0 to 1, with a low RV value representing a small individual disagreement (i.e., a high level of reliability), attributing values < 0.1 as negligible. The strength of agreement, of the ordinal and nominal items was calculated by the linear weighted and unweighted Kappa coefficients, respectively. The coefficients were interpreted following the Ladis et al.²⁶ table range values (< 0.00= Poor; 0.00-0.20 = Slight; 0.21-0.40 = Fair; 0.41-0.60 = Moderate; 0.61-0.80 = Substantial; 0.81-1.00 = Almost Perfect). For Svensson's method and for the Kappa coefficients, 95% confidence intervals (CI) were used. The internal consistency of the questionnaire was calculated through the Cronbach's α coefficient²⁷.

An α value of < 0.5 was considered as "Unacceptable"; $\alpha \geq 0.5$ "Poor"; $\alpha \geq 0.6$ "Questionable"; $\alpha \geq 0.7$ "Acceptable"; $\alpha \geq 0.8$ "Good"; and $\alpha \geq 0.9$ "Excellent"²⁷. Also, the Cronbach's α coefficients if item deleted and the corrected item-total coefficients were calculated. Corrected item-total coefficients of ≥ 0.3 were considered as acceptable²⁸.

The calculations for the Svensson test were performed with a Microsoft Excel (Microsoft Corp, Redmond, Washington) macro constructed by the developer. Other statistics were performed with IBM SPSS 24.0 (International Business Machines Corporation, Statistical Package for the Social Sciences, New York, United States of America).

Results

Cross-Cultural Adaptation and Validation

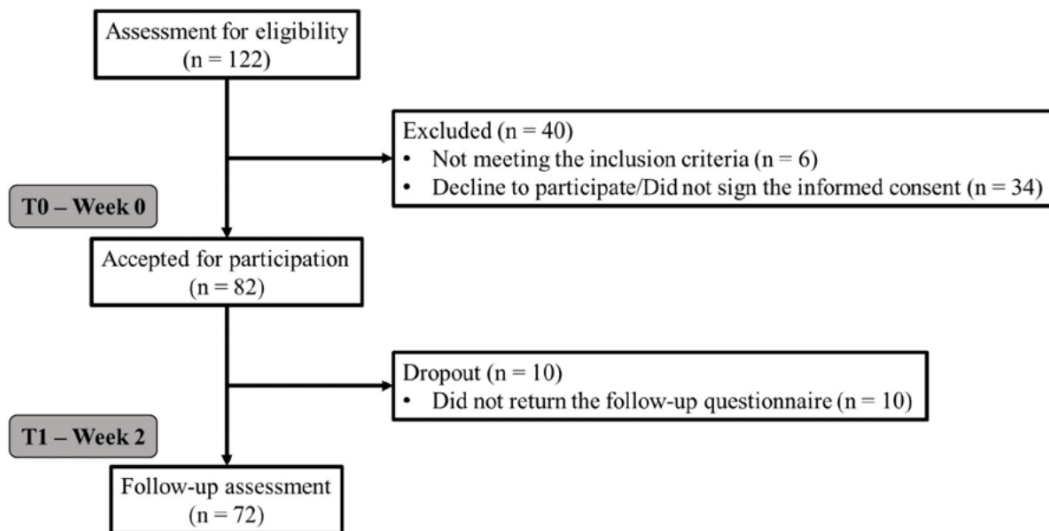
The preliminary final version of the European Portuguese EBP questionnaire was well accepted in the pre-test. The questionnaire mean average conclusion time, was 10:38 minutes and the interviews duration was 14:24 minutes. Overall, the majority of the PTs that participate in the preliminary version were females, in the 20-29 years age group, with less than 5 years of PT working license and a baccalaureate degree. Furthermore, most of the PT worked in private outpatient units, in an urban context. All the questions and response options were considered satisfactorily understandable by the PTs, where only small changes in semantics and syntax of the written Portuguese were made. Even so, some items and response options were removed or adapted to better suit the Portuguese context. The questions removed were the original items 37 and 40, as they do not suit the PT working context in Portugal. Regarding the adaptations, there were several items that had some minor revisions and adaptations, yet it is necessary to highlight the items 22 and 23 where the most significant modifications occurred. Specifically, the original "... databases and the Internet..." to *electronic databases* (in Portuguese - bases de dados eletrónicas) were changed since, as it was originally written, it was a "double-barreled question" and it should be avoided²⁹. Also, some adaptations in response

options in the original items 45 to 51 occurred. From those, the most significant adaptations occurred in the items 45 and 46, where the option 0 was added and the options “<5” and “5-10” were changed to 1-5 and 6-10, respectively. It was opted to add the option 0 and adapt the others since, as the response options were originally presented, they were not a sensitive enough scale to the question²⁹. It is expected that a PT that not treat patients has different behaviors and attitudes regarding EBP, comparing to others that treat at least one (treating the patient may lead to a greater search for evidence for the specific case). In the same way, it is expected that a PT that works alone has different behaviors and attitudes regarding EBP, comparing to others that work with at least one co-worker (one of the most common methods of evidence divulgation is through professional social diffusion³⁰). In the other referenced items, the response options were changed to better suit the Portuguese sociodemographic and working class context (for example, in the original item 49, it was chosen to change the open-ended response option to a close-ended response option – as open-ended questions should be avoid³¹ – providing the list of Portuguese districts). Furthermore, as already occurred in the Spanish translation²⁰ and indicated as a possible limitation of the original questionnaire⁸, it was decided to reduce the original 5-point Likert scale to a 4-point Likert scale, extinguishing the “Neutral” option, in an attempt to avoid the central tendency³¹.

Reliability

Of the original 122 PTs only 72 (59%) were included in the reliability test (Figure 1).

Figure 1. Flow Diagram of the PTs' Recruitment and Retention



The majority of the PTs were young females (59.7% in the 20-29 years age group), with a valid PT working license obtained less than 5 years ago (45.8%). Furthermore, as expected, most of them only had the baccalaureate degree (77.8%) and were not clinical instructors for PT students (62.5%). Regarding their practice, most of the PTs worked more than 40 hours per week (50.0%), focusing the time taking care of the patients (90.3%), leaving research and teaching as a low priority (97.1% and 98.6% within the 0-20% range, respectively). The majority worked in physical medicine and rehabilitation centers (34.4%), in an urban environment (86.1%), treating more than 15 patients per day (43.1%), most of them adults with orthopedic conditions (75.9% and 76.1%, respectively). For a more detailed data, the descriptive statistics of the PTs' personal and practice characteristics are presented in Table 1.

Table 1. PTs' Personal and Practice Characteristics (to be continued)

Personal				Practice			
N	Characteristic	Valid Frequency (%)	Missing (%)	N	Characteristic	Valid Frequency (%)	Missing (%)
72	<i>Sex</i>		0 (0.0%)	72	<i>Working Hours per Week</i>		0 (0.0%)
	Male	22 (30.6%)			< 20	1 (1.4%)	
	Female	50 (69.4%)			20-30	5 (6.9%)	
72	<i>Age Groups</i>		0 (0.0%)		31-40	30 (41.7%)	
	20-29 years	43 (59.7%)			> 40	36 (50.0%)	
	30-39 years	21 (39.2%)		72	<i>Patients per Day</i>		0 (0.0%)
	40-49 years	7 (9.7%)			1-5	6 (8.3%)	
	≥ 50 years	1 (1.4%)			6-10	13 (18.1%)	
72	<i>Valid License</i>		0 (0.0%)		11-15	7 (9.7%)	
	< 5 years	33 (45.8%)			> 15	46 (63.9%)	
	5-10 years	25 (34.7%)		71	<i>Number of PTs in the Facility</i>		1 (1.4%)
	11-15 years	6 (8.3%)			0	3 (4.2%)	
	> 15 years	8 (11.1%)			1-5	18 (25%)	
72	<i>Degree</i>		0 (0.0%)		6-10	8 (11.1%)	
	Certificate	2 (2.8%)			11-15	12 (16.7%)	
	Baccalaureate	56 (77.8%)			> 15	31 (43.1%)	
	Master	14 (19.4%)		71	<i>Percentage of Total Work Time in:</i>		1 (1.4%)
72	<i>Instructor</i>		0 (0.0%)		Patient Care		
	Yes	27 (37.5%)			25-50 %	2 (2.8%)	
	No	45 (62.5%)			55-75 %	5 (6.9%)	
					80-100 %	65 (90.3%)	
					Research		
					0-20 %	68 (97.1%)	
					25-50 %	4 (2.9%)	
					Teaching		
					0-20 %	71 (98.6%)	
					25-50 %	1 (1.4%)	
72	<i>Location of the Facility</i>		0 (0.0%)	72	<i>Location of the Facility</i>		0 (0.0%)
	Rural	2 (2.8%)			Rural	2 (2.8%)	
	Suburban	8 (11.1%)			Suburban	8 (11.1%)	
	Urban	62 (86.1%)			Urban	62 (86.1%)	
61	<i>Type of Facility</i>		11 (15.3%)	61	<i>Type of Facility</i>		11 (15.3%)
	Physical Medicine and Rehabilitation Center	22 (34.4%)			Physical Medicine and Rehabilitation Center	22 (34.4%)	
	Private Clinic	19 (29.7%)			Private Clinic	19 (29.7%)	
	Healthcare Provider Company	2 (3.1%)			Healthcare Provider Company	2 (3.1%)	

Table 1. PTs' Personal and Practice Characteristics (conclusion)

Personal				Practice			
N	Characteristic	Valid Frequency (%)	Missing (%)	N	Characteristic	Valid Frequency (%)	Missing (%)
					Aesthetics Office	1 (1.6%)	
					Physiotherapy Office	9 (14.1%)	
					Private Hospital	1 (1.6%)	
					Public or Public-Private Partnership Hospital	8 (12.5%)	
					Continuing Care Unit	2 (3.1%)	
				46	<i>Majority of Patients Condition</i>		26 (36.1%)
					Palliative Care	1 (2.2%)	
					Primary Health Care	1 (2.2%)	
					Sport	2 (4.3%)	
					Aging	4 (8.7%)	
					Aquatic Physiotherapy	1 (2.2%)	
					Orthopedic	35 (76.1%)	
					Neurological	2 (4.3%)	
				54	<i>Majority of Patients Age Group</i>		18 (25.0%)
					Adult (19–64 years)	41 (75.9%)	
					Geriatric (≥ 65 years)	13 (24.1%)	

Additionally, the respondents had generally positive attitudes and beliefs regarding EBP. For a more detailed information and further analysis the items sub-groups responses were gathered in Table 2.

Table 2. EVB Questionnaire responses (to be continued)

Item	N	Valid Response options (n; %)				Missing (n; %)
		<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Agree</i>	<i>Strongly Agree</i>	
1	72	0 (0.0%)	0 (0.0%)	23 (31.9%)	49 (68.1%)	0 (0.0%)
2	72	0 (0.0%)	1 (1.4%)	32 (44.4%)	39 (54.2%)	0 (0.0%)
3	72	0 (0.0%)	1 (1.4%)	49 (68.1%)	22 (30.6%)	0 (0.0%)
4	70	3 (4.3%)	50 (71.4%)	11 (15.7%)	6 (8.6%)	2 (2.8%)
5	71	0 (0.0%)	3 (4.2%)	38 (53.5%)	30 (42.3%)	1 (1.4%)
6	72	0 (0.0%)	1 (1.4%)	35 (48.6%)	36 (50.0%)	0 (0.0%)
7	72	2 (2.8%)	23 (31.9%)	36 (50.0%)	11 (15.3%)	0 (0.0%)
8	70	9 (12.9%)	29 (41.4%)	29 (41.4%)	3 (4.3%)	2 (2.8%)
9	72	2 (2.8%)	39 (54.2%)	28 (38.9%)	3 (4.2%)	0 (0.0%)
10	72	0 (0.0%)	3 (4.2%)	43 (59.7%)	26 (36.1%)	0 (0.0%)
11	72	5 (6.9%)	24 (33.3%)	38 (52.8%)	5 (6.9%)	0 (0.0%)
16	72	0 (0.0%)	21 (29.2%)	42 (58.3%)	9 (12.5%)	0 (0.0%)
17	72	3 (4.2%)	4 (5.6%)	60 (83.3%)	5 (6.9%)	0 (0.0%)

Table 2. EVB Questionnaire responses (conclusion)

Item	N	Valid Response options (n; %)					Missing (n; %)
		<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Agree</i>	<i>Strongly Agree</i>		
20	72	1 (1.4%)	8 (11.1%)	57 (79.2%)	6 (8.3%)	0 (0.0%)	
24	71	5 (7.0%)	14 (19.7%)	42 (59.2%)	10 (14.1%)	1 (1.4%)	
25	72	0 (0.0%)	7 (9.7%)	29 (40.3%)	36 (50.0%)	0 (0.0%)	
26	72	0 (0.0%)	14 (19.4%)	25 (34.7%)	33 (45.8%)	0 (0.0%)	
27	72	1 (1.4%)	2 (2.8%)	36 (50.0%)	33 (45.8%)	0 (0.0%)	
28	72	0 (0.0%)	12 (16.7%)	26 (36.1%)	34 (47.2%)	0 (0.0%)	
29	72	0 (0.0%)	8 (11.1%)	50 (69.4%)	14 (19.4%)	0 (0.0%)	
30	72	0 (0.0%)	5 (6.9%)	49 (68.1%)	18 (25.0%)	0 (0.0%)	
		≤1	2-5	6-10	11-15	≥16	
12	72	15 (20.8%)	38 (52.8%)	13 (18.1%)	2 (2.8%)	4 (5.6%)	0 (0.0%)
13	72	17 (23.6%)	33 (45.8%)	14 (19.4%)	6 (8.3%)	2 (2.8%)	0 (0.0%)
14	72	26 (36.1%)	26 (36.1%)	10 (13.9%)	8 (11.1%)	2 (2.8%)	0 (0.0%)

Item	N	Valid Response options (n; %)			Missing (n; %)						
		<i>Yes</i>	<i>No</i>	<i>Do Not Know</i>							
15	72	59 (81.9%)	4 (5.6%)	9 (12.5%)	0 (0.0%)						
18	72	66 (91.7%)	6 (8.3%)	NA	0 (0.0%)						
19	71	64 (88.9%)	7 (9.7%)	NA	1 (1.4%)						
21	72	10 (13.9%)	62 (86.1%)	NA	0 (0.0%)						
22	72	47 (65.3%)	15 (20.8%)	10 (13.9%)	0 (0.0%)						
23	72	68 (94.4%)	3 (4.2%)	1 (1.4%)	0 (0.0%)						
		<i>Understand Completely</i>	<i>Understand Somewhat</i>	<i>Do Not Understand</i>							
31 _a	71	34 (47.9%)	35 (49.3%)	2 (2.8%)	1 (1.4%)						
31 _b	71	38 (53.5%)	31 (43.7%)	2 (2.8%)	1 (1.4%)						
31 _c	71	62 (87.3%)	8 (11.3%)	1 (1.4%)	1 (1.4%)						
31 _d	71	28 (39.4%)	37 (52.1%)	6 (8.5%)	1 (1.4%)						
31 _e	71	45 (63.4%)	26 (36.6%)	0 (0.0%)	1 (1.4%)						
31 _f	71	47 (66.2%)	20 (28.2%)	4 (5.6%)	1 (1.4%)						
31 _g	70	52 (74.3%)	16 (22.9%)	2 (2.9%)	2 (2.8%)						
31 _h	71	40 (56.3%)	24 (33.8%)	7 (9.9%)	1 (1.4%)						
		1 ^a	2 ^b	3 ^c	4 ^d	5 ^e	6 ^f	7 ^g	8 ^h	9 ^w	
32 ¹³	53	39 (73.6%)	0 (0.0%)	1 (1.9%)	3 (5.7%)	5 (9.4%)	3 (5.7%)	2 (3.8%)	0 (0.0%)	0 (0.0%)	19 (26.4%)
32 ²²	52	3 (5.8%)	11 (21.2%)	2 (3.8%)	2 (3.8%)	16 (30.8%)	11 (21.2%)	5 (9.6%)	1 (1.9%)	1 (1.9%)	20 (27.8%)
32 ³²	52	1 (1.9%)	5 (9.6%)	6 (11.5%)	4 (7.7%)	5 (9.6%)	15 (28.8%)	10 (19.2%)	4 (7.7%)	2 (3.8%)	20 (27.8%)

a – Relative risk; b – Absolute risk; c – Systematic review; d – Odds ratio; e – Meta-analysis; f – Confidence interval; g – Heterogeneity; h – Publication bias; α – Insufficient time; β – Lack of information resources; γ – Lack of research skills; δ – Poor ability to critically appraise the literature; ε – Lack of generalizability of the literature findings to my patient population; θ – Inability to apply research findings to individual patients with unique characteristics; σ – Lack of understanding of statistical analysis; ψ – Lack of collective support among my colleagues in my facility; ω – Lack of interest; NA - Not Applicable.

For the reproducibility tests, 41 items were analyzed. Only one item (32^{3a}) had a PA less than 60%. The other items had a moderate to high PA, namely tree items (2, 6 and 322^o) were between 61 to 70%, twelve (3-5, 7-11, 13, 16, 38 and 31d) between 71 to 80%, twenty one (1, 12, 14, 15, 17, 20-22, 24-27, 29-31b and 31e-32^{1a}) between 81 to 90% and four (18, 19, 23 and 31c) between 91 to 100%. For the systematic disagreement, only one RC value – item 8 [-0.101 (95% CI, -0.180 to -0.023)] – had a statistical significant disagreement, and for RP the item 6 [0.144 (95% CI, 0.018 to 0.2709)] and the item 31f [0.111 (95% CI, 0.027 to 0.195)] had statistical significant disagreements, indicating a change in the positions of the responses on the scales toward higher values. Regarding the RV values, they were always inferior to 0.1, showing no random individual changes in the responses, with the item 2 achieving statistical significant differences [0.063 (95% CI, 0.004 to 0.121)]. Additionally, for the Kappa coefficients only two items (2 and 6) had a fair Kappa. The other items reached moderate (3, 5, 9, 10, 15, 18, 32^{2a} and 32^{3a}), substantial (1, 4, 7, 8, 11, 13, 14, 16, 17, 19-28 and 30-31h) and almost perfect (12 and 29) values. More detailed information was gathered in Tables 3 and 4.

Table 3. Reproducibility of the EBP questionnaire ordinal items

Item	Svensson's method				Kappa (95% CI)
	PA	RV (95% CI)	RP (95% CI)	RC (95% CI)	
1	85	0.005 (0.000, 0.014)	-0.014 (-0.104, 0.076)	0.000 (0.000, 0.000)	0.645 (0.453, 0.836)
2	65	0.063 (0.004, 0.121)	-0.014 (-0.147, 0.120)	0.001 (-0.009, 0.011)	0.336 (0.109, 0.562)
3	78	0.013 (0.000, 0.030)	-0.051 (-0.156, 0.054)	-0.017 (-0.051, 0.016)	0.511 (0.307, 0.715)
4	80	0.005 (0.000, 0.014)	-0.008 (-0.089, 0.074)	-0.078 (-0.163, 0.006)	0.619 (0.454, 0.784)
5	76	0.011 (0.000, 0.025)	0.046 (-0.057, 0.148)	-0.029 (-0.098, 0.040)	0.563 (0.384, 0.741)
6	67	0.038 (0.000, 0.078)	0.144 (0.018, 0.270)	-0.030 (-0.091, 0.030)	0.351 (0.152, 0.551)
7	74	0.004 (0.000, 0.009)	0.023 (-0.059, 0.105)	-0.015 (-0.118, 0.087)	0.653 (0.520, 0.786)
8	77	0.020 (0.000, 0.053)	-0.044 (-0.136, 0.048)	-0.101 (-0.180, -0.023)	0.671 (0.522, 0.819)
9	78	0.018 (0.000, 0.041)	0.082 (-0.018, 0.182)	-0.055 (-0.118, 0.009)	0.589 (0.410, 0.768)
10	75	0.042 (0.000, 0.107)	0.093 (-0.016, 0.202)	-0.024 (-0.104, 0.055)	0.487 (0.292, 0.682)
11	79	0.038 (0.000, 0.090)	0.007 (-0.084, 0.099)	-0.046 (-0.134, 0.041)	0.667 (0.514, 0.820)
12	86	0.001 (0.000, 0.002)	0.002 (-0.054, 0.057)	0.014 (-0.047, 0.074)	0.844 (0.747, 0.941)
13	74	0.024 (0.000, 0.060)	0.075 (-0.008, 0.159)	-0.016 (-0.107, 0.075)	0.710 (0.583, 0.837)
14	82	0.033 (0.000, 0.073)	0.002 (-0.072, 0.076)	-0.062 (-0.144, 0.020)	0.777 (0.659, 0.895)
16	78	0.003 (0.000, 0.008)	-0.051 (-0.140, 0.038)	-0.054 (-0.143, 0.035)	0.625 (0.462, 0.788)
17	88	0.001 (0.000, 0.002)	-0.024 (-0.092, 0.045)	0.017 (-0.037, 0.070)	0.686 (0.481, 0.891)
20	89	0.001 (0.000, 0.004)	-0.027 (-0.096, 0.043)	-0.025 (-0.084, 0.033)	0.657 (0.439, 0.875)
24	83	0.057 (0.000, 0.163)	0.021 (-0.061, 0.104)	-0.010 (-0.075, 0.054)	0.741 (0.592, 0.890)
25	85	0.005 (0.000, 0.013)	0.038 (-0.043, 0.120)	-0.019 (-0.063, 0.025)	0.771 (0.637, 0.905)
26	82	0.003 (0.000, 0.008)	-0.004 (-0.078, 0.070)	-0.042 (-0.127, 0.043)	0.769 (0.651, 0.888)
27	86	0.004 (0.000, 0.011)	0.000 (-0.083, 0.083)	0.000 (-0.018, 0.018)	0.767 (0.622, 0.912)
28	80	0.004 (0.000, 0.011)	0.023 (-0.054, 0.101)	-0.019 (-0.107, 0.069)	0.746 (0.620, 0.872)
29	90	0.001 (0.000, 0.002)	-0.039 (-0.102, 0.024)	0.047 (-0.004, 0.098)	0.824 (0.698, 0.951)
30	83	0.003 (0.000, 0.008)	-0.024 (-0.108, 0.061)	-0.011 (-0.071, 0.049)	0.665 (0.491, 0.839)
31 a	87	0.001 (0.000, 0.004)	-0.014 (-0.087, 0.060)	-0.002 (-0.054, 0.050)	0.771 (0.634, 0.908)
31 b	86	0.002 (0.000, 0.006)	-0.027 (-0.105, 0.050)	-0.004 (-0.058, 0.050)	0.746 (0.603, 0.888)
31 c	94	0.000 (0.000, 0.001)	0.000 (-0.054, 0.054)	0.000 (-0.008, 0.008)	0.774 (0.551, 0.997)
31 d	80	0.005 (0.000, 0.013)	0.064 (-0.024, 0.153)	-0.042 (-0.105, 0.021)	0.675 (0.520, 0.830)
31 e	85	0.004 (0.000, 0.009)	0.051 (-0.035, 0.137)	0.022 (-0.021, 0.065)	0.666 (0.492, 0.839)
31 f	85	0.009 (0.000, 0.022)	0.111 (0.027, 0.195)	0.018 (-0.053, 0.088)	0.637 (0.443, 0.831)
31 g	86	0.009 (0.000, 0.026)	-0.042 (-0.126, 0.042)	-0.008 (-0.061, 0.045)	0.657 (0.463, 0.851)
31 h	85	0.011 (0.000, 0.030)	0.057 (-0.024, 0.137)	-0.040 (-0.101, 0.022)	0.732 (0.582, 0.882)

PA – Percentage of Agreement; RV – Relative Rank Variance; RP – Relative Position; RC – Relative concentration; CI – Confidence Interval; Values in bold indicate significant changes

Table 4. Reproducibility of the EBP questionnaire nominal

Item	Svensson's method				Kappa (95% CI)
	PA	RV (95% CI)	RP (95% CI)	RC (95% CI)	
15	88	NA	NA	NA	0.553 (0.281, 0.826)
18	93	NA	NA	NA	0.508 (0.092, 0.924)
19	94	NA	NA	NA	0.683 (0.381, 0.985)
21	90	NA	NA	NA	0.639 (0.385, 0.893)
22	89	NA	NA	NA	0.764 (0.609, 0.918)
23	97	NA	NA	NA	0.655 (0.184, 1.000)
32 ^{1°}	88	NA	NA	NA	0.726 (0.533, 0.918)
32 ^{2°}	68	NA	NA	NA	0.604 (0.445, 0.762)
32 ^{3°}	58	NA	NA	NA	0.504 (0.342, 0.665)

NA – Not Applicable; PA – Percentage of Agreement; RV – Relative Rank Variance; RP – Relative Position; RC – Relative concentration; CI – Confidence Interval

Although the scores in this questionnaire are intended to be interpreted item by item, as the scores of each item do not contribute to produce full scale or subscale scores, the internal consistency was evaluated with the Cronbach's α coefficients according to the original questionnaire sub-grouping strategy⁸. *The Access to and availability of information to promote EBP* sub-group reach a Cronbach's α of 0.365, considered as unacceptable. Even if the item 23 was deleted, with an α increase to 0.367, it will be still considered as unacceptable. Also, four items (18, 19, 21, 23 and 24) did not reach the conventionally acceptable values in the correct item-total coefficients. Regarding the *Interest in and motivation to engage in EBP* and the *Access to practice guidelines* sub-groups they were considered as poor, as they reach an α of 0.577 and 0.564, respectively. None of the items if deleted, could increase their values. Furthermore, the items 15, 18, 19 and 20 did not reach the conventionally acceptable values in the correct item-total coefficients. Concerning the *Attitudes and beliefs about EBP* sub-group the α was 0.767, therefore it could be considered as acceptable. Once again, none of the items if deleted, could increase its values. Finally, *the Level of attention to and use of the literature* and the *Educational background, knowledge and skills related to accessing and interpreting information* sub-groups were considered as good, as reach an α of 0.837 and 0.879, respectively. In the *Educational background, knowledge and skills related to accessing and interpreting information* sub-group, if the item 31b was deleted it could raise the α to 0.882, however it will still be considered as good. None of the evaluated sub-group reached an α greater or equal to 0.95, showing no redundancy in the items³². For a more in-depth analysis, the internal consistency data was gathered in Table 5.

Table 5. Internal consistency of the EBP questionnaire items (to be continued)

Groups and Items	N	Corrected item-total coefficients	Cronbach's α coefficients	Cronbach's α coefficients if item deleted
<i>Attitudes and beliefs about EBP</i>	68		0.767	
1		0.451		0.748
2		0.551		0.734
4		0.453		0.745
6		0.491		0.741
7		0.433		0.749
8		0.444		0.748
9		0.313		0.765
10		0.393		0.753
11		0.578		0.723
<i>Interest in and motivation to engage in EBP</i>	71		0.577	
3		0.410		NA
5		0.410		NA
<i>Level of attention to and use of the literature</i>	72		0.837	
12		0.733		0.741
13		0.649		0.820
14		0.721		0.754
<i>Access to practice guidelines</i>	71		0.564	
15		0.234		0.546
16		0.446		0.439
17		0.431		0.449
18		0.233		0.549
19		0.202		0.557
20		0.294		0.524
<i>Access to and availability of information to promote EBP</i>	70		0.365	
18		0.111		0.356
19		0.125		0.349
21		0.168		0.327
22		0.339		0.190
23		0.082		0.367
24		0.238		0.308
<i>Educational background, knowledge and skills related to accessing and interpreting information</i>	70		0.879	
25		0.673		0.864
26		0.736		0.860
27		0.594		0.868
28		0.697		0.863
29		0.485		0.874
30		0.516		0.872
31 _a		0.391		0.878

Table 5. Internal consistency of the EBP questionnaire items (conclusion)

Groups and Items	N	Corrected item-total coefficients	Cronbach's α coefficients	Cronbach's α coefficients if item deleted
<i>Attitudes and beliefs about EBP</i>	68		0.767	
31 _b		0.308		0.882
31 _c		0.517		0.874
31 _d		0.538		0.871
31 _e		0.414		0.877
31 _f		0.517		0.872
31 _g		0.560		0.871
31 _h		0.675		0.864
<i>Perceived barriers to using evidence in practice</i>	NA		NA	
32 ^{1*}		NA		NA
32 ^{2*}		NA		NA
32 ^{3*}		NA		NA

NA – Not Applicable; EBP – Evidence-based Practice

Discussion

The results of the present study indicate that, in general, the translation, cross-cultural adaptation, validity and reliability of the questionnaire to European Portuguese and for the Portuguese PTs were successful.

The questionnaire was found to be valid in terms of face and content validity for the measurement of EBP aspects. Several instruments for measuring EBP have been developed³³, however few of them targeted toward beliefs, attitudes and knowledge, or focused specifically on PT working class. We have found no other questionnaire measuring EBP in PT practice against which we can compare our findings. Therefore, for the content validation, we used a sample of 17 PTs, 2 health care experts and the expert panel (also PTs and psychometricians), to assess the comprehensiveness of the questionnaire and the relevance of the items. So, it should be possible to draw inferences with regard to the target population and context. The interactive process in which the questionnaire was reviewed and consensus was reached by the expert panel on several occasions strengthens the validity conclusions.

In the reliability test, the results obtained in the final questionnaire showed that the PA values for dichotomous items were higher in this study (minimum 88%; maximum 94%) compared to the original questionnaire⁸ (minimum 68%; maximum 93%). The same was also true regarding ranked items, where the minimum in this study was 65% and the maximum 94%, contrasting with the original questionnaire⁸ 59% to 80% range values. Also, the PA values for the final questionnaire are in line with those found in the Bernhardsson et al.²¹ study - ranged from 60% to 81%. It should also be highlighted that, even with the reduction of the Likert scale from 5 to 4, the PA values from the items that could be compared were generally better relatively to the Bernhardsson et al.²¹ study (the only exception was our item 10 compared with the Bernhardsson et al.²¹ item 13 – 75% compared to 80%, respectively). The good achieved PA values were also confirmed by the RV results (as they were always inferior to 0.1, showing no major occasional disagreements) and were in line with the Kappa coefficients (only the 2 and 6 items had a fair Kappa).

In the internal consistency analysis the sub-group *Access to and availability of information to promote EBP* was the one that achieved unacceptable values. This may be explained by the differences in the access to EBP. For instance, 86.1% did not have access to current research through professional journals in their paper form and, although the majority access EBP by the use of electronic databases, this access was very different between work (65.3%) and home (94.4%). Despite the unacceptable results, we decided not to remove sub-group items since: (1) although

the items are part of a sub-group (according to Jette et al.⁸) responses in some items do not necessarily have to be coherent with responses to other items (for example, accessing evidence by paper form does not necessarily need to be coherent with accessing it online and vice-versa); (2) and the information gathered in these particular sub-group items are essential to understand how evidence is assembled by the PTs and it should not be discarded.

Analyzing item by item, it was found that item 32 in our questionnaire needs to be reviewed. The item 32 PA values went down as the respondent chose the least important barrier (88% for 32¹, 68% for 32² and 58% for 32³). This may be explained by PT poor ability to respond correctly to the item. Most of responders marked the three most important barriers with an "X" in the boxes, not indicating their order. Furthermore, in other cases, only one barrier was marked, still existing those that marked more than three boxes or even decided not to answer the item in the second occasion. Therefore, in an attempt to increase the number of valid responses (the item T0-T1 mean percentage of missing values was 26.9%), it was decided to change the boxes to - (marked blank spaces). With this new form of response space, it is expected that the responders leave the "X" type responses and chose to fill the space with the appropriated barrier number. We are aware that this form of response space will not solve all missing values, however as it will cover the most common response mistake, it is expected that it will dramatically decrease the number of missing responses and, consequently, increase the PA.

Still in the items agreement proprieties, the items 6, 8 and 31f were the only evaluated items that show a statistical significant disagreement (in the other items the 95% CI were rather narrow, indicating that the disagreements were not substantial). In both 6 and 31f items, the responders chose a change in attitudes toward higher categories on the second questionnaire administration. These differences could be explained by the sample mean age (20-29 years) and academic degree (baccalaureate) since, after the first questionnaire filling, younger PTs with a lower academic degree could had a greater

EBP attitudes awareness, as well as they have a greater desire for knowledge, incite searching some keywords that were less understood in T0 (better EBP knowledge are generally achieved later in life with a higher academic degree⁸).

Regarding the PT personal demographic information items, some important missing responses in the type of facility, majority of patient condition and majority of patient age group were identified (the items T0-T1 mean percentage of missing values were 13.2%, 36.1% and 25%, respectively). The reason for those high missing values relied in the responders' misinterpretation of the items. Most of the PTs misread the item question and instructions, and selected more than one box in each item. So, in order to overcome this issue, it was decided to highlight the importance of selecting only one response, adding the instruction select only one facility (in Portuguese - *selecione apenas um local de trabalho*) in the type of facility item and the instruction select only one intervention area and one age group (in Portuguese - *selecione apenas uma área de intervenção e um grupo etário*) in the majority of patient's condition and patient's age group item. After adding and highlighting these instructions, it is expected that the number of missing responses considerably drop, hoping to reach irrelevant missing values in a next questionnaire filling.

Another item issue identified and further discussed after the questionnaire administration was our item 45. Our item 45 corresponds to the original questionnaire⁸ item 47 and it is an open-ended question, where the responder is asked to fill the percentage of time dedicated to patient's care, research and teaching. As already discussed, open-ended questions should be avoided³¹. A major reason is variation in willingness and ability to respond in writing³⁴. Unless the sample is very homogeneous with respect to these two characteristics, response bias is likely³⁴. As this questionnaire is designed to all national working PTs, a heterogeneous sample with very different perspectives related to EBP is expected. Furthermore, the main reason for using open-ended questions is to capture unsuspected information³⁴. However, in this item, only answers in each type of activity between 0 and 100% are considered as

valid. Therefore, no unsuspected information will be gathered. Moreover, in questions where responders are likely to be estimating their answers, such as item 47, it is usually better to offer response categories³⁴. So, we suggest that the item includes, in each type of activity, five boxes with the options 0%, 5-25%, 30-50%, 55-75% and 80-100%. The percentage range options were similar to those used in the Jette et al.⁸ study results presentation and in the Bernhardsson et al.²¹ corresponding item response options (item 8).

In conclusion, the final translated and adapted European Portuguese EBP questionnaire has a good face validity, content validity and reliability. The results suggested that this questionnaire can be a useful instrument for measuring self-reported beliefs, attitudes, knowledge, and behaviors related to EBP in working Portuguese PTs.

Limitations

Among the limitations, this study had a relatively low response rate (59%) in the reliability test, especially in the early phase, where many PTs were not interested in participating in the study. Also, the number of missing responses in some items was high (for example, 36.1%) influencing the correct item appreciation. The questionnaire return rate and missing items responses may be explained by its large number of items (49 items) and completion time (approximately, 14 minutes²⁹). Regarding the questionnaire as a whole, as already mentioned in the Bernhardsson et al.²¹ study, we also think that the methods used to evaluate the validity of our questionnaire were limited to content and face validity evaluations. For example, construct validity was not assessed with factor analysis because the instrument was intended to measure item by item and not in factors. Also, testing of criterion validity was considered to be difficult because no other instrument measuring self-reported attitudes and behavior related to PT EBP could be found, and measuring self-reported behavior

against actual or observed behavior was not deemed possible in the present study. Furthermore, as this is a self-report questionnaire it is difficult to know whether respondents are expressing what they really believe and do, or what they think they are expected to believe and do. This social desirability bias is difficult to control in this type of questionnaire, even more when professional attitudes and behavior are being measured. A further reliability issue concerns the implicit assumption that professional attitudes, knowledge, and behavior are relatively stable. There is a possibility that some of the disagreement between the 2 test occasions (even in such a short time interval as 2 weeks), can be explained by social and professional networks, such as a discussion of the questionnaire between colleagues during a coffee break. Even the act of completing the questionnaire for the first time may cause a change in attitudes. Reviewing, at work or at home, some of the questionnaire keywords that raised more personal/practice questions or, for some reason drew a more in-depth attention, may also explain some of the disagreements between the two testing times. Another limitation of the present study is that the reliability of the revised version of the questionnaire was not tested again.

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Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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**Chapter 3.2 – Measuring Evidence-Based Practice in Physical
Therapy: A Mix-Methods Study**

Under Review in PeerJ

Important declarations

Please remove this info from manuscript text if it is also present there.

Associated Data

Data supplied by the author:

The raw measurements are provided in the supplementary figures, tables and quotations.

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Measuring evidence-based practice in physical therapy: A mix-methods study

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Background. Evidence-based practice (EBP) is considered the “holy grail” to manage patients by health practitioners (such as physical therapists). However, sometimes, patients are not treated with the best interventions for their condition. Although studies already explored the facilitators and barriers for this issue, they increase in the level of importance if the information gathered are context appropriated. As the profession is relatively new in Portugal, currently little is known about the implementation of EBP in Portuguese physical therapists context. So, the aim of this study is to know if the Portuguese physical therapists use an EBP, and collect and deeper understand the factors, barriers and facilitators associated with EBP.

Methods. This study incorporated a mixed-methods design (quantitative and qualitative). In an attempt to ensure the correct population sample, a national professional association e-mail database and the e-mails of past students from national schools were requested. For the quantitative data it was choose an e-survey, adapted from the EBP: Beliefs, Attitudes, Knowledge, and Behaviors of Physical Therapists Portuguese version questionnaire, consisted of 55 close-ended questions. It was analyzed response frequencies and associations between variables with logistic regression analyses. For the qualitative data, it was choose to perform semi-structured interviews in purposefully selected physical therapists to include different sociodemographic factors (especially those found to be statistically significant in the logistic regression) and survey responses regarding the physical therapists’ beliefs, attitudes, knowledge, and behaviors. The interviews were performed in an online software, where only audio contact was performed. The audios were anonymized and verbatim transcribed, and the texts explored by the thematic approach.

Results. From the 277 physical therapists that shown interest in participating in the study, 193 fully completed the questionnaire and, from those, 10 participated in the interviews. The Portuguese physical therapists reported positive beliefs, attitudes, knowledge, and behaviors regarding EBP. Among the physical therapists characteristics it seems that age (younger therapists), education (participating in continuing education courses; belonging to practice-orientated organizations; having a doctorate degree; pursuing a higher academic degree; and being a clinical instructor), and workplace (working for someone else account; and academic sector) are the main factors in the Portuguese EBP implementation. The Portuguese physical therapists, beyond the physical therapists individual characteristics and workplace, also stated that evidence, patients, clinical experience, schools, country and physical therapy characteristics, may behave as facilitators or barriers when performing an EBP.

1 **Introduction**

2 Evidence-Based Practice (EBP) is nowadays a widely used term by health-care practitioners.
3 Originally developed at the McMaster Medical School in Canada in the 1980s, EBP can be
4 defined as the conscientious, explicit and judicious use of current relevant available evidence
5 combined with the health-care providers' clinical expertise and the patients' preferences, guiding
6 clinical decisions about patients' care (1-4). Despite its importance (e.g. improving the quality of
7 healthcare), professional organizations identified it as a priority, and influential researchers and
8 clinicians argue that health-care practitioners (such as Physical Therapists (PTs)) have an ethical
9 obligation to base their practice on research findings, many still do not perform an EBP (5).
10 Personal, organizational, cultural, social, environmental, historical, educational, political,
11 financial and demographic factors have being suggested as the main causers of this issue (6, 7).
12 As the profession is relatively new in Portugal (the first PT Portuguese school is from 1966 –
13 Escola Superior de Saúde de Alcoitão (8)), currently little is known about the implementation of
14 EBP in Portuguese PTs and the existing research is scarce to fully understand how the
15 enumerated factors behave as a barrier and how to facilitate them (6, 9). Therefore, if it could be
16 understood the relationship between the different EBP “actors”, what are the barriers and how to
17 avoid them, we could come closer to accomplishing one important goal (10): by 2020 PTs would
18 be autonomous practitioners (i.e. independent, self-determined, professional judgment and
19 action) which, among other things, use an EBP.
20 So, the aim of this study is to know if the Portuguese PTs use an EBP, and collect and deeper
21 understand the factors, barriers and facilitators associated with EBP.

22

23 **Materials & Methods**

24 This study followed the Ethical Principles of the Helsinki Declaration (11) and was approved by
25 the Porto University Faculty of Sport ethics committee (CEFADE24-2019).

26 This study incorporated a concurrent mixed-methods design (12-18), collecting quantitative (e-
27 survey) and qualitative (semi-structured interviews) data to answer the research question. The
28 flowchart of the study design is depicted in Figure 1 in the Supplement material.

29 **Sample gathering**

30 In an attempt to ensure the correct population sample, a national PT professional association –
31 Associação Portuguesa de Fisioterapeutas (APFISIO) – e-mail database was requested for the
32 Portugal PTs working class recruitment. Also, in an attempt to increase the number of enrolled
33 participants, the e-mails of past students from 19 PT national schools were requested. According
34 to the APFISIO, the number of participants would be around 12000 PTs (19).

35 **Quantitative design**

36 For the quantitative data, it was chosen to apply a self-administered e-survey. The e-survey was
37 evaluated, designed, administered, conducted and collected according to established guidelines
38 (20-23).

39 The e-survey was e-mailed to all PTs in the APFISIO database in the regular online newsletter
40 and to past PT students as a formal e-mail with a cover letter containing a small study's

41 information (background, justification and aims). Additionally, after reading the study's
42 information, the participants were invited to click in the e-survey link
43 (<https://pt.surveymonkey.com/r/PBE2019FADEUP>).
44 Before initiating the e-survey (in the front page), the purpose and context of the study, the data
45 protection rights and how the results will be used (analyzed anonymously and confidentially,
46 where the data gathered will only be used for statistical information in an academic
47 environment), the criteria for selecting the participants and the reasons for non-participation, the
48 possibility to terminate the e-survey at any time, instructions about how to fill and complete the
49 e-survey, and the e-mail address for possible clarifications were explicitly stated. The consent for
50 participation in the study was obtained through a informed consent statement. The e-survey was
51 an adaptation of the Evidence-Based Practice: Beliefs, Attitudes, Knowledge, and Behaviors of
52 Physical Therapists Portuguese version questionnaire (24), developed originally by Jette et al.
53 (25). The e-survey included 55 close-ended questions, 23 sociodemographic-related items and 32
54 EBP-related items. Sociodemographic items include a mix of personal, professional and
55 academic data. From the sociodemographic information, the PTs could not proceed to the next e-
56 survey stage if they (Table 1):
57 The EBP-related items were divided in 3 main sections: personal attitudes toward, use of, and
58 perceived benefits and limitations of EBP (14 items); personal use and understanding of clinical
59 practice guidelines (6 items); availability of resources to access information and personal skills
60 in using those resources (12 items). The questionnaire explores the respondents' attitudes and
61 beliefs about EBP (survey items 25, 26, 28, and 30–55); interest in and motivation to engage in
62 EBP (survey items 27 and 29); educational background and knowledge and skills related to
63 accessing and interpreting information (survey items 49–55); level of attention to and use of the
64 literature (survey items 36–38); access to and availability of information to promote EBP (survey
65 items 42, 43, and 45–48); access to CPGs (survey items 39–44); and their perceived barriers of
66 evidence use in practice (survey item 56). Responses to most items were addressed using a 4-
67 point Likert scale with “Strongly Disagree”, “Disagree”, “Agree” and “Strongly Agree”. Other
68 items that collect data about the access to information used a dichotomous “Yes” or “No”
69 answer. The questions related to the understanding of scientific terms related to EBP required
70 multiple choice answers with 3 possible choices: “Understand Completely”, “Understand
71 Somewhat” or “Do Not Understand”. Also, the questions linked to the barriers related to the use
72 of EBP, required multiple choice answers with a 1 to 3 ranking scheme (1 as the most
73 important). Previously to sending the e-survey by e-mail, the e-survey was pre-tested by the
74 authors and evaluated in its completion time, design, questions order, attractiveness, syntax,
75 clarity, logic, correct question type and response format. Also, it was permitted to the
76 respondents to review and change their answers. Using the Raosoft Sample Size Calculator
77 (<https://www.raosoft.com/samplesize.html>), the sample size goal for this study was 373
78 responses, based in a 95% confidence level, a margin of error of 5% and a 50% response
79 distribution (26). To ensure that the sample size goal was achieved, after two, four and six weeks
80 respectively, a thank you note and a reminder containing the e-survey link was e-mailed.

81 **Qualitative design**

82 Following the completion of the e-surveys, an individual qualitative strategy was performed. For
83 the qualitative data collecting, it was chosen to apply semi-structured interviews with open-
84 ended questions on the volunteer PTs. The interviews were conducted by 1 author, blinded to
85 PTs characteristics and prior questionnaire answers, using Skype software (Microsoft
86 Corporation, Rives de Clausen, Luxemburg), where only audio-recorded was performed –
87 excluding any face-to-face or written contact. Furthermore, there was no relationship between
88 the interviewers and the PTs prior to the study, and the interviewees were recruited by
89 completing the study previous stages where, at the end of the e-survey, the respondents were
90 invited to fill a space where a personal e-mail could be inserted. With this filling, they consent to
91 be later contacted, if desired to continue to be studied. Following a review of questionnaire
92 responses, the sample was purposefully selected to include different sociodemographic factors
93 (especially those found to be statistically significant in the logistic regression) and survey
94 responses regarding the PTs' beliefs, attitudes, knowledge, and behaviors. To ensure a high
95 participation rate, after one, two and four weeks respectively, a thank you note, a reminder
96 containing the interview objectives and a request to provide their most convenient dates for the
97 interview, were e-mailed. The interview script had 12 core questions (Table 1 of the Supplement
98 material), constructed according to Qu and Dumay (27), and properly validated by an expert
99 panel, before the interviews. The semi-structured interviews were performed according to Leech
100 et al. (28) guidelines. However, because of the interviewees' responses to specific questions, the
101 number and order of questions was sometimes altered to a more in-deep investigation, to
102 conserve the flow of the interview, and to maintain a positive relationship with the interviewee.
103 Before initiating the core questions, an introductory section with the purpose of the study, the
104 protection rights, how the data will be used, and some "warm-up" questions were included in
105 order to build empathy and comfort. The "yes" or "no" answers were avoided. At the end of the
106 core questions, the opportunity to the interviewees to add additional information and opinions
107 that they found to be relevant to the thematic addressed was given. The interview script was
108 tested on the first participant who, after the interview, was asked for feedback on the interview
109 conduction, structure, design and phrasing of questions.

110 **Data analysis – Quantitative**

111 Response frequencies for the survey questions were determined and displayed in tabular and
112 graphic formats, using the Microsoft Excel (Microsoft Corp, Redmond, Washington) and the
113 IBM SPSS 26.0 (International Business Machines Corporation, Statistical Package for the Social
114 Sciences, Armonk, New York, United States of America) software.
115 After examining the response frequencies and before examining the associations between
116 variables, some variables categories were collapsed in order to allow further analysis using them
117 as dependent measures in logistic regression analyses. Using a similar strategy as Jette et al. (25),
118 for items with a 4-point Likert scale the "Strongly Agree" and "Agree" categories were
119 combined, as well as the "Strongly Disagree" and "Disagree" categories, so that responses fell
120 into 1 of 2 categories: "Agree" or "Disagree". For the items with a "Yes/No/Do Not Know"

121 choice set, the “Do Not Know” category was combined with the “No” category, based on the
122 belief that the lack of knowledge regarding EBP topics is, partially, similar as not performing it.
123 For items categorized by the number of times, the lowest categories (≤ 1 and 2-5) were
124 distinguished from the higher categories (6-10, 11-15 and ≥ 16), and combined in “Poor” for the
125 lower values and “Good” for high values. For items that were designed to examine the degree of
126 understanding of research terms, the “Understand Completely” and “Understand Somewhat”
127 categories were combined so that a 2-category response was obtained: “Understand at Least
128 Somewhat” or “Do Not Understand”. Lastly, in the barriers item, the PTs’ choices were
129 collapsed into “Present” (if the PT chooses 1st, 2nd or 3rd) or “Absent” (no barrier choice).
130 For some of the sociodemographic data, where subsamples were smaller, we collapsed categories
131 in an effort to derive stable models. For example, our sample included only 1 PT who indicated a
132 professional Post-Doctorate degree, so we included him/her with others Philosophy Doctor
133 (PhD) degrees. Furthermore, we combined the Certificate and Baccalaureate degrees into the
134 same category (Baccalaureate), as in Portugal they are the minimum required professional entry-
135 level.
136 After item categories were collapsed, logistic regression analyses were conducted to examine the
137 associations with the PTs’ characteristics. An alpha level of 0.05 was used to determine whether
138 a model was to be reported. Odds ratios (ORs) and their 95% CIs were determined for each level
139 of the independent variables in those models that were significant. CIs including 1.0 were
140 considered as not statistically significant (29).

141 **Data analysis – Qualitative**

142 The data was analyzed with a Computer Assisted Qualitative Data Analysis Software, namely
143 the NVivo v12 (QRS International, Doncaster, Victoria, Australia) (30). The audios collected in
144 the interviews were anonymized and verbatim transcribed. Then, the texts were explored by the 6
145 phases of thematic approach (31). Data collection and analysis were continuously alternated in
146 an iterative manner, in which 3 authors continuously reflected on, compared, discussed, and
147 adjusted the codes and themes. Each author read all the transcripts to obtain an understanding of
148 the whole. Next, the authors independently reviewed the transcripts and identified coding units in
149 the text that captured various key statements and thoughts in relation to the study aim. The
150 researchers scrutinized the coding units and reviewed the text several times, providing the
151 opportunity to add new codes to the previous identified ones. During this process, the coding
152 units were merged into context units. The context units included several coding units and
153 reflected more than one key statement or thought. The context units were combined into
154 categories based on similarity of the content. The categories were merged into overarching
155 system levels based on their characteristics. During the process, all authors discussed the content
156 of the categories using triangulating analysis, i.e., the authors independently analyzed the same
157 data and compared their findings using the FreeMind software (SourceForge Software). The
158 discussions continued until no inconsistencies existed and a shared understanding was reached to
159 prevent researchers’ bias and strengthen the internal validity. Then, the original classification
160 tree was analyzed and further discussed with the expert panel, where some categories were

161 collapsed, eliminated or renamed. Quotations were identified to report the findings and illustrate
162 the content, and were translated from Portuguese to English. To ensure complete and transparent
163 data reporting, the methodology was conducted according to established guidelines (32-38).

164

165 **Results**

166 **Quantitative**

167 From the 277 PTs that shown interest in participating in the study, only 193 (69.7%) fully
168 completed the questionnaire (Figure 1).

169 The average time to complete the e-survey was 12 min. The majority of the PTs that completed
170 the questionnaire were females (73.1%), within the 30-39 years age group (44.6%), with a valid
171 PT working license obtained between 5 to 10 years ago (32.1%). Furthermore, despite the
172 majority only had the baccalaureate degree (61.1%), they shown interest in pursuing a higher
173 academic degree in the future (66.3%). Most of them obtained the Certificate/Baccalaureate in
174 the Escola Superior de Saúde de Alcoitão (20.7%) and were clinical instructors for PT students
175 (51.3%). Additionally, they reported belonging to a practice-oriented organization (78.8%) and
176 participate, at least once per year, in continuing education courses (89.1%). Regarding their
177 practice, most of the PTs worked more than 40 hours per week (44.6%), focusing their time
178 taking care of patients (57.9%), leaving research and teaching as a low priority (87.6% and
179 82.4% within the 0-25% range, respectively). Typically, the PTs treated more than 15 adult
180 patients per day, with orthopedic conditions (58%, 63.9% and 39.9%, respectively). The majority
181 worked in Lisbon (35.2%), in an urban environment (82.9%), for someone else's account, with 5
182 to 10 PTs, in the private sector (76.7%, 43.5% and 63.2%, respectively) – private clinics
183 (21.2%). For a more detailed data analysis, the descriptive statistics of the PTs personal and
184 practice characteristics are presented in Table 2.

185 Concerning the items sub-group Attitudes and Beliefs About EBP, respondents stated they held
186 generally positive attitudes and beliefs regarding EBP. The only exception was in the item 32,
187 where they Disagreed (45.1%) that EBP may increase their reimbursement. Moreover, there is
188 the necessity to highlight the item 31 (“EBP does not take into account the limitations of my
189 clinical practice setting”), where the PTs' answers were very balanced between Agree (44.6%)
190 and Disagree (44.0%). The respondents' answers are presented in Figure 2.

191 Regarding the statistically significant associations between PTs' characteristics and their
192 perceived Attitudes and Beliefs About EBP, therapists that participate at least once per year in
193 continuing education courses were 2.9 and 3.7 more likely to agree that “EBP Doesn't Account
194 for Practice Settings Limitations” and that “Evidence is Lacking to Support Interventions” in
195 comparison to those that do not participate in continuing education courses ($p=0.033$ and
196 $p=0.040$, respectively). Also, PTs that treat 11 to 15 patients per day were 2.5 times more likely
197 to agree that “EBP Doesn't Account for Practice Settings Limitations”, in comparison with those
198 who treated more than 15 patients per day ($p=0.036$). Furthermore, PTs that belong to a practice-
199 orientated organization were 4.1 and 4.2 more likely to agree that “EBP Improves Care Quality”
200 and that “EBP Helps Decision Making” in comparison to those that do not belong to a practice-

201 orientated organization ($p=0.033$ and $p=0.019$, respectively). Moreover, male PTs were 2.6 times
202 more likely to agree that “EBP Will Increase Reimbursement” and 55% less likely to agree that
203 “EBP Creates Unreasonable Demands” in comparison to their female peers ($p=0.004$ and
204 $p=0.034$, respectively). Likewise, PTs that work by their own account were 91% less likely to
205 agree that “EBP is Necessary to Practice” ($p=0.044$). Table 2 of the Supplement material
206 summarizes the sub-group logistic regression information.

207 In the items sub-group Interest in and Motivation to Engage in EBP, they Agreed that they
208 needed to increase the use of evidence in the daily practice (57.5%). The PTs’ characteristics that
209 were more likely to agree were female therapists that worked in the public sector, for someone
210 else account (OR 0.427 [95% CI: 0.187; 0.977] for “Male” – $p=0.044$, OR 3.012 [95% CI: 0.909;
211 9.977] for “Public” – $p=0.009$, and OR 0.401 [95% CI: 0.172; 0.936] for “Own Account” –
212 $p=0.035$). Overall, the responders shown interest in learning or improving the skills necessary to
213 incorporate EBP into practice (64.8%). The PTs’ characteristics that were more likely to agree
214 with the overall findings were therapists that have a Certificate/Baccalaureate degree (OR 8.850
215 [95% CI: 1.734; 45.178] – $p=0.009$), that devote most of their time treating several patients (OR
216 0.089 [95% CI: 0.010; 0.786] for “1-5 Patients Day” – $p=0.029$ and OR 0.009 [95% CI: 0.000;
217 0.272] for “0% Patient Care” – $p=0.007$, OR 0.016 [95% CI: 0.002; 0.162] for “5-25% Patient
218 Care” – $p=0.000$, OR 38.333 [95% CI: 3.958; 371.244] for “0% Teacher” – $p=0.002$ and OR
219 27.333 [95% CI: 1.890; 395.245] for “5-25% Teacher” – $p=0.015$) and do not work in the
220 academic sector (OR 31.111 [95% CI: 3.248; 297.981] for “Public” – $p=0.003$ and OR 16.389
221 [95% CI: 3.734; 71.938] for “Private” – $p=0.000$) (Figure 2 and Table 3 of the supplement
222 material).

223 About the items sub-group Level of Attention to and Use of the Literature, PTs read, use and
224 search a small number of professional literature (2-5 – 45.1%, 35.2% and 48.7%, respectively)
225 (Figure 3). Regarding the statistically significant associations between PTs’ characteristics and
226 their Level of Attention to and Use of the Literature, male therapists were 2.1 to 2.4 times more
227 likely to read, use and search professional literature in comparison to their female peers
228 ($p=0.022$, $p=0.010$ and $p=0.022$, respectively). Similarly, younger PTs were more likely to read
229 and search professional literature in comparison to more experienced therapists (OR 4.105 [95%
230 CI: 1.556; 10.830] – $p=0.004$ and OR 3.778 [95% CI: 1.448; 9.856] – $p=0.007$, respectively). In
231 contrast, it was found that PTs with lower level academic degrees read and search less literature
232 in comparison with Doctorate level peers (79% – $p=0.013$ and 81% – $p=0.008$, respectively).
233 Furthermore, PTs that spend moderate time in patient care were more likely to read and search
234 literature in comparison with PTs who spend 80-100% of their time treating patients (30-50% –
235 OR 3.181 [95% CI: 1.122; 9.020] ($p=0.030$) and 55-75% – OR 3.054 [95% CI: 1.533; 6.085]
236 ($p=0.002$) in “Articles Read per Month”; and 5-25% – OR 7.540 [95% CI: 1.873; 30.359]
237 ($p=0.004$) and 30-50% – OR 6.786 [95% CI: 2.201; 20.922] ($p=0.001$) in “Databases Searches
238 Performed per Month”). Similarly, PTs that spend moderate time as researchers were more likely
239 to search literature in comparison with PTs who spend no time in that activity (OR 2.379 [95%
240 CI: 1.230; 4.601] – $p=0.010$ for “5-25%” and OR 6.825 [95% CI: 2.294; 20.306] – $p=0.001$ for

241 “30-50%”). Still, PTs that belong to a practice-orientated organization were 2.5 times more likely
242 to read more articles in comparison to those that do not belong to a practice-orientated
243 organization ($p=0.030$). Moreover, it was found that younger PTs were more likely to have good
244 levels in professional literature searched in comparison to their older peers (OR 4.529 [95% CI:
245 1.676; 13.017] – $p=0.005$). Also, PTs that pursue a higher academic degree were more likely to
246 search professional literature (OR 0.328 [95% CI: 0.115; 0.932] – $p=0.036$ for “No” and OR
247 0.350 [95% CI: 0.155; 0.793] – 0.012 for “Do Not Know”). Furthermore, those who work in the
248 public sector were 80% less likely to search it in comparison to PTs who work primarily in the
249 academic context ($p=0.011$). Table 4 in the supplement material summarizes the sub-group
250 logistic regression information.

251 Within the items sub-group Access to Practical Guidelines, most of the PTs know, seek, use, and
252 access practice guidelines, and incorporate them with patient preferences (78.2%, 56.5%, 64.2%,
253 85%, 83.4% and 72%, respectively) (Figure 2 and Figure 4). Concerning the associations
254 between PTs’ characteristics and the referred sub-group, clinical instructors were 66% less likely
255 to think that guidelines are not available for topics related to their practice ($p=0.004$) and were
256 3.1 time more likely to use them in their practice ($p=0.012$). Additionally, PTs that pursue a
257 higher academic degree and participate at least once a year in continuing education courses were
258 more likely to use practice guidelines (OR 0.158 [95% CI: 0.059; 0.427] – $p=0.000$ for “No” and
259 OR 6.039 [95% CI: 2.251; 16.206] – $p=0.000$ for “Yes”, respectively). Furthermore, it was found
260 that PTs that spend no time as teachers were 9.1 times more likely to be in agreement that
261 practice guidelines incorporate patients’ preferences in comparison with those who spend 80-
262 100% ($p=0.025$). Table 5 in the supplement material summarizes the sub-group logistic
263 regression information.

264 Regarding the items sub-group Access to and Availability of Information to Promote EBP, the
265 majority of the respondents reported that, generally, they have access to EBP at work or at home.
266 However, this access is mainly by the use of electronic databases (69.4% at work and 90.7% at
267 home), since the majority assumed that they do not have access to current research through
268 professional journals in their paper form (77.7%) (Figure 4). From the different PTs’
269 characteristics, the ones that were more likely to assume that they do not have access to current
270 research through professional journals in their paper form, include non-clinical instructors and
271 therapists that spend less time in teaching (OR 0.369 [95% CI: 0.179; 0.763] – $p=0.007$ for
272 “Yes” and OR 25.250 [95% CI: 2.651; 240.495] – $p=0.005$ for “0%”, respectively).

273 Additionally, male therapists were the ones who have an easier access to online databases at
274 work ($p=0.018$). Nevertheless, in general, PTs Agreed that the facility supports the use of
275 research in practice (42.5%) (Figure 2). From the different PTs’ characteristics, the ones who
276 were more likely to agree include therapist that work 20-30 hours per week (OR 5.250 [95% CI:
277 1.669; 16.517] – $p=0.005$), treating 6-10 patients per day (OR 2.350 [95% CI: 1.087; 5.079] –
278 $p=0.030$), 30-50% as researcher (OR 6.963 [95% CI: 1.884; 25.736] – $p=0.04$), working by their
279 own account (OR 3.444 [95% CI: 1.623; 7.310] – $p=0.001$), in either the academic or private
280 work sector. (Table 6 in the supplemental material).

281 Concerning the items sub-group Educational Background, Knowledge and Skills Related to
282 Accessing and Interpreting Information, most Agreed that they learned the foundations for EBP
283 (48.2%), and receive training for finding and critically appraise research literature (43.5% and
284 47.7%, respectively), as part of their academic preparation. Furthermore, they were self-
285 confident in their skills to critical appraisal and find research (62.7% and 64.2%, respectively).
286 They were also familiar with medical search engines (44.6%). Figure 2 shows the distribution of
287 the sub-group responses. Regarding the statistically significant associations between PTs’
288 characteristics and their Educational Background, Knowledge and Skills Related to Accessing
289 and Interpreting Information, the oldest therapists were less likely to agree that they learned their
290 foundations for EBP and had formal training in search strategies, in comparison to younger
291 therapists (20-29 – OR 9.474 [95% CI: 2.397; 37.436] ($p=0.001$) and 30-39 – OR 3.547 [95%
292 CI: 1.395; 9.015] ($p=0.008$) in “Learned Foundations”; and 20-29 – OR 5.262 [95% CI: 1.941;
293 14.260] ($p=0.001$) and 30-39 – OR 3.577 [1.521; 8.410] ($p=0.003$) in “Search Strategies”).
294 Similar comparison was found for formal training in critical appraisal, where PTs in the 20-29
295 and in the 30-39 age group were 4.2 and 2.6 times more likely to agree in contrast with the older
296 therapists ($p=0.008$ and $p=0.037$, respectively). As a complementation, PTs that had less years of
297 license report a similar pattern as younger therapists in the “Formal Training in Search
298 Strategies” (OR 3.832 [95% CI: 1.276; 11.508] – $p=0.017$ for “< 5” and OR 3.283 [95% CI:
299 1.475; 7.307] – $p=0.04$ for “5-10”). In contrast, more experienced therapists were more likely to
300 agree that they were confident in search skills (OR 0.254 [95% CI: 0.078; 0.824] – $p=0.023$ for
301 “5-10” and OR 0.267 [95% CI: 0.078; 0.916] – $p=0.036$ for “11-15”). Still, clinical instructors
302 were 3.3 and 2.3 times more confident in searching and critically reviewing professional
303 literature, in comparison to non-clinical instructors ($p=0.008$ and $p=0.039$, respectively).
304 Additionally, not knowing if the PT wants to pursue a higher academic degree had a negative
305 impact in learning his foundations for EBP as part of the academic preparation, received formal
306 training in search strategies, and help them to be more familiar with medical search engines,
307 since therapists who pursue it are more likely to agree (OR 0.286 [95% CI: 0.122; 0.699] –
308 $p=0.004$, OR 0.370 [95% CI: 0.177; 0.772] – $p=0.008$ and OR 0.233 [95% CI: 0.092; 0.541] –
309 $p=0.001$, respectively). Additionally, PTs that work in the Public and Private sectors were 4.7
310 and 7.1 times more likely to agree that “I learned the foundations for EBP as part of my
311 academic preparation”, in comparison with the academic sector peers ($p=0.015$ and $p=0.001$,
312 respectively). In the same item, therapists that are not teachers were 13.1 times more likely to
313 agree, in contrast with PTs that are teachers ($p=0.007$). Table 7 in the supplemental material
314 summarizes the sub-group logistic regression information.

315 The positive findings in the Educational Background, Knowledge and Skills Related to
316 Accessing and Interpreting Information sub-group was further confirmed, as most the PTs
317 Understand Completely (62.2%) the presented scientific terms. Nevertheless, the most
318 understood scientific term was “Systematic Review” (17.4%) and the least was “Odds Ratio”
319 (9.7% in Understand Somewhat and 39.6% in Do Not Understand). The only term that had
320 statistically significant associations was “Publication Bias”. The PTs who do not understand the

321 term were non-clinical instructors working by their own account (OR 0.262 [95% CI: 0.082;
322 0.836] – $p=0.024$ for “Clinical Instructor”, and OR 3.339 [95% CI: 1.205; 9.252] – $p=0.020$ for
323 “Own Account”, respectively). The understanding levels of the terms associated with EBP are
324 described in Figure 5 and the sub-group logistic regression information is summarized in Table 8
325 in the supplemental material.

326 Within the items sub-group Perceived Barriers for Evidence Using in Practice, the PTs reported
327 “Insufficient time” as the most important barrier (24.2%), followed by “Inability to apply
328 research findings to individual patients with unique characteristics” (17.8%), and finally “Lack
329 of generalizability of the literature findings to my patient population” (15.7%). In the ranking,
330 “Insufficient time” was the most chosen for 1st (49.7%), and “Inability to apply research findings
331 to individual patients with unique characteristics” for 2nd and 3rd (23.3% and 18.1%,
332 respectively). The barriers distribution is exhibited in Figure 6. Regarding the statistically
333 significant associations between PTs’ characteristics and their perceived barriers, PTs that work
334 by their own account were 2.4 more likely to choose “Lack of information resources” and “Lack
335 of research skills” as barriers, in comparison with other therapists that work for someone else
336 account ($p=0.022$). At the same time, they were 62% less likely to choose “Lack of collective
337 support among my colleagues in my facility” as a barrier, in comparison with their peers
338 ($p=0.022$). Less experienced PTs were more likely to choose “Insufficient Time” as a barrier in
339 comparison with more experienced therapists (OR 3.106 [95% CI: 1.031; 9.356] – $p=0.044$ for
340 “< 5” and OR 2.941 [95% CI: 1.297; 6.668] – $p=0.010$ for “5-10”). Furthermore, non-clinical
341 female therapists’ instructors were more likely to choose “Insufficient Time” in comparison with
342 their male clinical instructors peers ($p=0.029$ and $p=0.016$, respectively). It was also found that
343 the number of PTs in the facility might influence the “Inability of Apply Research to Individual
344 Patients” barrier, as in facilities with more than 15 PTs, this barrier was less chosen (OR 3.491
345 [95% CI: 1.096; 11.124] – $p=0.0034$ for “0”, OR 4.945 [95% CI: 1.654; 14.790] – $p=0.004$ for
346 “1-5” and OR 12.800 [95% CI: 2.545; 64.372] – $p=0.002$ for “11-15”). Additionally, PTs that
347 treat 1-5 patients per day were 72% less likely to choose the “Lack of Collegial Support” in
348 comparison with the ones that treat more than 15 patients per day ($p=0.041$). Finally, differences
349 were found between public and academic work sector, as academic therapists were more likely
350 to have restrictions to apply research to individual patients (OR 0.271 [95% CI: 0.076; 0.986] –
351 $p=0.044$ for “Public”) (Table 9 in the supplemental material).

352 For a more detailed data analysis, the descriptive statistics of the PTs EBP responses are
353 presented in Table 10 in the supplemental material.

354 **Qualitative**

355 From the 193 PTs that completed the e-survey, only 67 (34.7%) volunteered for the interviews.
356 From those, 23 PTs were selected, but only 10 responded to the emails. The participants’
357 characteristics in the qualitative study are outlined in Table 3.

358 The interviews were made from January to April 2020. At the end, 313 minutes of recordings
359 were obtained (31 minutes in average – 21 minimum [FT 3]; 72 maximum [FT 5]), which
360 generated 71 transcript pages (7 average – 5 minimum; 13 maximum). The interviews offered

361 compelling fragments of PT's experiences, opinions and beliefs about evidence-based practice.
362 In most cases, the qualitative data underpins the survey findings. The most often spoken word by
363 PTs was "persons", followed by "evidence" and "practice" (191 times, 179 times and 128 times,
364 respectively). The Figure 2 in the supplemental material shows the word cloud frequency.
365 With the interviews, 6 main themes were identified: EBP definition; EBP concept origin; Main
366 actors and their individual importance; Relations between the main actors; EBP in the
367 workplace; EBP national wide. The classification tree is illustrated in Figure 3 in the
368 supplemental material.

369 Generally, the PTs shown positive beliefs, attitudes, knowledge, and behaviors about EBP. The
370 majority of the PTs had similar EBP concept. Almost all of them included clinical experience,
371 patient's preferences and scientific evidence as the main actors (Quotation 1). However, there
372 were outliers cases. A PT beyond all the actors previously described, still found the necessity to
373 add another one: ethics. For him/her, there is no EBP without ethics, being present and important
374 at all times (Quotation 2). Furthermore, another PT, defined EBP as performing a practice in
375 which the PT has to constantly register the clinical findings and makes his assessments according
376 to international and national scales/tests (Quotation 3). The workplace may explain the reason for
377 this different EBP perception. The PT worked in a continuing care unit, where scales/tests are
378 used not only as a way of assessing, recording and monitoring the patients' health status, but also
379 as a way of communication between the several health professionals (the work in these units is
380 mainly based on multidisciplinary health teams) (Quotation 4). In these units, scales/tests are
381 also used as a basis for decision making to change the type of health service provided to a patient
382 and to make a decision when to release a patient (Quotation 5). The other explanation may be
383 related with the patients who attend to continuing care units. Where, patients are often very
384 debilitated, with profound state losses, both physical and in consciousness. So, often, they are
385 unable to participate actively in the treatment plan decision-making (Quotation 6).

386 Still in the EBP concept, it is necessary to point out that there were PTs who balanced all the
387 main EBP actors on equal importance levels and there were others who ranked their importance:
388 evidence in 1st, patients' preferences in 2nd and clinical expertise in 3rd (Quotation 7). A factor
389 that could be involved in this ranking scheme is the PTs' inexperience, since most of the younger
390 PT reported it. In the clinical experience, it was stated that it only came with the years of work
391 and the increased number of treated patients (Quotation 8). So, as younger and less experienced
392 PTs still do not have many years of work, they cannot yet count on their clinical experience in
393 the clinical decision-making (Quotation 9). However, this may not be the only factor responsible
394 for this stratification. Some PTs who have higher academic degrees or who are currently
395 increasing their degree, also made similar associations (however, in these cases, as in general
396 they were more experienced, they placed clinical expertise in 2nd and the patients' preferences in
397 3rd) (Quotation 10). So, the EBP concept can be influenced not only by personal but also by
398 professional related factors. Besides the PT experience/inexperience and the increase of the
399 academic degree factors, other elements were invoked by the PTs, namely: (1) the attendance to
400 trainings/workshops/congresses; (2) the natural peer discussions; and, (3) reading and searching

401 scientific papers. In fact, many PTs reported that, the EBP concept is not a fixed “element”, but it
402 behaves almost like a caterpillar, i.e., it can transform from its foundation and metamorphoses
403 with time (Quotations 11, 12, 13, 14, 15 and 16). The majority of the interviewed PTs had the
404 foundations for EBP as part of their bachelor academic program, in either a specific lecture or
405 part of the curricular internship (Quotations 17 and 18).

406 Although some PTs balanced the main actors level of importance and others ranked their
407 importance, for all, evidence has a very important role in EBP (Quotation 19). Evidence helps
408 them to: (1) make more informed decisions; (2) justify their decision making; and, (3) have more
409 certainty in the diagnosis, prognosis and intervention plan (Quotations 20 and 21). The majority
410 associated the evidence with the best evidence available at the moment (Quotation 22). For that,
411 it was mentioned that it was necessary to: (1) gather information; and, (2) critically analyze the
412 information collected (Quotation 23). The most frequent strategies that PTs use to keep updated
413 were similar with those pointed as responsible for the EBP concept transformation: (1) the
414 attendance to trainings/workshops/congresses; (2) natural peer discussions (either personal or by
415 social media); (3) increase academic degree; and, (4) read and search scientific papers (either
416 physical or by electronic databases) (Quotations 24, 25, 26 and 27). For the interviewed PTs
417 there is not an exclusive way to gather information. All strategies were considered valid and
418 important (Quotation 28). Nevertheless, preferences and advantages in the different evidence
419 actualization strategies were stated. The pointed advantages of peer discussion are to have a
420 different opinion of a topic (can change the personal perspective) and/or have access to a more
421 specialized professional that can bring new, better informed and summarized evidence
422 (Quotations 29 and 30). Similar to peer discussion, is the attending to congresses advantages.
423 The PTs stated that going to congresses is a good way to receive summarized evidence and to be
424 in contact with a new/innovator/not well-known treatment. Furthermore, as congresses can show
425 new interventions, the PTs could later attend to workshops as, besides of being another example
426 of having evidence summarized, it could help to transform the theory into practice, showing the
427 PTs how to perform an intervention (Quotation 31). Regarding the practice-related Facebook
428 groups, it is stated that there are useful studies’ sharing and discussion (Quotation 32). Increasing
429 the academic degree can have an important role to keep up to date, since in most of the
430 individual lectures their opinions must be based in the evidence and their thesis developed with
431 the most recent and high quality evidence (Quotation 33). Besides being a good way to keep up
432 to date, increasing the academic degree has another important role in evidence, since it improves
433 the search performance and the ability to critically analyze studies (Quotation 34). Nevertheless,
434 regardless that these strategies give a better and faster overall idea of a topic or area, most affirm
435 that it lead them to go to the source – read and search scientific studies (Quotations 35 and 36).

436 Although some receive studies directly via email (by subscription to scientific journals), most of
437 them read and search scientific studies in online practice-related databases, being paper form the
438 least stated option. The online databases were searched ranging from 1 per week to 5 per week
439 (Quotations 37 and 38). The most common studies types searched were: guidelines, systematic
440 reviews, meta-analyses, RCTs and expert opinion papers. From those, the PTs preferred to start

441 reading information through studies that have a higher level of evidence, such as guidelines,
442 systematic reviews or meta-analyzes (Quotations 39 and 40). Another factor that could interfered
443 in the study type choice, may rely on the specific area or topic that is been searched. In fact, most
444 of them raised daily clinical practice or academic related factors as the main reasons to do the
445 searches (Quotations 41, 42, 43 and 44).

446 Despite PTs placed evidence as a key element in EBP, sometimes they cannot count on it. The
447 reasons raised were: (1) they cannot reach the best evidence available; (2) the evidence is often
448 inconclusive; (3) as the evidence is rapidly and constantly evolving, they can never be
449 completely updated and informed; (4) it is difficult to apply in the daily clinical practice; (5) in
450 the physical therapy area, it is difficult to find high quality studies; and, (6) there are still areas
451 that are not fully explored scientifically (Quotations 45, 46, 47, 48 and 49). So, in those cases,
452 they have to rebalance the importance of the other two actors (clinical experience and patients'
453 preferences) to make their clinical decisions. Clinical experience may help PTs to know quicker
454 what could result in that specific type of patient, to define which therapies they master the most
455 and make more assertive diagnostics and prognostics (Quotations 50 and 51). In other hand, in
456 the patients' preferences, it was stated that it is important to listen to the patient as: (1) each
457 patient is unique, so after gathering the information by evidence and clinical practice the
458 intervention plan has to be adapted to the patient' preferences and needs; (2) in case of doubt, the
459 patient' preferences could help to establish the interventions applied; and, (3) as the treatments
460 are applied to the patients, the intervention plan final word is always theirs (Quotations 52 and
461 53).

462 However, as exposed, in some cases one or more actors could fail (for example, evidence
463 nonexistence or inconclusive, not enough clinical experience or patient with a poor level of
464 consciousness). Therefore, the PTs never counted in each actor individually to make clinical
465 decisions (Quotations 54, 55 and 56). Even in a mental ranking scheme, when possible, they
466 tried to incorporate all actors to make a final clinical decision. However, not always shown to be
467 a simple and easy task.

468 First, is the PT's internal discussion, between evidence and clinical practice. The PTs stated that
469 when a solid scientific prove about a topic (area, intervention or pathology) exists, the PT's
470 personal opinion should never overlap it (Quotation 57). Once again, ideally, the practice should
471 be evidence guided. The main reasons stated were, in one hand, scientific papers have to respect
472 rigorous quality methods to evaluate the outcomes and analyze data and, in the other hand,
473 generally they have a larger number of enrolled patients in comparison to the daily clinical
474 practice (Quotations 58 and 59). However, science still cannot answer and prove everything. The
475 PT's daily clinical experiences can show what intervention can improve the condition in a
476 particular patient. If a PT has a lot of experience in treating specific cases (expert) and when
477 applying a specific intervention plan he/she has good results, even if some of the therapies
478 applied have a few studies or are poor quality, he/she feels confidence in maintaining that
479 intervention plan (Quotation 60). Furthermore, the studies' nature and conduction can be an issue
480 in this relationship and poor evidence trust. Sometimes the research groups fail to analyze a

481 treatment effectiveness in its wholeness (Quotation 61). A suggested way to improve it can be by
482 basing/constructing/guiding the studies by the daily clinical practice doubts and make them
483 easier to understand and apply (Quotations 62 and 63).

484 Secondly, and sometimes the most difficult, is to conjugate the patients' preferences with either
485 evidence or daily clinical practice (Quotation 64). For an intervention plan to work properly, the
486 PT and the patient have to be in agreement (Quotation 65). No matter how well designed the
487 intervention plan is, if the patient does not feel motivated to do it, it will most likely fail
488 (Quotations 66 and 67). So, for the success of the intervention plan, a good relationship and
489 proper communication between the PT and the patient is mandatory (Quotations 68 and 69). For
490 this good communication, it is necessary for the PT to adapt its speech to the patient health
491 literacy level (Quotation 70). Where, not only what will be the intervention plan designed should
492 be explained, but also what the treatments' goals are, remove pathology related myths, and
493 educate the patient to manage its health-related issues independently (Quotation 71). When there
494 is a communication failure between the PT and the patient, the most common inductee stated was
495 the PT since he/she, more experienced in the area and aware of the best evidence, has the
496 responsibility to clarify the patient, even when they have very strong and wrong beliefs
497 (especially in elderly patients) (Quotations 72, 73, 74 and 75).

498 Yet, PTs are not the only inductee. Patients can also be a barrier. Often, their interventions
499 preferences are either placebo or harmful (Quotation 76). When placebo, what was mentioned
500 was that the PTs, in the first place, tried to explain (in the light of science and clinical
501 experience) why the intervention is considered placebo and why it is not the best alternative for
502 the patient. But if, after the explanation, the patient insists on doing the placebo intervention, the
503 PT could give in to the request by coming into an agreement with the patient, integrating more
504 effective interventions in the intervention plan. Doing so, the PT can make the intervention plan
505 more effective while consenting with the patient's will, increasing the degree of satisfaction,
506 confidence and motivation. As a note, it was recalled that placebo interventions have some kind
507 of results, since if the patient believes that the intervention will make him/her better, he/she will
508 in fact feel better. Nevertheless, over time, the PT would gradually leave the placebo
509 interventions and focus more time on more effective interventions. It is important to do it
510 because placebo interventions can, often, become addictive. Although, PTs only conducted this
511 clinical reasoning if a very important condition was respected: the placebo intervention has to be
512 not harmful (Quotation 77). If there is a harmful choice or attitude regarding an intervention, the
513 first rational is to explain why it is harmful and try to demote the patient to do it (Quotation 78).

514 If the patient insists, the PTs could have 3 options: (1) not do the harmful intervention (first, PTs
515 have to be beneficent and, second, PTs have the right to refuse to apply an intervention if they
516 believe that it goes against their principles or causes harm to the patient); (2) do the harmful
517 intervention, if the patient signs the informed consent and assumes the responsibility; or, (3) do
518 the intervention against the patient will (if the patient's life is at risk) (Quotations 79, 80, 81, 82
519 and 83). Nevertheless, once again, the keywords in both situations is a good, simple, correct,
520 informed and assertive communication between the PT and the patient.

521 Despite there are some obstacles to perform an EBP, most of the PTs stated that they perform it
522 (or at least try) in their daily practice (Quotation 84). Generally, they stated that they have the
523 resources and the work environment needed to practice an EBP (Quotation 85). However, they
524 also affirmed that there were some details that could be improved and even pointed some barriers
525 that made it difficult to implement EBP at work. One of the most common was the self-
526 evaluation and assuming the blame for not having enough neither knowledge, informatics skills
527 nor actively produce scientific studies (Quotations 86, 87 and 88). Another repeated statement is
528 working under a medical prescription, since it does not allow them to apply the idealized and
529 more evidence-based interventions (Quotation 89). Then, another factor was frequently stated,
530 the wrong or even lack of resources (to perform the interventions or to be up to date with the
531 evidence) (Quotations 90 and 91). The resources problem can be explained by either lack of
532 money to buy them, or can be a result of the PTs' lack of knowledge (if the PTs do not update
533 regularly they do not know what new treatment strategies exist or what new equipment is on the
534 market to complement their workplaces) (Quotations 92 and 93). The typology of the workplace
535 can also influence the implementation of EBP since, in some of them, there is too much
536 bureaucracy associated and, often, time is guided to fill documentation and not so much to the
537 patients' treatments (Quotation 94). Lack of time can also be an important barrier as, among
538 others, it can limit the PTs' updating ability (Quotation 95). Something that was related to the
539 lack of time, was the high number of patients treated daily. As the PTs have a high number of
540 patients to treat daily, there is not much time left for each patient, thus makes it difficult to
541 implement the idealized intervention plan (Quotation 96). Another factor related to patients is
542 that they often go with very restricted ideas or come with bad habits from other health care units
543 (without an EBP), making it an obstacle to implement evidence-based treatments (especially
544 more active treatments) (Quotation 97).

545 In addition to these personal daily clinical practice related barriers, PTs also pointed out other
546 barriers responsible for a non-EBP in Portugal. Although they think that it is moving in a good
547 direction, all agreed that EBP was still not widely practiced in Portugal (Quotation 98). The 5
548 main barriers themes responsible for this were: Personal PT factors; Physical therapy profession
549 in Portugal; Workplace; Evidence; Physical Therapy national schools.

550 Within the Personal PT factors theme 3 sub-groups were found: Attitudes and believes regarding
551 evidence; Laziness; and Age. In the attitudes and believes regarding evidence group, it was
552 referred as barriers that: (1) the PTs are outdated or do not want to know what evidence shows;
553 (2) the PTs do not give enough weight on evidence for their daily clinical decisions; (3) the PTs
554 do not do continuous training and education; and, (4) almost as a consequence, most of the PTs
555 still do not have the capacity to search and critically appraise studies (Quotations 99, 100 and
556 101). Since working according to EBP requires hard effort, most of the interviewed consider that
557 in Portugal the PTs are lazy as: (1) "if one intervention results in one patient, it should result in
558 other patients, and I do not have to improve my knowledge"; (2) it is easier to perform an
559 intervention that doing a proper clinical rational; and, (3) there is still not a culture of evaluation
560 and registration performed by the PTs (Quotations 102, 103 and 104). They also thought that all

561 these exposed barriers are more evident in the oldest PTs as, for example, they have less
562 informatics skills (making the access to evidence difficult), did not had the EBP basis, do not
563 have the necessary abilities to search in electronic databases, do not do continuous training and
564 education, and as the PTs age increases the importance of evidence in their daily clinical
565 decisions may decrease (Quotation 105, 106, 107, 108, 109 and 110).

566 Regarding the Physical Therapy profession in Portugal theme, one of the most stated barrier was
567 that physical therapy in the country rules itself by “vogue” interventions and by alternative
568 therapies (Quotations 111, 112 and 113). This can lead to profession disrespect and discredit,
569 giving a bad image to society and to other health professionals, and even lead to usurpation of
570 work-related functions (Quotations 114, 115, 116 and 117). Another important factor is the
571 individual profession characteristic, since it focuses mainly on providing quality of life and not
572 quantity of life (being quantity of life more valued in the current national health system)
573 (Quotation 118). Moreover, in the national health system, the PTs in the primary health care are
574 still scarce (Quotation 119). With this image and importance toward society and the health
575 system, along with the recent profession age in the country, it can result in one of the main
576 barriers in the profession: the PTs’ salaries (Quotation 120). PTs’ salaries are low, which often
577 leads PTs to work in multiple places at the same time (Quotation 121). As they have to work in
578 multiple places at the same time, they have little free time for other tasks, namely do, search and
579 read scientific literature (Quotation 122). Another problem resulting from this lack of time, but
580 also related to low salaries, is the poor trainings/workshops/congresses attendance. In the PTs’
581 opinion, in addition to their limited time for trainings/workshops/congresses, those that exist are
582 scarce and expensive for the national panorama (Quotations 123, 124 and 125).

583 Then, in part related with the profession, is the Workplace. The workplace could be a barrier
584 since, in some workplaces, the PTs have to treat many patients per hour, thus it becomes
585 impossible to them to perform an EBP (Quotation 126). In addition, there is often a total lack of
586 responsibility for the role of the PT in clinical decision-making (especially in workplaces with
587 medical prescription). In some workplaces, the PT do not participate actively in the intervention
588 plan design, they just have to apply it (Quotation 127).

589 Lastly, there were the Evidence and Schools barriers. They were the least stated barriers. Despite
590 this, PTs still pointed some difficulties in each one. Regarding the evidence barrier, in addition to
591 the already explored studies’ nature and conduction, it was reported that, as the majority of the
592 studies are written in English with particular expressions, a linguistic barrier could be
593 encountered (Quotation 128). In the schools theme, the PTs think that more importance should
594 be given to EBP, as they felt that this concept is still not sufficiently valued (Quotation 129). It
595 was also pointed that schools should update more often their contents (Quotation 130).

596 So, the PTs suggested some facilitators to overcome the identified barriers. The facilitators
597 described were aggregated in 5 main themes: Workplace and Way of working; PT Attitudes and
598 Beliefs; Physical Therapy in Portugal; Schools; and Professional Bodies.

599 In the first theme, Workplace and Way of working, something that PTs felt important to
600 underline is that physical therapy is a scientific autonomous health profession, so there should be

601 no restrictions on their participation in the patient's intervention plan (Quotations 131 and 132).
602 To further highlight this factor, it was also suggested that PTs evaluate and register more
603 (Quotation 133). Undoubtedly, it is important to have oral conversations (either with patients or
604 with other health professionals), but what is not registered tends to be forgotten. Additionally,
605 the ability to perceive the patient's evolution throughout the intervention plan may be lost
606 (Quotation 134). Another important factor frequently stated was time. In this theme, time was
607 related to having enough time to properly treat each patient (Quotation 135). With the greatest
608 need to evaluate and register, along with the demand for more time per patient, another proposal
609 for improvement has emerged: evaluation and treatments should not be carried out in the same
610 session. They must have different days to be performed (Quotation 136). So, as it can be
611 inferred, the health care units owners can play a very important role in the EBP implementation.
612 Besides they have the moral duty to perform it in their health care units, they should: (1)
613 encourage, motivate and even reward PTs who attend to trainings/workshops/congresses or
614 academically update; and, (2) promote frequent patients' cases discussion and studies' sharing
615 among colleagues (Quotations 137 and 138). Still in information sharing between colleagues, it
616 was suggested that, ideally, teams should be constituted of older and younger PTs. It is important
617 to have an age heterogeneity, since the older PTs could transmit their clinical experiences to the
618 younger ones and, in return, the younger PTs could help the older ones with some technologies
619 skills, namely search in electronic databases (Quotations 139 and 140).
620 However, for this to work out it is necessary that PTs partly lose their pride, have an "open-
621 mind" and ask for help (Quotations 141 and 142). This is precisely the first factor mentioned in
622 the PTs' Attitudes and Beliefs theme. Another important factor stated was that it is necessary for
623 PTs to be aware that they are treating patients and to treat patients properly they have to do an
624 EBP (Quotation 143). It is necessary to "return to the origins", not to lose the physical therapy
625 identity and what separates it from other health professions, and trying to avoid the use of
626 alternative therapies or others with little scientific evidence (Quotations 144 and 145). In order to
627 define which techniques should be applied (preferably those with good evidence), PTs will also
628 have to be more proactive and do more studies (Quotation 146). With this, it could be closer to
629 achieve the last factor described in this theme: specialization. PTs thought that there is an
630 increasing need to create specializations in physical therapy, in order to provide the best
631 treatment experience to their patients (Quotation 147).
632 If all this PTs attitudes and beliefs regarding EBP could be implemented, the first factor on the
633 Physical Therapy in Portugal theme could be achieved: improve the physical therapy image to
634 the patients and other health professionals. This could be done in various ways, such as
635 awareness actions for the society, advertising (in newspapers, radio, internet and television),
636 working in multidisciplinary teams, but above all by promoting good work practices, including
637 EBP (Quotations 148, 149, 150 and 151). Thus, it could result in a greater profession
638 valorization and consequently better wages (Quotation 152).
639 The physical therapy Schools can also help to change the way of working, the PTs' attitudes and
640 beliefs and improve the physical therapy valorization in society. For this, it will be necessary to

641 instill and prepare physical therapy students, from the beginning, for an EBP (Quotation 153). It
642 will also be essential to normalize and regularize the schools' academic content programs in the
643 country (Quotation 154).

644 Of course, the PTs Professional Bodies can facilitate all these factors and themes. First, although
645 it is well forwarded, it must be fully operational (Quotations 155, 156 and 157). Without this,
646 any other factor to be mentioned in this theme may fall apart. In addition to others that can be
647 carried out, the PTs pointed out as important tasks to be performed by the professional bodies:
648 (1) regulation of the professional activity (as for example, define profession functions and limit
649 the number of patients treated per hour); (2) in order to maintain the physical therapy license
650 valid, the PTs would have to show that they keep updating (additionally, an exam could also be
651 performed every 2 years to evaluate PTs level of competence); and, (3) do more physical therapy
652 trainings/workshops/congresses in Portugal (for example, to explain to older PTs how to search
653 in electronic databases) (Quotations 158, 159, 160 and 161).

654 In order to resume the qualitative findings, Figure 7 shows the qualitative results conceptual
655 map.

656

657 **Discussion**

658 The aim of this study was to know if the Portuguese PTs use an EBP, to collect and deeper
659 understand the factors, barriers and facilitators associated to EBP. The overall results shown that
660 the Portuguese PTs have positives beliefs, attitudes, knowledge and behaviors regarding EBP.
661 Most of the PTs answer Agree or Yes to the questionnaire questions, except in the item
662 "Application of EBP is necessary in the practice of physical therapy", where the majority of the
663 PTs answered Strongly Agree. There were some negative items such as "I have access to current
664 research through professional journals in their paper form", "EBP does not take into account
665 patient preferences", "My reimbursement rate will increase if I incorporate EBP into my
666 practice", "The adoption of EBP places an unreasonable demand on PTs", and "Strong evidence
667 is lacking to support most of the interventions I use with my patients", where the answers were
668 Disagree or No. Still, there was the item "EBP does not take into account the limitations of my
669 clinical practice setting" where the answers balanced between Agree (44.6%) and Disagree
670 (44.0%). Despite the answers to these items were negative, they shown progressive attitudes
671 regarding EBP, as disagreeing to the majority of these statements is considered as positive (39).
672 The only item that may be evaluated as truly negative is not having access to professional
673 journals in their paper form. This was also confirmed in the qualitative data, where almost none
674 of the interviewed PTs had access to information this way. Quantitative data shown that,
675 nowadays, PTs access evidence through professional online databases, as presented in the sub-
676 group Access to and Availability of Information to Promote EBP responses. Other forms to keep
677 up to date stated included: natural peer discussions; increase academic degree; and the
678 attendance to trainings/workshops/congresses. So, it seems that, for the Portuguese PTs, EBP is
679 easily spread by either personal contact or electronic information, swapping from the traditional
680 paper form. This change was also found in other countries, especially after the introduction and

681 access to computers and the Internet (40). However, this change could be problematic for older
682 PTs as they could not have enough informatics skills to do an EBP. In fact, Bridges et al. (41)
683 found that age and years licensed as a PT were negatively correlated with the propensity to adopt
684 EBP, as older PTs may not know how to access the scientific literature. For the Portuguese PTs,
685 and as expected (18), EBP should include clinical experience, patients' preferences and scientific
686 evidence as main actors. Although some PTs balanced the main actors and others rank their
687 importance, for all of them evidence was a key element in EBP, being mainly referred as the
688 "best evidence available at the moment". This definition is similar to the one used by Sackett et
689 al. (3). Despite its importance to make more informed decisions, to justify the intervention plan,
690 and to make more assertive diagnostics and prognostics, one barrier is to gather the best recent
691 evidence, as evidence is rapidly and constantly evolving. For example, in August 2019, PEDro
692 indexed 44,309 articles (34,619 trials, 9004 reviews, and 686 guidelines), and the number is
693 predicted to double by 2025 (42). Nevertheless, nowadays the task of searching for relevant
694 information is greatly aided by the Internet and the existence of very sophisticated search engines
695 and databases (40). It seems that the majority of the Portuguese PTs are confident in their search
696 skills and aware of online databases, as they Agree in both items, being guidelines, systematic
697 reviews, meta-analyses, RCTs and expert opinion papers the most common studies searched.
698 From those, the PTs preferred reading from what is in higher level in the evidence hierarchy,
699 such as guidelines, meta-analysis, systematic reviews or reviews. These choices are supported by
700 evidence and associated with positive attitudes regarding EBP (18, 40, 43, 44). Moreover, it was
701 found that PTs preferred online access to research summaries or systematic reviews to save time,
702 to filter and critique research articles (45). However, as older PTs are less informatics educated
703 and in their school time online databases did not exist, they may not have the necessary abilities
704 to search in electronic databases and reach the most recent evidence. Jette, Bacon (25) found
705 similar associations, where younger PTs have reported more confidence in skills than the elders,
706 due to the fact that they are part of a generation that grew up with computers and Internet at
707 school and at home.

708 As suggested by the interviewed PTs, this issue could be overcome with a work environment
709 with age heterogeneity, where older PTs could give information about their clinical experiences
710 and, in return, younger PTs could show how to search in online databases. Knowledge exchange
711 between peers (informal – such as, everyday conversations about the merits of a specific
712 treatment approach; and formal – such as, specific meetings devoted to reflection on research
713 studies and new findings), has been demonstrated as an important factor in modeling EBP, as
714 PTs reported that their colleagues are the first people they turn to when they need more
715 knowledge or a second opinion about a certain treatment method or to obtain support for testing
716 a new approach (5, 46). For example, in the Iles and Davidson et al. (47) study, 42% of the
717 responders confirmed that they formally shared and discussed evidence with others in their
718 department or practice. Additionally, in the Nilsagård and Lohse (48) study, 38% of the PTs
719 mentioned colleagues as sources of information related with EBP. Individuals tend to be linked
720 to others who are close to them in physical distance and who are relatively homophilous in social

721 characteristics (49). So, this strategy, could be a good facilitator for work and evidence
722 associated barriers. Another related factor is being a clinical instructor. In our qualitative data
723 whenever there was a statistically significant association, those who are clinical instructors
724 shown more positive beliefs, attitudes, knowledge and behaviors regarding EBP. So, as clinical
725 instructors are usually older PTs (20-29 years 31%, 30-39 years 54%, 40-49 years 64% and ≥ 50
726 years 67%), the clinical instructor position may “force” PTs to be more aware of EBP. Salbach,
727 Guilcher (50) also found that clinical instructors PTs were more likely to use research in practice,
728 compared with non-clinical instructors.

729 Additionally, increasing the academic degree may have a positive influence in EBP. The
730 advantages pointed out by the PTs were better search and critical analyze literature skills, as for
731 the lectures and dissertation it is needed to constantly base their options on the most recent and
732 higher quality evidence and to preform studies. In our quantitative data, Baccalaureate degree
733 PTs were 9 times more likely to Agree that “I am interested in learning or improving the skills
734 necessary to incorporate EBP into my practice” and were 80% less likely to search and read
735 studies per month, in comparison to PhD PTs. Moreover, for the oldest PT interviewed,
736 increasing the academic degree was very important to do an EBP. This is evidenced in the
737 Nilsagård and Lohse (48), Grimmer-Somers et al. (51), Alshehri et al. (52), and Bridges et al.
738 (41) studies where higher-level degrees PTs (Master’s 2 years – PhD) had greater overall values
739 in knowledge, behaviors, attitudes, adoption, awareness and prerequisites, compared with their
740 lower-level degree peers.

741 Another suggested facilitator was having frequent trainings/courses/workshops provided by
742 professional bodies. It could not only be a good way to receive summarized evidence and have
743 the possibility to be in contact with new treatments, but it could also exist more specialized
744 workshops or lectures to give older PTs the necessary skills to search in online databases.
745 Evidence has been showing that directed educational meetings have a positive impact in the EBP
746 (5, 6, 41, 53-56). For example, courses and in-service training were reported to be the two most
747 important methods of keeping up to date for UK PTs (57). Moreover, in a study with American
748 PTs (58), after EBP presentations given in the workplace, most of them reported gaining new
749 information and integration of the material, increased the beliefs, attitudes, knowledge and
750 behaviors regarding EBP, and even welcome additional presentations. Furthermore, in our study,
751 PTs that belong to a professional practice-oriented organization use and have more positive
752 attitudes and beliefs regarding EBP, comparing to their peers that do not belong to it. However,
753 not only in the PTs opinion Portuguese trainings/workshops/congresses are scarce and expensive
754 for the national panorama, but also, PTs also think that older PTs do not have enough positive
755 attitudes and believes regarding EBP (as they are lazy, do not give enough weigh on evidence in
756 their daily clinical practice, and do not do continuous training). This last statement was more
757 referred by younger PTs as, in their opinion, older PTs plan their sessions based only in clinical
758 experience. Despite clinical experience may help PTs to know quicker what could result in a
759 specific condition, to help define which interventions they master most, and to make more
760 assertive diagnostics and prognostics, in the PTs point of view, as in evidence more information

761 could be gathered about a topic comparing with a lifetime work, practice should be mainly
762 evidence guided. This practice change may be one of the most important factors related with PTs
763 EBP (6). Moreover, such as any knowledge, clinical experience can be biased and poorly used
764 (59). It is common to find that people have a misinterpretation of their ability, skills,
765 performance and/or knowledge (60). What separates the experienced practitioners from the
766 experts is the wise application of their clinical experience (6). Also, these professionals have a
767 better ability to “sense” when something is wrong, known as intuition (6, 61). So, although
768 having frequent trainings/workshops/congresses could help older PTs (for example, PTs that
769 regularly participate in continuing education courses were 6 times more likely to use guidelines
770 in practice), currently this may not be the most correct facilitator for this population, as referred
771 by one of the oldest interviewed PT: “I can tell you that I have colleagues who graduated like me
772 in 1987 and I never saw them in a congress.”. Nevertheless, as suggested by the PTs, if the
773 national professional bodies demand that for keeping the physical therapy license, PTs have to
774 show/prove that they keep updating (such as, attending to congresses), this may be a good
775 incentive to solve this lack of interest. In American PTs (62), it was found that in states with
776 mandatory continuing education, PTs have a clinical practice beneficial effect, compared with
777 their peers in non-mandatory continuing education states. Other stated incentive may be from the
778 health care units where the PTs work, as the attendance to trainings/workshops/congresses or
779 increasing academic degree should be encouraged, motivated and even rewarded. However, the
780 PTs are pessimistic on being rewarded (at least financially), as in the quantitative data the
781 majority do not think that their reimbursement rate will increase if they incorporate EBP into
782 their practice.

783 Other factors that may help to decrease the evidence interest for older PTs include: evidence is
784 often inconclusive or in certain areas non-existent; lack of high quality physical therapy studies;
785 recommendations are difficult to apply in practice and do not respond to the clinical practice
786 “real” problems; most of the papers are written in English and difficult to read/understand.
787 Similar evidence-related barriers were reported in other studies (6, 44, 63-74). However, some of
788 these barriers could be hard to overcome. For instance, as papers in the native language are
789 published in national journals (and those may have a small impact factor), scientists do not tend
790 to publish in these journals because it gives them fewer academic credits, pursuing international
791 English-written journals with superiors impact factors (Mathew effect – “the rich get richer”)
792 (64, 75). Furthermore, to have the “best evidence available at the moment”, besides gathering
793 evidence, it is needed to critically analyze it (2). For the majority of the Portuguese PTs
794 population this may not be an issue as most Agree that “I am confident in my ability to critically
795 review professional literature”, the majority of the scientific terms were “Understand
796 Completely” and the barrier “Poor ability to critically appraise the literature” was only chosen
797 4.8%. However, in addition to the already exposed barriers, older PTs may not have the
798 necessary skills to search, critically analyze and be aware of EBP in school. Therefore, this may
799 explain why differences were found between ages in “I learned the foundations for EBP as part
800 of my academic preparation”, “I have received formal training in search strategies for finding

801 research relevant to my practice”, and “I received formal training in critical appraisal of research
802 literature as part of my academic preparation” items and other beliefs, attitudes, knowledge and
803 behaviors regarding EBP explored in the qualitative data. Likewise, in the Salbach et al. (63)
804 study respondents with less than 5 years of experience were 31.2 times more likely to have
805 learned the foundations of EBP in their academic preparation, 9.3 times more likely to report
806 having received formal training with search strategies and 99.8 times more likely to report
807 having received formal training in critical appraisal skills, compared with respondents who had
808 more than 15 years of practice experience. Additionally, Australians PTs (47) showed similar
809 behaviors, as the mean score of recent graduates was 4.95 points higher than experienced,
810 regarding overall EBP skills, and Brazilians PTs (71) who had graduated within nine years had
811 more knowledge and skills compared with those who had graduated more than nine years ago in
812 experience with EBP in graduate or postgraduate degree ($p=0.001$), the knowledge in the
813 graduate or postgraduate degree regarding EBP was sufficient ($p=0.004$), understanding of the
814 EBP core elements ($p=0.004$), ability to critically analyze a scientific paper ($p=0.005$), and
815 access online databases frequency ($p=0.009$). Jette et al. (25) pointed out that the fact that
816 positive beliefs were more likely among younger and more recently licensed respondents than
817 those who were older or had been licensed longer suggests a more recent focus on the topic of
818 using evidence in practice within physical therapy education programs. Although it seems that
819 Portuguese physical therapy schools are getting better in preparing their students for EBP, it was
820 also recommended to regularize and update their academic contents, and continuing to insist in
821 EBP contents until doing EBP becomes almost a habit for the PTs. This facilitator was identified
822 as early as 2005 (6) and reinforced by the qualitative data gathered by Rotor et al. (76) where, in
823 the PT students views, their EBP education had a positive impact on EBP knowledge and
824 attitudes.

825 Other researchers found, as we did, that the primary barrier to implement EBP is lack of time (6,
826 25, 39, 41, 47, 48, 51, 58, 63, 66, 68, 73, 77-87) and, although not directly evidence-related, it
827 was found that “Insufficient time” might also influence the PTs updating ability, as they could
828 not have sufficient time to do, search and read scientific literature. In fact, such as in Ballin et al.
829 (79) and in Jette et al. (25) studies, besides “Insufficient time”, the most pointed EBP barriers in
830 the questionnaire were patient-evidence-related: “Lack of generalizability of the literature
831 findings to my patient population” and “Inability to apply research findings to individual patients
832 with unique characteristics” (16% and 18%, respectively). “Insufficient time” barrier could be
833 lessened if: evidence is present in their facilities in a form of a lecture (58); research evidence be
834 more easy to access, time efficient, and relevant to practice (41); more national guidelines are
835 accessible (88, 89). Moreover, this could be more problematic for younger and less experienced
836 PTs where statistical significant associations were found between years of license and the barrier.
837 This was further pointed out in the qualitative data as the interviewed PTs stated that, since
838 salaries are low in Portugal, PTs (especially in a younger age) need to have multiple jobs and
839 work for several hours to have a minimal decent standard living. So, as suggested, increasing the
840 PTs salaries could have a positive influence in using EBP, since Portuguese PTs may began to

841 choose working in one workplace, freeing time for other tasks, namely do, search and read
842 scientific literature. For example, in a study with Americans PTs (79), when asked to select the
843 single most significant inducer to stimulate research, the most frequent choice was salary
844 increase (31%).

845 Although no statistically significant association was found, “Insufficient time” was further
846 related in the qualitative data with workplace, especially in Physical Therapy Medicine and
847 Rehabilitation Centers. In those workplaces, the PTs pointed out that there are excessive patients
848 “treated” per hour (it was referred 10 patients/hour), sometimes the work is very bureaucratic
849 (time is more spent in filling paper forms and less in treating patients), and the PTs have to
850 respect what is prescribed by the physiatrist (the PTs do not actively participate in the
851 intervention plan and generally interventions are chosen by what is stated-founded). Belgians
852 PTs reported similar barriers, but still added that some doctors are influenced by commercial
853 firms that promote certain products, prejudicing an EBP (64). So, as a basic approach to
854 influence behavior is through work environmental change and with the provision of new
855 structures or resources (5, 6, 66, 79, 90), the PTs suggested that: the number of patients treated
856 per hour needs to be reduced (recommending 1 patient per hour); it is needed to give more
857 autonomy to the PTs and more participation in the intervention plan decision-making; treatments
858 and evaluations should be performed in different sessions; it is needed to move away for what is
859 stated-founded and focusing in interventions that are evidence-based; and having more and
860 correct resources. Additionally, despite not directly related with this workplace, statistically
861 significant associations were found in work sector, work mode, and the total time spent in patient
862 care, research and teaching. However, the best characteristic related to EBP in each group could
863 not be reached.

864 An explanation for the barriers may relay on the image that other health professional and the
865 Portuguese society have regarding physical therapy. The bad image could be from: some
866 discredit and disrespect of the Portuguese PTs on using an EBP (some PTs still do not do a
867 practice evidence-based or use “vogue” and alternative interventions); the profession focuses
868 mainly on providing quality of life and not quantity of life (being quantity of life more valued in
869 the current national health system); the number of PTs involved in top health policy makers is
870 still scarce (there is not even a full functional physical therapy national professional bodies yet);
871 the profession in Portugal is considered as new (54 years); and the fullness of its work areas is
872 unknown (association still exists with manual therapy and masseuses). Related barriers were also
873 reported by Belgians PTs (64). There were suggested facilitators that may overcome these issues,
874 such as: working in multidisciplinary teams; doing more evidence-based and physical therapy
875 related interventions in daily practice; evaluate and register more; increasing the participation in
876 scientific studies; having more specialized PTs or increasing the academic degrees; and doing
877 more physical therapy advertising and actions society-centered.

878 As showed in the qualitative data, for the interviewed PTs, EBP is not a “fixed” concept. This
879 was already shown in the literature, where other factors were added to the early EBP definition
880 proposed by Sackett et al. (3). As in our study, Lizarondo et al. (91), and Dijkers et al. (44),

881 added social, cultural, economic, political and work environment, as important influencing
882 factors in EBP. Nevertheless, our study found a paradigm shift in the EBP concept. As discussed,
883 it seems that age, clinical experience and academic degree may have an important role in clinical
884 practice. So, it seems that the most important influence in EBP is personal-related factors. Our
885 data shown that, as younger PTs are less experienced, they only have evidence to guide them in
886 the clinical decision-making. In contrast, older and more experienced PTs may not have the skills
887 to search in online databases and critically analyze literature, so they do their clinical decision-
888 making based mainly in their clinical experience. Moderate old and experienced PTs may be the
889 ones that have the necessary skills to do an EBP, balancing evidence with clinical experience.
890 Furthermore, increasing academic degree may help PTs achieving better performances in search
891 and critically appraise scientific literature, reaching the best evidence. Patients' preferences are
892 complex and the level of importance given to it may have other factors to influence it (66, 92,
893 93). In one hand, patients' preferences could establish the interventions applied in case of doubt,
894 in other hand, their preferences, habits, attitudes and beliefs could be a barrier to EBP
895 (sometimes they have a wrong idea about their condition and their interventions preferences may
896 be either placebo or harmful). To overcome this barrier and to have a successful intervention
897 plan, a good relationship, trust and proper communication PT-patient is mandatory (92). As older
898 and more experienced PTs in their lifetime had to deal with more patients (with different
899 personalities), they could increase their PT-patients interaction skills (78). Additionally,
900 undergraduate students and novice therapists tend to focus on patients' symptoms, impairments,
901 and functional problems, instead of integrating patients' problems with their needs, life styles
902 and environment (94). However, this could not be confirmed in our study, as in the qualitative
903 data experienced and less experienced PTs shown similar PT-patients interaction skills. This may
904 be explained by the PTs preparation in Portuguese schools for patient care (95). Nevertheless,
905 since the PT is more experienced and aware of the best recent evidence, he/she has the
906 responsibility to clarify the patient. Furthermore, as each patient is unique, the PT should adapt
907 the communication to the patient's health literacy level (96, 97). In fact, in a study with Kuwaiti
908 PTs (86), 90% confirmed that the key factor, when selecting and applying the best therapy, is
909 their capability to effectively communicate with the patient. Therefore, often a good, simple,
910 correct, informed and assertive communication could be enough for information assimilation
911 (96, 97). To ensure a better communication, both oral and written informations should be given
912 to the patient (49, 90, 96). Furthermore, patient education is usually in the guidelines as a core
913 treatment (98).

914

915 **Conclusions**

916 In conclusion, the Portuguese PTs reported positive beliefs, attitudes, knowledge, and behaviors
917 regarding EBP. Among the PTs characteristics it seems that age (younger therapists), education
918 (participating in continuing education courses; belonging to practice-orientated organizations;
919 having a doctorate degree; pursuing a higher academic degree; and being a clinical instructor),
920 and workplace (working for someone else account; and academic sector) are the main factors in

921 the Portuguese EBP implementation. The Portuguese PTs, beyond the PTs individual
922 characteristics and workplace, also stated that evidence, patients, clinical experience, schools,
923 country and physical therapy characteristics, may behave as facilitators or barriers when
924 performing an EBP.

925 There were found some limitations in our study. One limitation was the number of valid
926 questionnaires. The 373 sample size goal was not reached and 26% of the questionnaires were
927 incomplete. This is may be due to the questionnaire extension and complexity. As no reward was
928 given to the responders PTs, they may felt tired after answering some of the questions.

929 Additionally, although the questionnaire was anonymous, as many of the questions were clinical
930 practice related, some of the PTs may not felt comfortable to answer them. Moreover, as the
931 questionnaire has 32 questions EBP related, the sociodemographic questions should have
932 appeared after the EBP related questions, since the PTs, even if tired, could be more enthusiastic
933 in answering more individual questions, possibly increasing the number of complete
934 questionnaires. Another factor may be the PTs lack of interest in participating in national studies.

935 Although the quantitative data shows that the Portuguese PTs have positive beliefs, attitudes,
936 knowledge and behaviors regarding EBP, in our qualitative data all the PTs interviewed agreed
937 that EBP was still not widely practiced in Portugal. So, it is possible that therapists with more
938 positive attitudes, or those who are more confident in their evidence-based practice knowledge
939 and practice, are more likely to return surveys and could correspond to the majority of the PTs
940 sample (47). For example, in our study, the PTs that pursued a higher academic degree, regularly
941 participate in continuing education courses, and belong to a professional practice-oriented
942 organization were in greater number compared with their peers (66%, 89%, and 79%,
943 respectively). These characteristics contributed to better beliefs, attitudes, knowledge and
944 behaviors regarding EBP. Therefore, the results could not truly represent the Portuguese PTs
945 practice. Person-to-person questionnaire and direct clinical practice observations may solve some
946 of these limitations. For example, differences were found in treatments use between surveys
947 completed by PTs and audits of clinical notes, in musculoskeletal conditions (98). In surveys,
948 54% of PTs chose recommended treatments, 43% chose not recommended treatments, and 81%
949 chose treatments that have no recommendation. Based on audits of clinical notes, 63% of
950 patients received recommended physical therapy-delivered treatments, 27% received not
951 recommended treatments, and 45% received treatments that have no recommendation. The
952 sample size limitation could also influence the logistic regression analyses. It is expected that if
953 the sample size was enlarged, the number and strength of significant logistic regressions would
954 also increase.

955

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959

960 **References**

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Table 1 (on next page)

Inclusion and Exclusion criteria

1 Table 1 – Inclusion and Exclusion criteria

<u>Inclusion</u>	<u>Exclusion</u>
have an active PT license;	do not have an active PT license or have another profession than PT;
obtained at least the PT bachelor degree;	obtained the PT bachelor degree in a foreign country;
work or have worked as a PT in the past 6 months in Portugal;	do not work in Portugal;
be able to read, write and speak Portuguese;	do not be able to read, write or speak Portuguese;
	be a PT bachelor student

2

3

Table 2(on next page)

Instructions for Submissions PTs Personal and Practice Characteristics

Instructions for Submissions Abbreviations: ESSATLA – Escola Superior de Saúde Atlântica; ESSCVP – Escola Superior de Saúde da Cruz Vermelha Portuguesa; ESSUA – Escola Superior de Saúde da Universidade de Aveiro; ESSL – Escola Superior de Saúde de Leiria; ESSP – Escola Superior de Saúde do Porto; ESSS – Escola Superior de Saúde de Setúbal; ESSA – Escola Superior de Saúde de Alcoitão; ESSVA – Escola Superior de Saúde do Vale do Ave; ESSVS – Escola Superior de Saúde do Vale do Sousa; ESSLD – Escola Superior de Saúde Dr. Lopes Dias; ESSEM – Escola Superior de Saúde Egas Moniz; ESSJP – Escola Superior de Saúde Jean Piaget; ESTeSC – Escola Superior de Tecnologia e da Saúde de Coimbra; ESTeSL – Escola Superior de Tecnologia e da Saúde de Lisboa; ISSAA – Instituto Superior da Saúde do Alto Ave; UFP – Universidade Fernando Pessoa

1 Table 1 – PTs Personal and Practice Characteristics

Characteristic	Frequency (%)	Characteristic	Frequency (%)
Sex		<i>Working Hours per Week</i>	
Male	52 (26.9%)	< 20	5 (2.6%)
Female	141 (73.1%)	20-30	26 (13.5%)
Age Groups		31-40	76 (39.4%)
20-29 years	48 (24.9%)	> 40	86 (44.6%)
30-39 years	86 (44.6%)	<i>Patients per Day</i>	
40-49 years	28 (14.5%)	1-5	29 (8.3%)
≥ 50 years	31 (16.1%)	6-10	71 (18.1%)
Valid License		11-15	49 (9.7%)
< 5 years	27 (14%)	> 15	44 (63.9%)
5-10 years	62 (32.1%)	<i>Number of PTs in the Facility</i>	
11-15 years	46 (23.8%)	0	46 (23.8%)
> 15 years	58 (30.1%)	1-5	84 (43.5%)
Degree		6-10	27 (14%)
Certificate	4 (2.1%)	11-15	15 (7.8%)
Baccalaureate	118 (61.1%)	> 15	21 (10.9%)
Master	58 (30.1%)	<i>Percentage of Total Work Time in:</i>	
Doctorate	12 (6.2%)	<i>Patient Care</i>	
Post-doctorate	1 (0.5%)	0%	2 (1%)
Pursue a Higher Academic Degree		5-25%	11 (5.7%)
Yes	128 (66.3%)	30-50%	17 (8.8%)
No	24 (12.4%)	55-75 %	52 (26.9%)
Do Not Know	41 (21.2%)	80-100 %	111 (57.9%)
Participate in Continuing Education		<i>Researcher</i>	
Yes	172 (89.1%)	0%	83 (43%)
No	21 (10.9%)	5-25%	86 (44.6%)
Belong to a Practice-oriented Organization		30-50%	19 (9.8%)
Yes	152 (78.8%)	55-75%	5 (2.6%)
No	41 (21.2%)	<i>Teacher</i>	
Instructor		0%	117 (60.6%)
Yes	99 (51.3%)	5-25%	42 (21.8%)
No	94 (48.7%)	30-50%	19 (9.8%)
Certificate/Baccalaureate School		55-75 %	10 (5.2%)
ESSATLA	12 (6.2%)	80-100 %	5 (2.6%)
ESSCVP	5 (2.6%)	<i>Location of the Facility</i>	

ESSUA	3 (1.6%)	Rural	11 (5.7%)
ESSL	5 (2.6%)	Suburban	21 (10.9%)
ESSP	18 (9.3%)	Urban	160 (82.9%)
ESSS	16 (8.3%)	Do not Treat Patients	1 (0.5%)
ESSA	40 (20.7%)	<i>Facility District</i>	
ESSVA	5 (2.6%)	Açores	5 (2.6%)
ESSVS	10 (5.2%)	Aveiro	14 (7.3%)
ESSLD	11 (5.7%)	Braga	8 (4.1%)
ESSEM	7 (3.6%)	Bragança	2 (1%)
ESSJP – Vila Nova de Gaia	4 (2.1%)	Castelo Branco	2 (1%)
ESSJP – Viseu	1 (0.5%)	Coimbra	14 (7.3%)
ESTeSC	28 (14.5%)	Évora	2 (1%)
ESTeSL	18 (9.3%)	Faro	4 (2.1%)
ISSAA	3 (1.6%)	Guarda	4 (2.1%)
UFP	7 (3.6%)	Leiria	11 (5.7%)
		Lisboa	68 (35.2%)
		Madeira	3 (1.6%)
		Portalegre	1 (0.5%)
		Porto	27 (14%)
		Santarém	5 (2.6%)
		Setúbal	13 (6.7%)
		Viana do Castelo	3 (1.6%)
		Vila Real	2 (1%)
		Viseu	4 (2.1%)
		Do Not Treat Patients	1 (0.5%)
		<i>Type of Facility</i>	
		Town Hall	1 (0.5%)
		Physical Medicine and Rehabilitation Center	28 (14.5%)
		Health Center	9 (4.7%)
		Geriatric Center/Resting Home	20 (10.4%)
		Private Clinic	41 (21.2%)
		Sports Club	3 (1.6%)
		Home Care	8 (4.1%)
		Commercial or Industrial Company	2 (1%)
		Healthcare Provider Company	2 (1%)
		Physical Therapy Office	18 (9.3%)
		Private Hospital	8 (4.1%)

Public or Public-Private Partnership Hospital	31 (16.1%)
Elementary or Secondary School	1 (0.6%)
Higher Education Institute or Research Center	4 (2.1%)
Continuing Care Unit	14 (7.3%)
Other	2 (1%)
Do Not Treat Patients	1 (0.5%)
<i>Majority of Patients Condition</i>	
Cardiovascular/pulmonary	16 (8.3%)
Palliative Care	12 (6.2%)
Hospital Health Care	6 (3.1%)
Primary Health Care	2 (1%)
Dermatological	1 (0.5%)
Sport	5 (2.6%)
Aging	28 (14.5%)
Aquatic Physical Therapy	2 (1%)
Orthopedic	77 (39.9%)
Neurological	23 (11.9%)
Pediatric	10 (5.2%)
Women's Health	8 (4.1%)
Mental Health	1 (0.5%)
Other	1 (0.5%)
Do Not Treat Patients	1 (0.5%)
<i>Majority of Patients Age Group</i>	
Pediatric (≤ 18 years)	13 (6.7%)
Adult (19–64 years)	112 (58%)
Geriatric (≥ 65 years)	67 (34.7%)
Do Not Treat Patients	1 (0.5%)
<i>Work Sector</i>	
Public	57 (29.5%)
Private	122 (63.2%)
Academic	14 (7.3%)
<i>Work Modality</i>	
Own Account	45 (23.3%)
Someone Else's Account	148 (76.7%)

- 2 Abbreviations: ESSATLA – Escola Superior de Saúde Atlântica; ESSCVP – Escola Superior de Saúde da Cruz Vermelha Portuguesa;
3 ESSUA – Escola Superior de Saúde da Universidade de Aveiro; ESSL – Escola Superior de Saúde de Leiria; ESSP – Escola Superior
4 de Saúde do Porto; ESSS – Escola Superior de Saúde de Setúbal; ESSA – Escola Superior de Saúde de Alcoitão; ESSVA – Escola
5 Superior de Saúde do Vale do Ave; ESSVS - Escola Superior de Saúde do Vale do Sousa; ESSLD – Escola Superior de Saúde Dr.

6 Lopes Dias; ESSEM – Escola Superior de Saúde Egas Moniz; ESSJP – Escola Superior de Saúde Jean Piaget; ESTeSC – Escola
7 Superior de Tecnologia e da Saúde de Coimbra; ESTeSL – Escola Superior de Tecnologia e da Saúde de Lisboa; ISSAA – Instituto
8 Superior da Saúde do Alto Ave; UFP – Universidade Fernando Pessoa

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Table 3(on next page)

Instructions for Submissions PTs' characteristics in the qualitative study

Instructions for Submissions **Abbreviations:** Bac., Baccalaureate; Mas., Master; Doc.,
Doctorate. **Note:** All include PTs Pursue a Higher Academic Degree, Participate in Continuing
Education Courses and Belong to a Practice-Orientated Organization.

1 Table 1 – PTs' characteristics in the qualitative study

Characteristics	Physical Therapists									
	PT 1	PT 2	PT 3	PT 4	PT 5	PT 6	PT 7	PT 8	PT 9	PT 10
Sex	Male	Female	Female	Male	Male	Female	Male	Female	Female	Female
Age	20-29	20-29	20-29	40-49	< 50	30-39	30-39	30-39	20-29	30-39
Years of License	> 5	> 5	> 5	< 15	< 15	11-15	5-10	5-10	5-10	11-15
Academic Degree	Bac.	Bac.	Bac.	Doc.	Mas.	Bac.	Mas.	Mas.	Bac.	Bac.
Clinical Instructor	No	No	No	No	No	No	Yes	Yes	No	No
Working Hours	31-40	20-30	20-30	< 40	< 40	31-40	< 40	31-40	< 40	31-40
Patients Day	6-10	6-10	11-15	6-10	1-5	11-15	6-10	11-15	11-15	6-10
PTs in the Facility	1-5	1-5	1-5	< 15	0	1-5	0	6-10	6-10	0
% Time in:										
<i>Patient Care</i>	80-100%	55-75%	55-75%	30-50%	5-25%	80-100%	55-75%	30-50%	80-100%	80-100%
<i>Researcher</i>	5-25%	5-25%	30-50%	5-25%	5-25%	0%	5-25%	5-25%	0%	5-25%
<i>Teacher</i>	0%	0%	0%	55-75%	80-100%	0%	30-50%	5-25%	0%	0%
Work Sector	Private	Private	Public	Academic	Academic	Private	Private	Public	Private	Private
Work Mode	Others	Own	Own	Others	Others	Others	Own	Others	Others	Own
	Account	Account	Account	Account	Account	Account	Account	Account	Account	Account

Abbreviations: Bac., Baccalaureate; Mas., Master; Doc., Doctorate.

Note: All include PTs Pursue a Higher Academic Degree, Participate in Continuing Education Courses and Belong to a Practice-Orientated Organization.

2

Figure 1

Instructions for Submissions Questionnaire Views, Participation and Completion

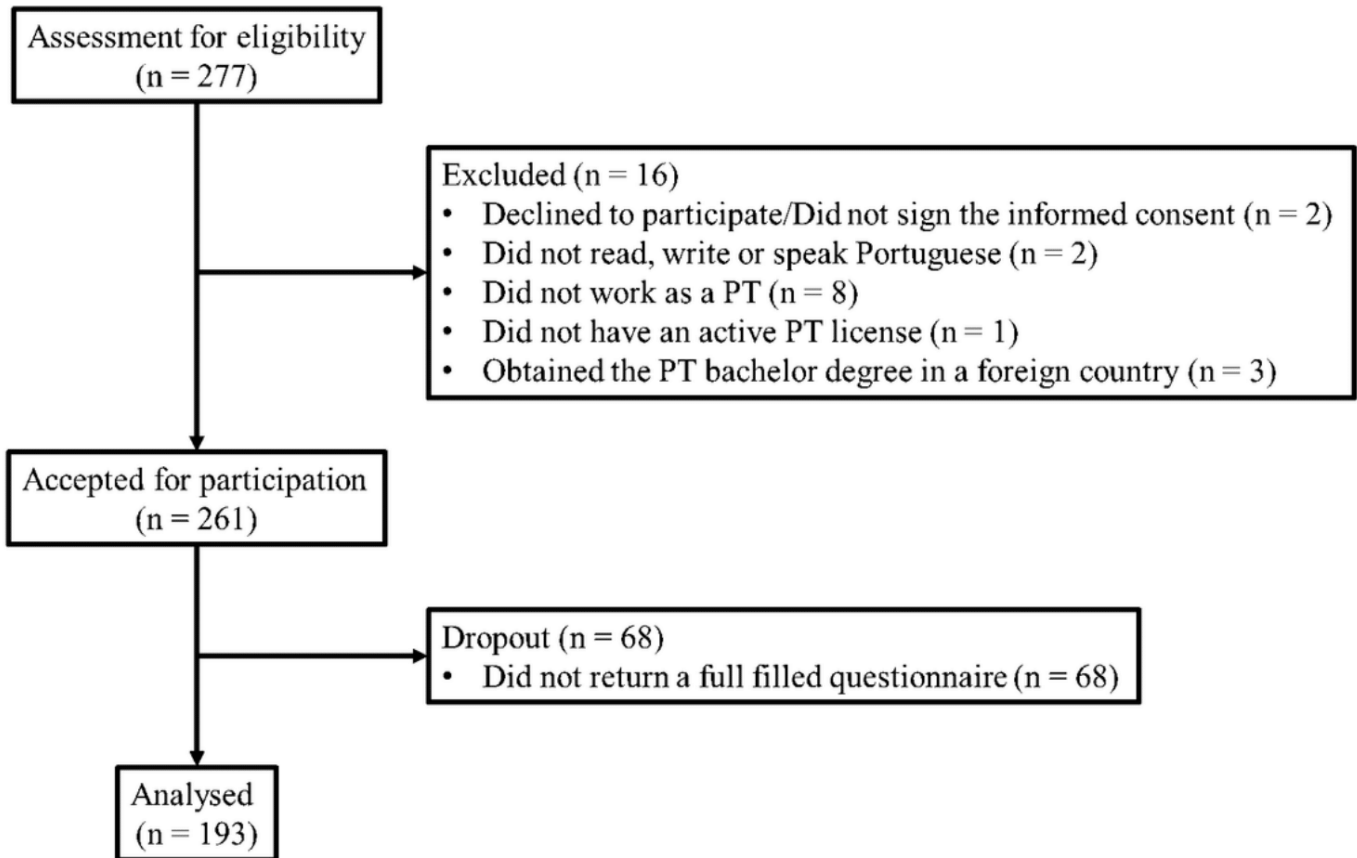


Figure 2

Instructions for Submissions PTs' choices in the Attitudes and Beliefs About EBP, Interest in and Motivation to Engage in EBP, Access to Practical Guidelines, Access to and Availability of Information to Promote EBP, and Educational Background, Knowled

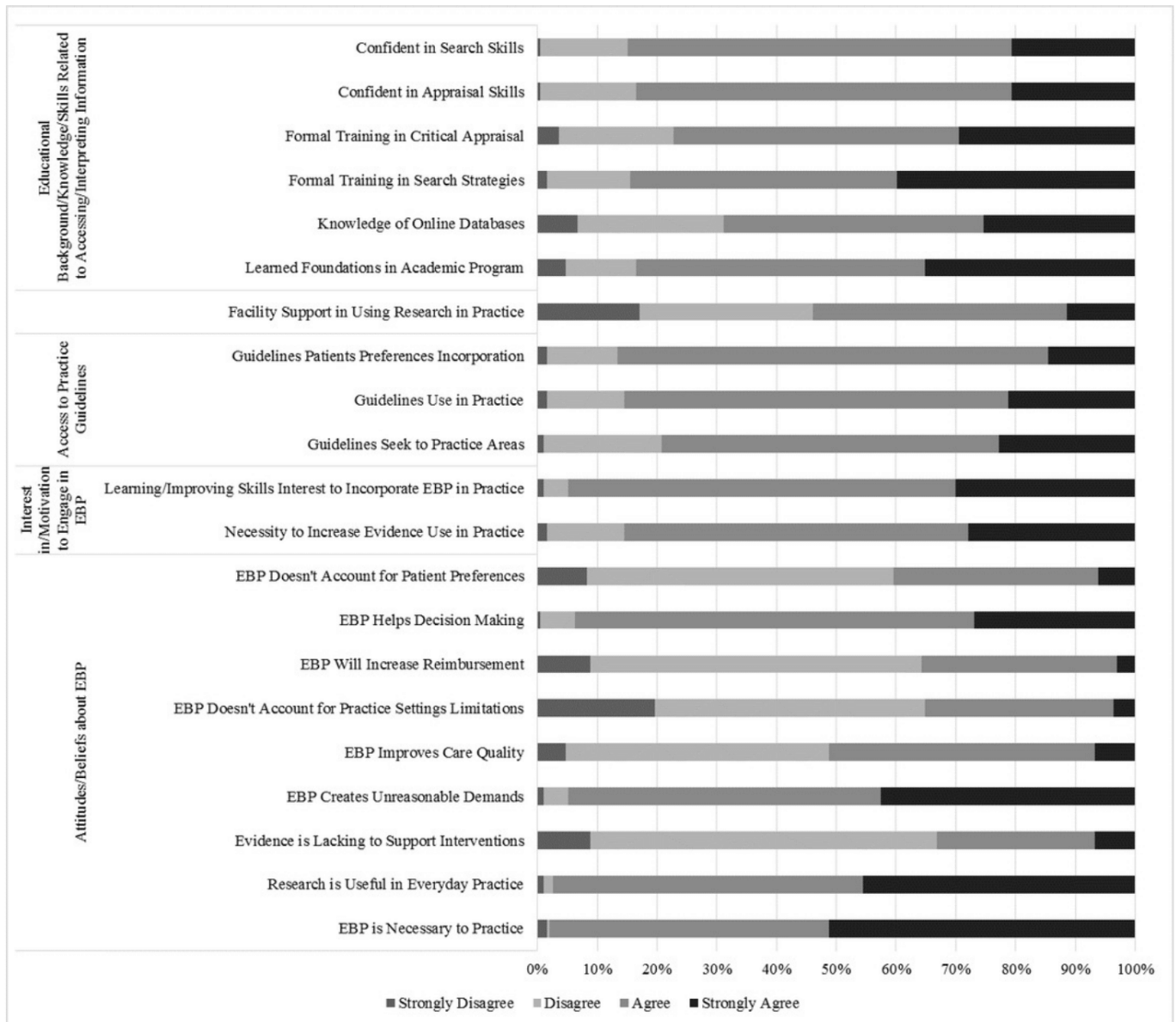


Figure 3

Instructions for Submissions PTs' choices in the Level of Attention to and Use of the Literature sub-group

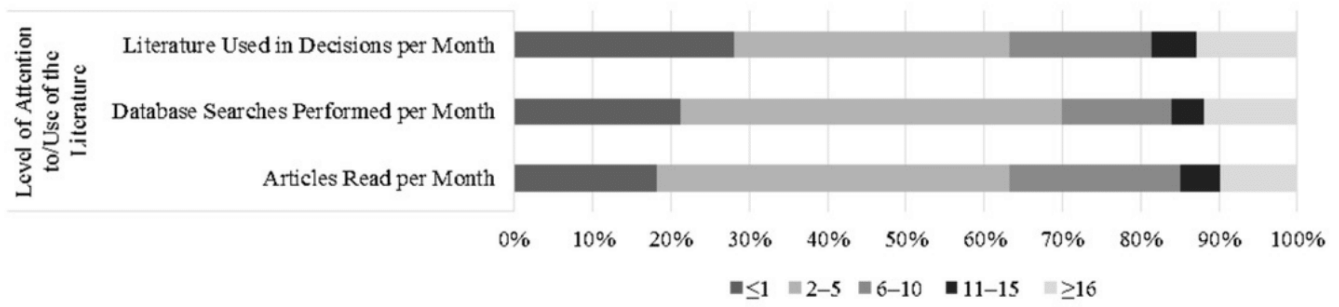


Figure 4

Instructions for Submissions PTs' choices in the Access to Practical Guidelines, and Access to and Availability of Information to Promote EBP sub-groups.

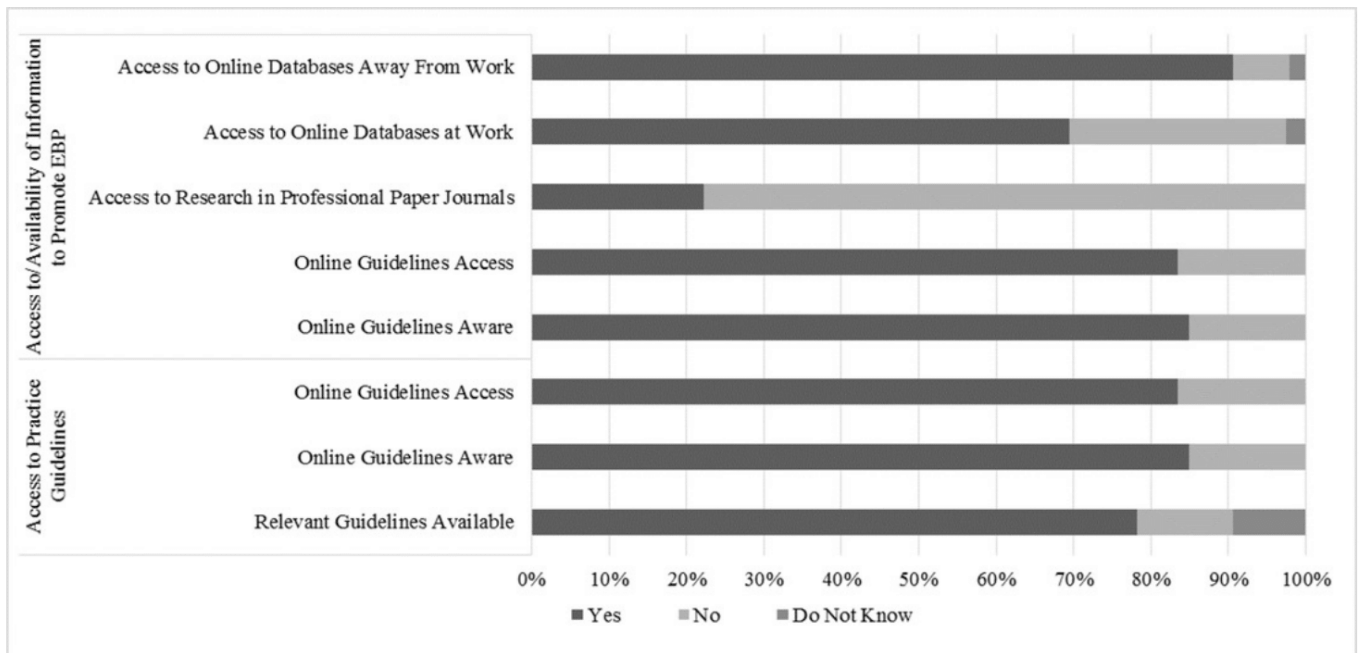


Figure 5

Instructions for Submissions PTs' Scientific Terms Understanding.

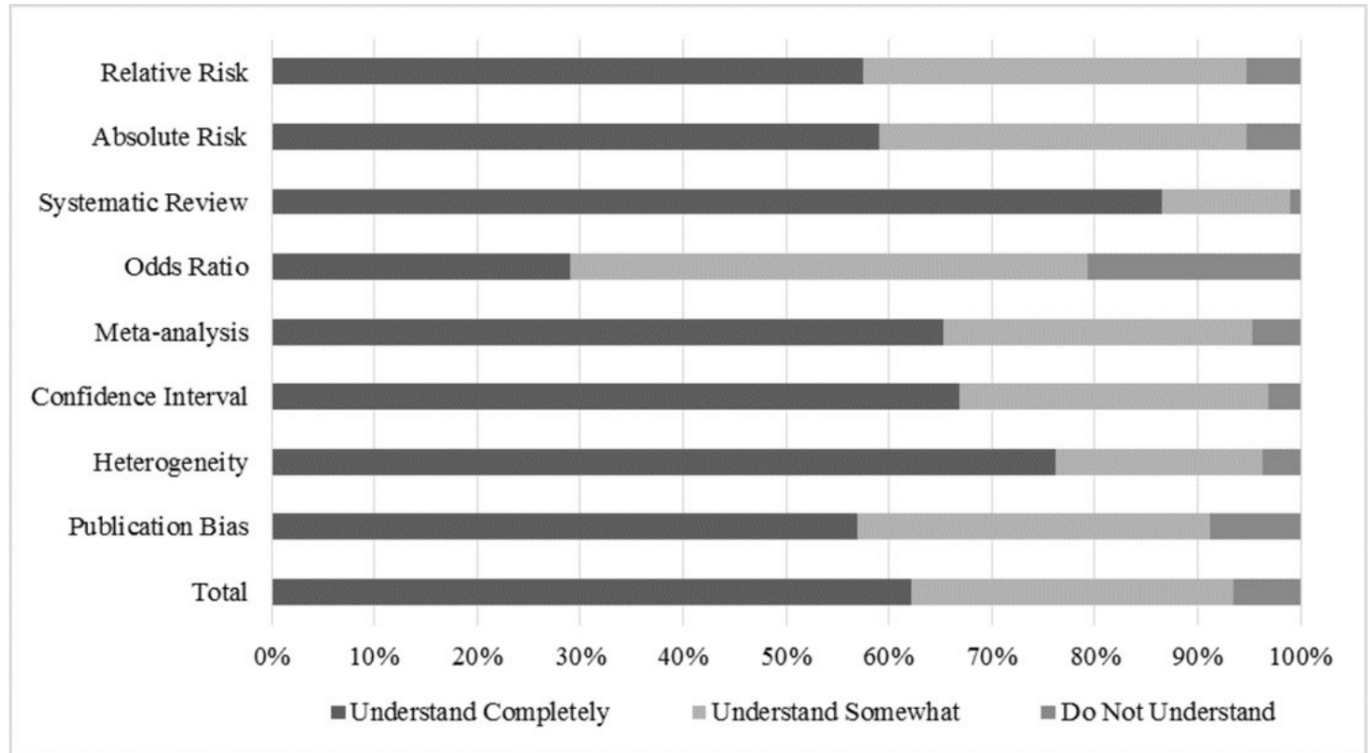


Figure 6

Instructions for Submissions PTs' Choices in Perceived Barriers to EBP Use.

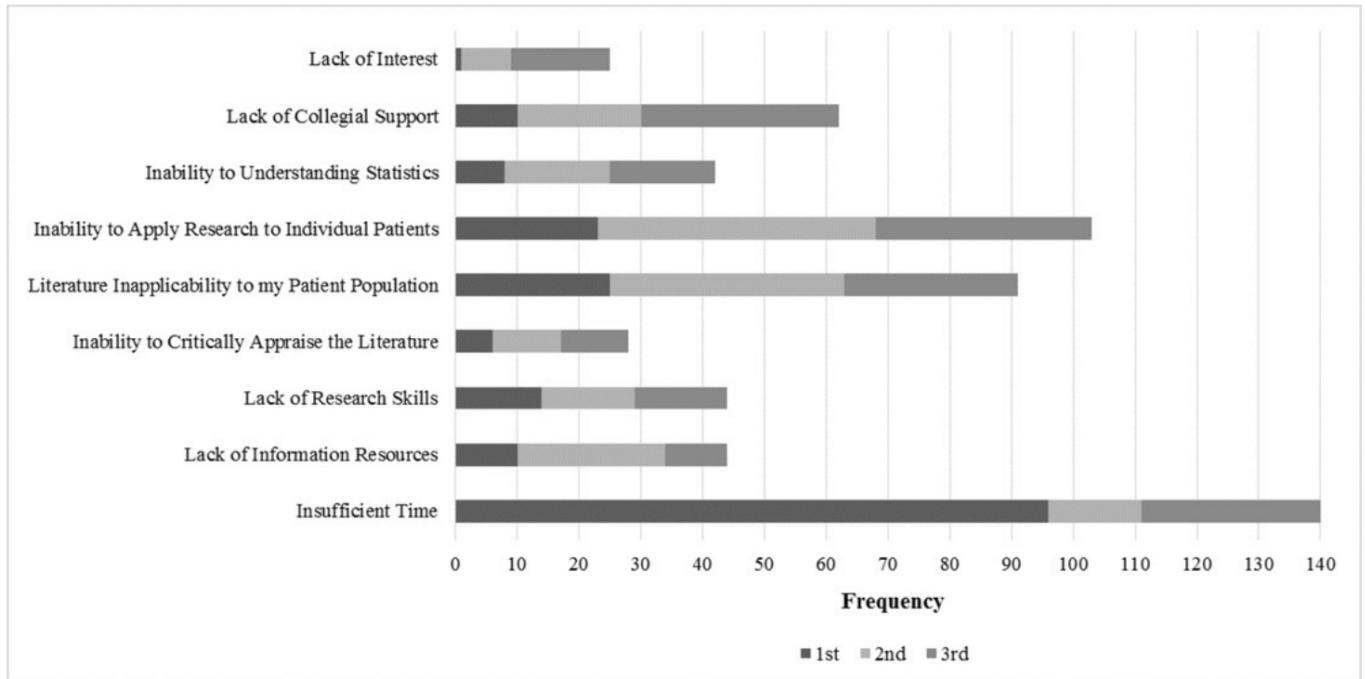
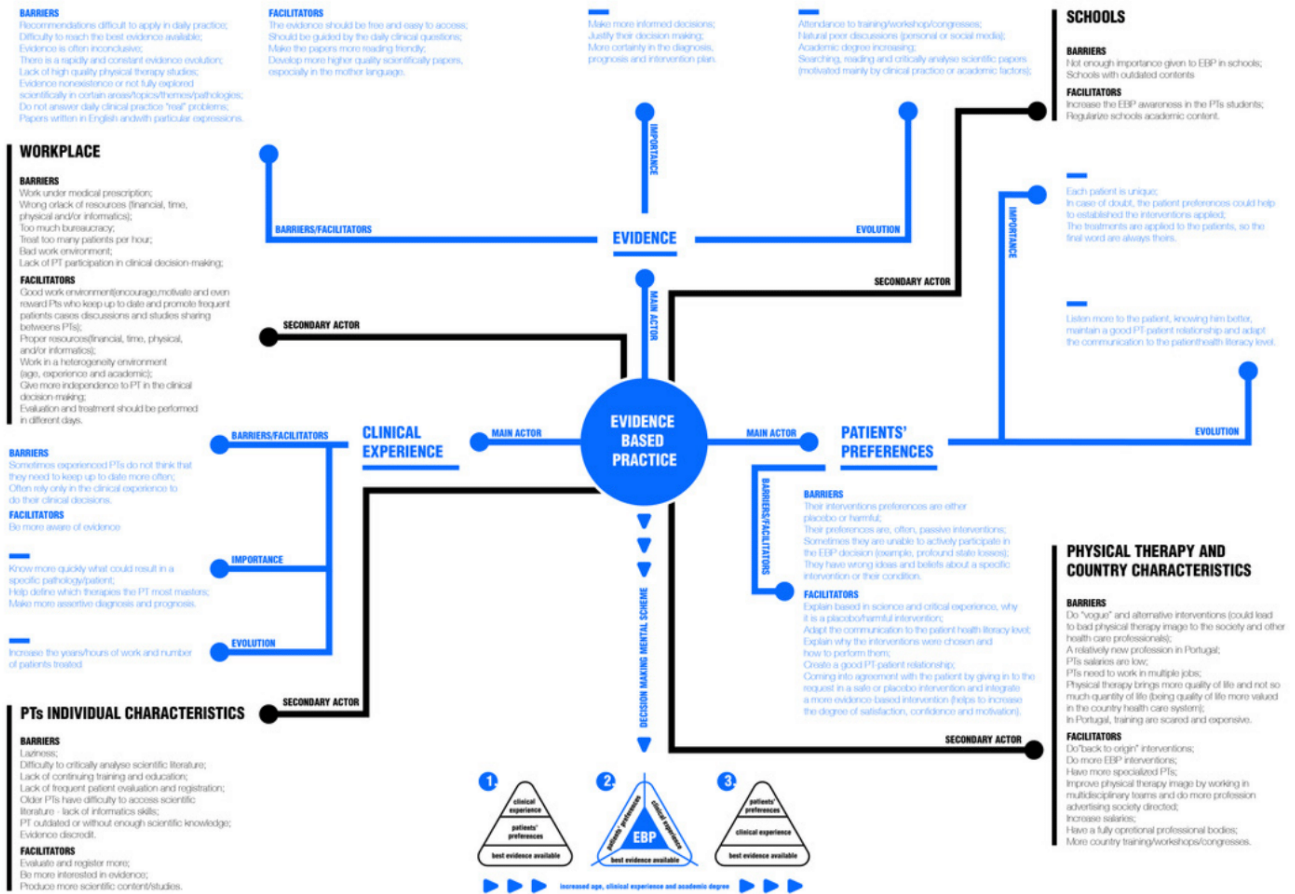


Figure 7

Qualitative conceptual map



Supplemental Files

Supplemental Figures

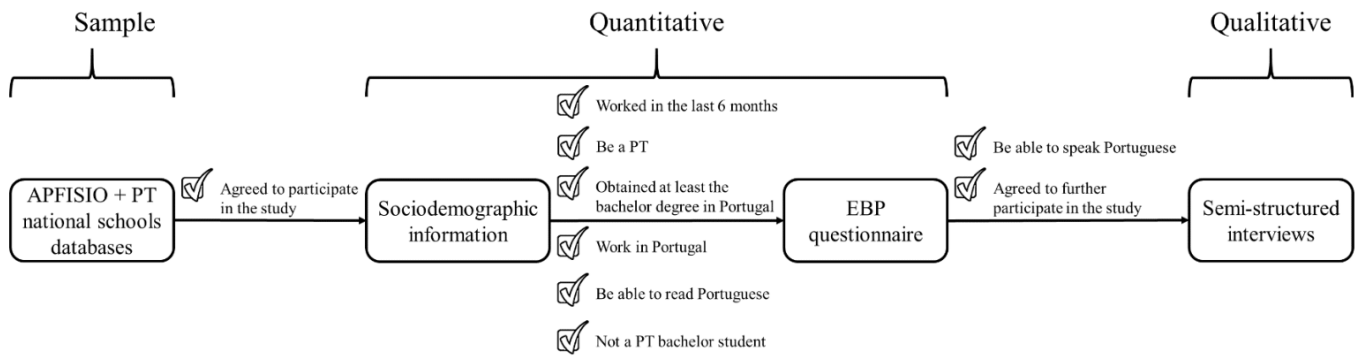


Figure 1 – Methodological flowchart

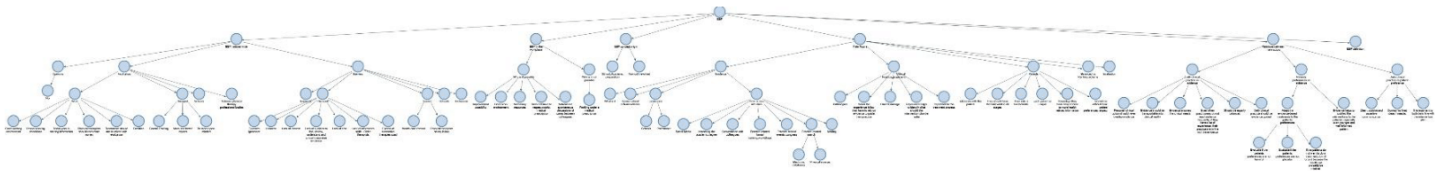


Figure 3 – Classification tree

Supplemental Tables

Table 1 – Semi-Structured Interviews Script

1. Why did you choose to be a physical therapist?
 2. What is your opinion about the physical therapist profession's valorization in Portugal?
 - 2.1. Do you think we could improve the profession's valorization?
 - 2.1.1. If so, why/in which way (examples)?
 - 2.1.2. If not, why?
 3. Do you know the **evidence-based practice** concept?
 - 3.1. Could you explain what evidence-based practice is for you?
 - 3.2. Do you know its prepositions, ideas and main actors?
 - 3.2.1. If so, from your point of view, how are they related?
 4. Which was your first contact with the evidence-based practice concepts?
 5. As a physical therapist, what is your opinion about evidence-based practice?
 6. Do you feel motivated for an evidence-based practice?
 7. Is evidence-based practice applicable in your daily clinical practice?
 - 7.1. If so, why?
 - 7.2. If not, why?
 8. For you, what is the patient's role in an evidence-based practice?
 9. What is your opinion about the current evidence regarding the most common pathologies that you treat (examples/specific conditions)?
 - 9.1. And about interventions (examples/specific conditions)?
 10. Do you consider yourself an updated person regarding the scientific evidence in your area?
 - 10.1. If so, which is the reason/motivation/frequency?
 - 10.1.1. How do you keep yourself up to date?
 - 10.1.1.1. Do you usually use guidelines?
 - 10.1.1.1.1. If so, which is the reason/motivation/frequency?
 - 10.1.1.1.2. If not, why?
 - 10.1.2. Do you think the evidence influences your daily clinical practice?
 - 10.1.2.1. If so, in which way?
 - 10.1.2.2. If not, why?
 - 10.2. If not, why?
 - 10.2.1. For you, what strategies would work to improve your update?
 11. In the context of an evidence-based practice, how do you perceive scientific knowledge and the clinical experience/practice?
 - 11.1. Do you think that these two concepts are related?
 - 11.1.1. How do they relate?
 - 11.1.2. What strategies would you use to improve this relationship?
 12. Do you think that you have adequate resources at your disposal for an evidence-based practice?
 - 12.1. If so, what is the reason?
-

12.1.1. Can you give some examples?

12.2. If not, what are the main barriers for a non-evidence-based practice?

12.2.1. According to the examples you mentioned, what facilitating strategies do you suggest?

Table 2 – Association Between PTs’ Characteristics and Their Attitudes and Beliefs About EBP

Attitude or Belief (Agree)	Factor - Level	Odds Ratio (95% CI)	P	R² ^a
EBP is Necessary to Practice	<i>Work Mode</i>		0.044	0.137
	Own Account	0.095 [0.010; 0.940]		
EBP Creates Unreasonable Demands	Someone Else Account	Reference ^b	0.034	0.035
	<i>Sex</i>			
	Male	0.445 [0.211; 0.941]		
EBP Improves Care Quality	Female	Reference ^b	0.033	0.066
	<i>Belong to a Professional Practice-orientated Organization</i>			
	Yes	4.083 [1.122; 14.864]		
EBP Doesn’t Account for Practice Settings Limitations	No	Reference ^b	0.033	0.034
	<i>Participated in Continuing Education Courses</i>			
	Yes	2.943 [1.090; 7.945]		
	No	Reference ^b		
	<i>Patients day</i>			
	1-5	1.348 [0.526; 3.454]		
	6-10	0.713 [0.334; 1.524]		
11-15	2.483 [1.063; 5.796]			
EBP Will Increase Reimbursement	>15	Reference ^b	0.004	0.059
	<i>Sex</i>			
	Male	2.634 [1.369; 5.067]		
Evidence is Lacking to Support Interventions	Female	Reference ^b	0.040	0.038
	<i>Participated in Continuing Education Courses</i>			
	Yes	3.736 [1.059; 13.174]		
EBP Helps Decision Making	No	Reference ^b	0.019	0.072
	<i>Belong to a Professional Practice-orientated Organization</i>			
	Yes	4.171 [1.269; 13.714]		

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 3 – Association Between PTs’ Characteristics and Their Interest in and Motivation to Engage in EBP.

Interest or Motivation (Agree)	Factor - Level	Odds Ratio (95% CI)	P	R² ^a
Necessity to Increase Evidence Use in Practice	<i>Sex</i>		<i>0.044</i>	<i>0.036</i>
	Male	0.427 [0.187; 0.977]		
	Female	Reference ^b		
	<i>Work Sector</i>		<i>0.032</i>	<i>0.064</i>
	Public	7.361 [1.655; 32.748]	0.009	
	Private	3.012 [0.909; 9.977]	0.071	
	Academic	Reference ^b		
	<i>Work Mode</i>		<i>0.035</i>	<i>0.039</i>
	Own Account	0.401 [0.172; 0.936]		
	Someone Else Account	Reference ^b		
Learning/Improving Skills Interest to Incorporate EBP in Practice	<i>Academic Degree</i>		<i>0.029</i>	<i>0.089</i>
	Baccalaureate	8.850 [1.734; 45.178]	0.009	
	Master	5.500 [0.969; 31.222]	0.054	
	Doctorate	Reference ^b		
	<i>Patients Day</i>		<i>0.008</i>	<i>0.174</i>
	1-5	0.089 [0.010; 0.786]	0.029	
	6-10	0.802 [0.071; 9.118]	0.859	
	11-15	1.116 [0.068; 18.387]	0.939	
	>15	Reference ^b		
	<i>Patients Care</i>		<i>0.002</i>	<i>0.287</i>
	0%	0.009 [0.000; 0.272]	0.007	
	5-25%	0.016 [0.002; 0.162]	0.000	
	30-50%	0.145 [0.009; 2.443]	0.180	
	55-75%	0.148 [0.015; 1.463]	0.102	
	80-100%	Reference ^b		
	<i>Teacher</i>		<i>0.006</i>	<i>0.233</i>
	0%	38.333 [3.958; 371.244]	0.002	
	5-25%	27.333 [1.890; 395.245]	0.015	
	30-50%	3.556 [0.405; 31.233]	0.253	
	55-75%	2.667 [0.250; 28.438]	0.417	
	80-100%	Reference ^b		
	<i>Work Sector</i>		<i>0.000</i>	<i>0.225</i>
	Public	31.111 [3.248; 297.981]	0.003	
Private	16.389 [3.734; 71.938]	0.000		
Academic	Reference ^b			

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 4 – Association Between PTs’ Characteristics and Their Attention to and Use of the Literature.

Attention an Use of Literature (Good)	Factor - Level	Odds Ratio (95% CI)	P	R ² a
Articles Read per Month	<i>Sex</i>		0.022	0.037
	Male	2.133 [1.115; 4.081]		
	Female	Reference ^b		
	<i>Years of License</i>		0.011	0.083
	< 5	4.105 [1.556; 10.830]	0.004	
	5-10	1.051 [0.492; 2.248]	0.897	
	11-15	0.809 [0.348; 1.881]	0.622	
	> 15	Reference ^b		
	<i>Academic Degree</i>		0.039	0.049
	Baccalaureate	0.209 [0.061; 0.720]	0.013	
	Master	0.292 [0.080; 1.061]	0.061	
	Doctorate	Reference ^b		
	<i>Belong to a Professional Practice-orientated Organization</i>		0.030	0.037
	Yes	2.449 [1.093; 5.490]		
	No	Reference ^b		
	<i>Patients Care</i>			0.014
0%		2.828 [0.171; 46.683]	0.467	
5-25%		2.356 [0.668; 8.308]	0.182	
30-50%		3.181 [1.122; 9.020]	0.030	
55-75%		3.054 [1.533; 6.085]	0.002	
80-100%		Reference ^b		
Literature Used in Decisions per Month	<i>Sex</i>		0.010	0.047
	Male	2.402 [1.232; 4.682]		
	Female	Reference ^b		
Database Searches Performed per Month	<i>Sex</i>		0.022	0.037
	Male	2.133 [1.115; 4.081]		
	Female	Reference ^b		
	<i>Age</i>		0.023	0.070
	20-29	4.529 [1.676; 13.017]	0.005	
	30-39	2.011 [0.741; 5.461]	0.170	
	40-49	3.125 [0.976; 10.005]	0.055	
	≥ 50	Reference ^b		
	<i>Years of License</i>		0.024	0.068
	< 5	3.778 [1.448; 9.856]	0.007	
	5-10	1.311 [0.614; 2.797]	0.485	
	11-15	0.875 [0.374; 2.047]	0.759	
	> 15	Reference ^b		
	<i>Academic Degree</i>		0.009	0.069
	Baccalaureate	0.186 [0.054; 0.643]	0.008	
	Master	0.361 [0.100; 1.307]	0.121	
Doctorate	Reference ^b			
<i>Pursue a Higher Academic Degree</i>		0.009	0.071	
No	0.328 [0.115; 0.932]	0.036		
Do Not Know	0.350 [0.155; 0.793]	0.012		
Yes	Reference ^b			
<i>Patients Care</i>			0.001	0.134
	0%	2.828 [0.171; 46.683]	0.467	
	5-25%	7.540 [1.873; 30.359]	0.004	
	30-50%	6.786 [2.201; 20.922]	0.001	

55-75%	1.915 [0.954; 3.847]	0.068	
80-100%	Reference ^b		
<i>Researcher</i>		<i>0.002</i>	<i>0.109</i>
5-25%	2.379 [1.230; 4.601]	0.010	
30-50%	6.825 [2.294; 20.306]	0.001	
55-75%	0.788 [0.083; 7.489]	0.835	
0%	Reference ^b		
<i>Work Sector</i>		<i>0.032</i>	<i>0.051</i>
Public	0.198 [0.057; 0.687]	0.011	
Private	0.348 [0.110; 1.102]	0.073	
Academic	Reference ^b		

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 5 – Association Between PTs’ Characteristics and Their Access to Practical Guidelines.

Access to Practical Guidelines	Factor - Level	Odds Ratio (95% CI)	P	R² ^a
Relevant Guidelines Available (No)	<i>Clinical Instructor</i>		<i>0.004</i>	<i>0.071</i>
	Yes	0.339 [0.163; 0.703]		
Guidelines Use in Practice (Agree)	No	Reference ^b		
	<i>Pursue a Higher Academic Degree</i>		<i>0.001</i>	<i>0.113</i>
	No	0.158 [0.059; 0.427]	0.000	
	Do Not Know	0.814 [0.272; 2.438]	0.713	
	Yes	Reference ^b		
	<i>Participated in Continuing Education Courses</i>		<i>0.000</i>	<i>0.104</i>
Guidelines Patients’ Preferences Incorporation (Agree)	Yes	6.039 [2.251; 16.206]		
	No	Reference ^b		
	<i>Clinical Instructor</i>		<i>0.012</i>	<i>0.063</i>
	Yes	3.074 [1.281; 7.378]		
	No	Reference ^b		
	<i>Teacher</i>		<i>0.011</i>	<i>0.120</i>
	0%	9.083 [1.321; 62.446]	0.025	
	5-25%	2.833 [0.404; 19.873]	0.295	
	30-50%	2.500 [0.306; 20.453]	0.393	
	55-75%	1.000 [0.112; 8.947]	1.000	
	80-100%	Reference ^b		

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 6 – Association Between PTs’ Characteristics and Their Access to and Availability of Information to Promote EBP.

Access and Availability of Information	Factor - Level	Odds Ratio (95% CI)	P	R² a	
Access to Research in Professional Paper Journals (No)	<i>Clinical Instructor</i>		<i>0.007</i>	<i>0.060</i>	
	Yes	0.369 [0.179; 0.763]			
	No	Reference ^b			
	<i>Teacher</i>		<i>0.005</i>	<i>0.131</i>	
	0%	25.250 [2.651; 240.495]	0.005		
	5-25%	8.923 [0.906; 87.840]	0.061		
	30-50%	8.667 [0.790; 95.088]	0.077		
Access to Online Databases at Work (No)	55-75%	6.000 [0.478; 75.344]	0.165		
	80-100%	Reference ^b			
	<i>Sex</i>		<i>0.018</i>	<i>0.046</i>	
	Male	0.381 [0.172; 0.845]			
	Female	Reference ^b			
	Facility Support in Using Research in Practice (Agree)	<i>Working Hours</i>		<i>0.008</i>	<i>0.102</i>
		< 20	3.818 [0.410; 35.570]	0.239	
20-30		5.250 [1.669; 16.517]	0.005		
31-40		0.773 [0.416; 1.445]	0.414		
> 40		Reference ^b			
<i>Patients Day</i>			<i>0.006</i>	<i>0.088</i>	
1-5		2.280 [0.865; 6.007]	0.095		
6-10		2.350 [1.087; 5.079]	0.030		
11-15		0.697 [0.304; 1.598]	0.394		
> 15		Reference ^b			
<i>Researcher</i>			<i>0.013</i>	<i>0.088</i>	
5-25%		1.649 [0.898; 3.029]	0.107		
30-50%		6.963 [1.884; 25.736]	0.004		
55-75%		5.222 [0.559; 48.775]	0.147		
0%		Reference ^b			
<i>Work Sector</i>		<i>0.000</i>	<i>0.147</i>		
Public	0.158 [0.043; 0.570]	0.005			
Private	0.709 [0.210; 2.395]	0.580			
Academic	Reference ^b				
<i>Work Mode</i>		<i>0.001</i>	<i>0.078</i>		
Own Account	3.444 [1.623; 7.310]				
Someone Else Account	Reference ^b				

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 7 – Association Between PTs’ Characteristics and Their Educational Background, Knowledge and Skills Related to Accessing and Interpreting Information.

Education, Skill or Knowledge (Agree)	Factor - Level	Odds Ratio (95% CI)	P	R² a
Learned Foundations in Academic Program	<i>Age</i>		<i>0.005</i>	<i>0.114</i>
	20-29	9.474 [2.397; 37.436]	0.001	
	30-39	3.547 [1.395; 9.015]	0.008	
	40-49	3.789 [1.052; 13.652]	0.042	
	≥ 50	Reference ^b		
	<i>Pursue a Higher Academic Degree</i>		<i>0.015</i>	<i>0.069</i>
	No	0.664 [0.200; 2.206]	0.504	
	Do Not Know	0.286 [0.122; 0.699]	0.004	
	Yes	Reference ^b		
	<i>Teacher</i>		<i>0.026</i>	<i>0.097</i>
	0%	13.125 [1.990; 86.554]	0.007	
	5-25%	4.800 [0.700; 32.903]	0.110	
	30-50%	5.625 [0.688; 46.019]	0.107	
	55-75%	3.500 [0.372; 32.971]	0.274	
	80-100%	Reference ^b		
	<i>Work Sector</i>		<i>0.005</i>	<i>0.086</i>
	Public	4.700 [1.346; 16.411]	0.015	
Private	7.133 [2.195; 23.187]	0.001		
Academic	Reference ^b			
Formal Training in Search Strategies	<i>Age</i>		<i>0.007</i>	<i>0.089</i>
	20-29	5.262 [1.941; 14.260]	0.001	
	30-39	3.577 [1.521; 8.410]	0.003	
	40-49	3.462 [1.168; 10.263]	0.025	
	≥ 50	Reference ^b		
	<i>Years of License</i>		<i>0.012</i>	<i>0.081</i>
	< 5	3.832 [1.276; 11.508]	0.017	
	5-10	3.283 [1.475; 7.307]	0.004	
	11-15	1.800 [0.806; 4.022]	0.152	
	> 15	Reference ^b		
	<i>Pursue a Higher Academic Degree</i>		<i>0.016</i>	<i>0.059</i>
	No	0.447 [0.181; 1.108]	0.082	
	Do Not Know	0.370 [0.177; 0.772]	0.008	
Yes	Reference ^b			
Knowledge of Online Databases	<i>Pursue a Higher Academic Degree</i>		<i>0.004</i>	<i>0.099</i>
	No	0.393 [0.124; 1.242]	0.112	
	Do Not Know	0.223 [0.092; 0.541]	0.001	
	Yes	Reference ^b		
Formal Training in Critical Appraisal	<i>Age</i>		<i>0.043</i>	<i>0.062</i>
	20-29	4.230 [1.447; 12.370]	0.008	
	30-39	2.547 [1.060; 6.119]	0.037	
	40-49	3.322 [0.999; 11.045]	0.050	
	≥ 50	Reference ^b		
Confident in Appraisal Skills	<i>Clinical Instructor</i>		<i>0.039</i>	<i>0.038</i>
	Yes	2.301 [1.042; 5.085]		
No	Reference ^b			
Confident in Search Skills				

<i>Years of License</i>		<i>0.035</i>	<i>0.099</i>
< 5	1.926 [0.205; 18.103]	0.556	
5-10	0.254 [0.078; 0.824]	0.023	
11-15	0.267 [0.078; 0.916]	0.036	
> 15	Reference ^b		
<i>Clinical Instructor</i>		<i>0.008</i>	<i>0.070</i>
Yes	3.272 [1.370; 7.815]		
No	Reference ^b		

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 8 – Association Between PTs’ Characteristics and Their Understanding of Scientific Terms.

Term (Do Not Understand)	Factor - Level	Odds Ratio (95% CI)	P	R² ^a
Publication Bias	<i>Clinical Instructor</i>		<i>0.024</i>	<i>0.068</i>
	Yes	0.262 [0.082; 0.836]		
	No	Reference ^b		
	<i>Work Mode</i>		<i>0.020</i>	<i>0.058</i>
	Own Account	3.339 [1.205; 9.252]		
	Some Else Account	Reference ^b		

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 9 – Association Between PTs’ Characteristics and Their Perceived Barriers.

Barriers (Present)	Factor - Level	Odds Ratio (95% CI)	P	R² ^a
Insufficient Time	<i>Sex</i>		<i>0.016</i>	<i>0.042</i>
	Male	0.433 [0.220; 0.855]		
	Female	Reference ^b		
	<i>Years of License</i>		<i>0.037</i>	<i>0.063</i>
	< 5	3.106 [1.031; 9.356]	0.044	
	5-10	2.941 [1.297; 6.668]	0.010	
	11-15	2.000 [0.863; 4.634]	0.106	
	> 15	Reference ^b		
	<i>Clinical Instructor</i>		<i>0.029</i>	<i>0.036</i>
	Yes	0.484 [0.252; 0.930]		
No	Reference ^b			
Lack of Information Resources	<i>Work Mode</i>		<i>0.022</i>	<i>0.039</i>
	Own Account	2.365 [1.133; 4.936]		
	Someone Else Account	Reference ^b		
Lack of Research Skills	<i>Work Mode</i>		<i>0.022</i>	<i>0.039</i>
	Own Account	2.365 [1.133; 4.936]		
	Someone Else Account	Reference ^b		
Inability to Apply Research to Individual Patients	<i>PTs in the Facility</i>		<i>0.008</i>	<i>0.105</i>
	0	3.491 [1.096; 11.124]	0.034	
	1-5	4.945 [1.654; 14.790]	0.004	
	6-10	2.200 [0.622; 7.787]	0.221	
	11-15	12.800 [2.545; 64.372]	0.002	
	> 15	Reference ^b		
	<i>Work Sector</i>		<i>0.042</i>	<i>0.045</i>
	Public	0.271 [0.076; 0.986]	0.044	
	Private	0.538 [0.168; 1.813]	0.318	
	Academic	Reference ^b		
Lack of Collegial Support	<i>Patients Day</i>		<i>0.038</i>	<i>0.067</i>
	1-5	0.280 [0.083; 0.950]	0.041	
	6-10	0.686 [0.307; 1.532]	0.358	
	11-15	1.426 [0.620; 3.280]	0.404	
	> 15	Reference ^b		
	<i>Work Mode</i>		<i>0.022</i>	<i>0.043</i>
	Own Account	0.376 [0.163; 0.867]		
	Someone Else Account	Reference ^b		

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table 10 – EBP Questionnaire responses

Item	Response options (n; %)				
	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Agree</i>	<i>Strongly Agree</i>	
25	3 (1.6%)	1 (0.5%)	90 (46.6%)	99 (51.3%)	
26	2 (1.0%)	3 (1.6%)	100 (51.8%)	88 (45.6%)	
27	3 (1.6%)	25 (13.0%)	111 (57.5%)	54 (28.0%)	
28	17 (8.8%)	112 (58.0%)	51 (26.4%)	13 (6.7%)	
29	2 (1.0%)	8 (4.1%)	125 (64.8%)	58 (30.1%)	
30	2 (1.0%)	8 (4.1%)	101 (52.3%)	82 (42.5%)	
31	9 (4.7%)	85 (44.0%)	86 (44.6%)	13 (6.7%)	
32	38 (19.7%)	87 (45.1%)	61 (31.6%)	7 (3.6%)	
33	17 (8.8%)	107 (55.4%)	63 (32.6%)	6 (3.1%)	
34	1 (0.5%)	11 (5.7%)	129 (68.8%)	59 (26.9%)	
35	16 (8.3%)	99 (51.3%)	66 (34.2%)	12 (6.2%)	
40	2 (1.0%)	38 (19.7%)	109 (56.5%)	44 (22.8%)	
41	3 (1.6%)	25 (13.0%)	124 (64.2%)	41 (21.2%)	
44	3 (1.6%)	23 (11.9%)	139 (72.0%)	28 (14.5%)	
48	33 (17.1%)	56 (29.0%)	82 (42.5%)	22 (11.4%)	
49	9 (4.7%)	23 (11.9%)	93 (48.2%)	68 (35.2%)	
50	13 (6.7%)	47 (24.4%)	84 (43.5%)	49 (25.4%)	
51	3 (1.6%)	27 (14.0%)	86 (44.6%)	77 (39.9%)	
52	7 (3.6%)	37 (19.2%)	92 (47.7%)	57 (29.5%)	
53	1 (0.5%)	31 (16.1%)	121 (62.7%)	40 (20.7%)	
54	1 (0.5%)	28 (14.5%)	124 (64.2%)	40 (20.7%)	
	<i>≤1</i>	<i>2–5</i>	<i>6–10</i>	<i>11–15</i>	<i>≥16</i>
36	35 (18.1%)	87 (45.1%)	42 (21.8%)	10 (5.2%)	19 (9.8%)
37	41 (21.2%)	94 (48.7%)	27 (14.0%)	8 (4.1%)	23 (11.9%)
38	54 (28.0%)	68 (35.2%)	35 (18.1%)	11 (5.7%)	25 (13.0%)
	<i>Yes</i>	<i>No</i>		<i>Do Not Know</i>	
39	151 (78.2%)	24 (12.4%)		18 (9.3%)	
42	164 (85.0%)	29 (15.0%)		NA	
43	161 (83.4%)	32 (16.6%)		NA	
45	43 (22.3%)	150 (77.7%)		NA	
46	134 (69.4%)	54 (28.0%)		5 (2.6%)	
47	175 (90.7%)	14 (7.3%)		4 (2.1%)	

	<i>Understand Completely</i>	<i>Understand Somewhat</i>	<i>Do Not Understand</i>	
55 _a	111 (57.5%)	72 (37.3%)	10 (5.2%)	
55 _b	114 (59.1%)	69 (35.8%)	10 (5.2%)	
55 _c	167 (86.5%)	24 (12.4%)	2 (1.0%)	
55 _d	56 (29.0%)	97 (50.3%)	40 (20.7%)	
55 _e	126 (65.3%)	58 (30.1%)	9 (4.7%)	
55 _f	129 (66.8%)	58 (30.1%)	6 (3.1%)	
55 _g	147 (76.2%)	39 (20.2%)	7 (3.6%)	
55 _h	110 (57.0%)	66 (34.2%)	17 (8.8%)	
Total	960 (62.2%)	483 (31.3%)	101 (6.5%)	
	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	Total
56 _α	96 (68.6%)	15 (10.7%)	29 (20.7%)	140 (24.2%)
56 _β	10 (22.7%)	24 (54.5%)	10 (22.7%)	44 (7.6%)
56 _γ	14 (31.8%)	15 (34.1%)	15 (34.1%)	44 (7.6%)
56 _δ	6 (21.4%)	11 (39.3%)	11 (39.3%)	28 (4.8%)
56 _ε	25 (27.5%)	38 (41.8%)	28 (30.8%)	91 (15.7%)
56 _θ	23 (22.3%)	45 (43.7%)	35 (34.0%)	103 (17.8%)
56 _σ	8 (19.0%)	17 (40.5%)	17 (40.5%)	42 (7.3%)
56 _ψ	10 (16.1%)	20 (32.3%)	32 (51.6%)	62 (10.7%)
56 _ω	1 (4.0%)	8 (32.0%)	16 (64.0%)	25 (4.3%)

a – Relative risk; b – Absolute risk; c – Systematic review; d – Odds ratio; e – Meta-analysis; f – Confidence interval; g – Heterogeneity; h – Publication bias; α – Insufficient time; β – Lack of information resources; γ – Lack of research skills; δ – Poor ability to critically appraise the literature; ε – Lack of generalizability of the literature findings to my patient population; θ – Inability to apply research findings to individual patients with unique characteristics; σ – Lack of understanding of statistical analysis; ψ – Lack of collective support among my colleagues in my facility; ω – Lack of interest; NA – Not Applicable.

Supplemental Quotations

Quotation 1: *“EBP is a three-sided triangle. One, undoubtedly the base of the triangle, is the best available scientific evidence. Then we have, on the other side of the triangle, the clinician expertise. And we have the patient’s expectations on the third side of the triangle. When it’s possible to combine these three sides, in order to improve the treatment results or the intervention in that patient, then we do an EBP.” [FT_5]*

Quotation 2: *“There’s no EBP without ethics. The PT’s ethics is a dimension that has to be involved in all moments of the EBP. And we continue to discuss very little about ethics in Portugal ... and scientific evidence is one of the components of ethics. We often discuss scientific evidence, without discussing the basis, that is ethics. Whether it’s ethical or not ethical, proposing treatments that have no scientific evidence, and that’s the main basis of the discussion ... EBP and ethics must always be associated.” [FT_4]*

Quotation 3: *“As we often say in our service: ‘What’s not detailed or registered isn’t done’. Based on the evidence, we use written validated things so that our intervention really has the needed validity. (...)*

Q: How is the current evidence regarding the majority of patients that you treat?

We ended up using in neurological cases, the Tinetti test and the Barthel index. Sometimes we generalize these scales to everyone. Of course, we still have strength tests, range of motion tests...and the Borg scale, we also use it a lot ...” [FT_6]

Quotation 4: *“...who makes the evaluation is a team. (...) The team is constituted by doctors, psychologists, social workers, nurses and nutritionists and then, in the area of rehabilitation, there’s the PTs and occupational therapists, speech therapists and physiatrists. (...) ... then at the next meeting, the individual intervention plan is defined, which is done in a team meeting, with the opinion of all areas ...” [FT_6]*

Quotation 5: *“The individual plan is evaluated more or less in the middle of hospitalization, to see if it suit or not. Or if we have already achieved all the objectives outlined and we will propose others. Or, for any reason, if there’s a clinical situation worsening, the initial one is no longer applicable and we will have to outline other.” [FT_6]*

Quotation 6: *“Q: For you, what’s the patient’s role in EBP?*

It depends on the patient’s state of consciousness. Because, often, disoriented patients arrive in the continuing care unit ... and don’t actively intervene in the intervention plan itself.” [FT_6]

Quotation 7: *“So I would say that I based my intervention plan on evidence (it’s my first contact to know what to do with that patient), then the patient values and characteristics comes afterwards, then my*

experience – that's not that much (so I can only count on it to a certain extent) – comes in the end.” [FT_3]

Quotation 8: “Clinical experience only comes with time (...) So, what I mean is the number of patients, the clinical mileage, the increase in patients' 'kilometers.’” [FT_5]

Quotation 9: “I do this because I feel the need, both personal and professional, to ensure that everything I do has a justification and is based on something, which it's not exclusively based on experience. Because, experience, I don't have it yet.” [FT_2]

Quotation 10: “Our clinical decisions must be made taking into account the best evidence available, our clinical experience and, of course, also attending to the patient' preferences and past treatments experiences. But always using this ranking. I. e., according to the evidence that exists, combine it with our clinical reasoning (in the light of what's our clinical experience) and then adjust in a context that's favorable for the patient.” [FT_7]

Quotation 11: “... through discussions I been having, whether in Facebook professional groups, or in different PT congresses...then, it was mainly in the master's degree that I learned the EBP importance ...” [FT_1]

Quotation 12: “... I did my bachelor degree, completed a postgraduate degree and I am currently writing my master's degree thesis. So I had many classes that focused on the investigation area, on EBP, on its importance and its limitations.” [FT_2]

Quotation 13: “I did a master degree and obviously in the master degree I gained respect for science and EBP. Then, I did my PhD degree and, in the PhD, the awareness of the value and importance of science and EBP became essential. It became a landmark. Nobody does a PhD without it. It's really a crescent.” [FT_4]

Quotation 14: “Until the 3rd year of the bachelor degree, we were thinking about recipes. That we were going to learn recipes to do anything and everything. We started to realize what we needed to know (at least what treatments can show results). Then, in the master degree the EBP concept was evidence, evidence, evidence. Only what was documented in the literature should be used. I think after the master degree and with the years of clinical experience, I started to incorporate other components, namely the patients' preferences. They are, in fact, very important to achieve positive results (and as time goes on it ends up being increasingly important). So, at least regarding mental flexibility, things have changed over time.” [FT_8]

Quotation 15: “...when I finished the bachelor degree, I tried to justify everything, and everything I did would be through EBP. Now too, but maybe I try not to do it so hard. Because, many times, not everything we do can be justified. If we see that we have results, we will not stop doing it just because it's not justified. I think that since the beginning, I have differentiated the concept, yes.” [FT_9]

Quotation 16: "I constantly do training, that forces me to read and increase my curiosity about some topics: 'Oh, I've never heard of it, and I'm going to read' ... in the past, I think PTs used to do the '5 holy grail' [heat/ice, TENS, US, passive mobilization and massage]. Or for that situation you do this, for that you do that. I think nowadays, due to the fact that there are more studies, I think it has already changed a lot." [FT_10]

Quotation 17: "The first contact was in the bachelor degree, in a lecture that we had about research in the 2nd year of graduation (although, in the 1st year we had already covered some clinical cases, where it was suggested that we search for scientific articles – but that was very difficult, because we didn't have the base concepts). And then, in the 2nd year, we approached more the EBP and the search in scientific databases." [FT_2]

Quotation 18: "... in the curricular internship an item that was evaluated was whether our practice has, in fact, evidence based...at the internship level they, (I can't say, obliged), but basically they encouraged us to do an EBP.

Q: But didn't you had specific a lecture about EBP?

No, nothing. I don't know if it exists at the moment, but there was none at my time. It was during normal academic lectures, that we were taught that. But at a general level. Not in a particular lecture." [FT_9]

Quotation 19: "... for me, the basis will always be science, i.e., what we are going to do must be based on evidence. (...) Physical therapy is a health profession in the scientific field. So, everything we do must have a basis, and scientific evidence must be, the basis of everything else. And our experience is achieved on the top of the scientific evidence. And the patients' preferences are also on top of scientific evidence." [FT_8]

Quotation 20: "...what science has to say about it, i.e., what's expected, what's effective, what's the prognosis, what should be done, what shouldn't be done, what are the mechanisms, and so on..." [FT_1]

Quotation 21: "... justify the diagnosis that we probably attribute to the person, justify the prognosis (that's often what most worries the person). And we cannot justify a prognosis based on our experience, we have to base it on what's written, on the evidence." [FT_2]

Quotation 22 "... but in the light of the best evidence at the time, help us to be more certain that what we are doing is the best possible intervention..." [FT_3]

Quotation 23: "... it's not enough for a PT to read a study ... a study doesn't mean anything ... it's necessary to read systematic reviews, meta-analyzes and guidelines, and then see if there's good evidence, if there's bad evidence, if there's a lot, if there's little, and what it points to." [FT_1]

Quotation 24: "... I try to follow practice-related Facebook groups or some more face-to-face forums ..." [FT_1]

Quotation 25: "I subscribe to several physical therapy journals. Also, I follow blogs of people that I think are influential and important for me (for example former teachers) ... and then through studies that I search on specific topics. Also books on specific topics that I buy when I need them. (...) Therefore, almost daily I receive emails with scientific studies..." [FT_3]

Quotation 26: "... in the PhD its [EBP] value and importance becomes fundamental." [FT_4]

Quotation 27: "I think that going to international congresses have helped a lot ..." [FT_8]

Quotation 28: "... I don't know if there's a better way. All are important, of course with different levels of knowledge acquisition ..." [FT_5]

Quotation 29: "For me, the best strategy is peer discussion. To see others' perspectives, others' opinions, to listen to experts in the area..." [FT_1]

Quotation 30: "... I work with other colleagues that have an EBP and I ask them if they have read an article that was interesting, or that they recommend." [FT_2]

Quotation 31: "Congresses are essential for people to hear things that they never heard before and hadn't read yet. (...) Pubmed alone, has more than 900,000 publications per year, and it has more than 9,000,000 citations of entries per year of health-related articles, so it's impossible to read everything. So, congresses help. Then, workshops help implementation in practice. This year, I happened to be at a very interesting congress on the ankle where I saw a different approach of the ankle treatment. (...) It's a matter of time before it starts to be worldwide implemented. I personally started to implement it in my practice, I did some workshops right there that gave me some practical base ..." [FT_5]

Quotation 32: "Also, in Facebook groups with other PTs, sometimes studies are shared that are quite interesting in other areas, which may not be my area of intervention, and for that sharing, sometimes I end up reading other studies." [FT_2]

Quotation 33: "For me, it was the academic degree increase. The master degree contributed a lot. During the master degree, I was always reading about the topics I mastered the most. Then, I went to PhD and ended up reading even more and understand a little bit more about the evidence. For me, the academic degree increase has been very important in this aspect. Because, at least, it never let me stop updating in relation to the topics and areas that I like the most, or in relation to the areas where I work the most." [FT_8]

Quotation 34: "We talked about something very important, increasing the academic degrees. I have the experience with this. It's a brutal quality leap. For the practice, it depends on the level that you're taking, master or doctorate degree. (...) But from the quality point of view of search, analysis, and willingness to improve knowledge, any of these level are fundamental. It's logical that the doctorate level, has a different demand from the master. But, any of them, are a good start." [FT_5]

Quotation 35: "... for my master degree Pubmed became a close friend. I search on it a lot, not that much for my clinical practice, but for lectures works and my thesis." [FT_1]

Quotation 36: "In congresses you learn. Of course, for implementing it in practice it's not enough. The person gets an idea, takes the authors name, and then goes home to study them." [FT_5]

Quotation 37: "In average, 1 per week." [FT_4]

Quotation 38: "Besides the weekend (and sometimes as well), during the week I search every day." [FT_7]

Quotation 39: "Q: What kind of studies do you read the most?"

Systematic reviews. And then, some more experimental research articles ...

Q: Including, guidelines?

Guidelines too!

Q: But fundamentally systematic reviews?

Yes. With or without meta-analysis. Systematic reviews, that's what I end up reading the most. And then, some expert opinion papers.

Q: But never the first line of reading, correct?

No, the first line of reading is, objectively, systematic reviews." [FT_4]

Quotation 40: "Of course, the higher up the pyramid, the better. Naturally, systematic reviews of RCTs have the greater validity, and then descend until the case studies, or expert opinions." [FT_7]

Quotation 41: "... when I have a new case in a not so well known area I do search ..." [FT_1]

Quotation 42: "Usually, it's more according to my academic needs. As a teacher. The studies that I end up reading have more to do with my academic part and with the topics that I'm teaching. But, obviously, they cover with useful and effective information for my clinical practice." [FT_4]

Quotation 43: "I always try, especially if it's a pathology, or a patient with specific characteristics, to do some research in Cochrane, Pubmed, or other databases. Understand in terms of clinical trials, RCTs, systematic reviews, guidelines, what exists within that area ..." [FT_7]

Quotation 44: "I read at least one study per day. Sometimes, I read more ... it depends on the new cases, pathology and necessity that I have at the time.

Q: So, you do your search related with your patients' pathologies, right?

Majority, yes.

Q: Did you have interest to do the search by intervention?

Sometimes, I do. But it's rare." [FT_10]

Quotation 45: "For example, in the geriatric area, where I work, sometimes the literature is very difficult to apply ... (...) I think that we, unfortunately, are never very updated. Because there are always new

studies coming out in a lot of journals. I think that, afterwards, it's a very constant job, trying to know what's new. And for that, I have some difficulty. I go on searching, depending on the pathologies that I'm following, but sometimes I can't be as updated as desired. (...) Sometimes, we must also realize that, in addition to understand the studies' limitations and their level of evidence, it's even more important to understand that not all studies are possible to extrapolate. Although, for example, the person that we are treating may be similar to an intervention group that we saw in a study, we must understand that it's not always possible to extrapolate. Because the person may have other co-morbidities that imply their clinical condition." [FT_2]

Quotation 46: "... of course the evidence is constantly evolving, and what it's valid today, isn't quite like that tomorrow ... (...) And then the question of the physical therapy evidence strength. Has a lot to do with certain methodological parameters that are used to assess the quality of the evidence. For example, if the person applying the therapy is blind. All those parameters that we have on the scores that evaluate the evidence in physical therapy, aren't always so easy to reach. Because, for example, a PT knowing what he/she is applying. Certain parameters aren't easy to achieve, i. e., many of the scores levels that exist in the evidence end up not being the highest ones ... (...) So, in one hand, there are still few studies and, in the other hand, the studies' scores aren't always the highest." [FT_3]

Quotation 47: "... it's difficult to compare the results between studies in physical therapy ... because the evaluation methodologies in each study are very different, the intervention strategies are very different and then it becomes very difficult to evaluate the results properly. (...) We have difficulty in explaining and validating our strategies because they are always different and the ways of presenting the results are also different and then it becomes difficult to compare them." [FT_4]

Quotation 48: "... because every time that we read a study, with rare exceptions, the systematic reviews conclusions are always the same: studies with weak quality, inconclusive, lack of coherence between studies." [FT_5]

Quotation 49: "... it depends on the areas. There are areas that are extremely well studied and extremely well-founded. And there are others that are very gray areas." [FT_9]

Quotation 50: "Throughout life, what's intended is that, in continuous professional development, the PT continues to absorb science and practice science. And then compare the results of his practice with what was expected of science and realize that maybe it's more competent in some strategies and get more results, and maybe less competent in other strategies so doesn't get so many results. (...) Experience can make the diagnostic process much easier. Can be much more assertive in the diagnosis in physical therapy with more experience. As for the intervention, experience will give us more effectiveness in the intervention, better results in less time, but it must always be based on scientific evidence. Clinical experience will tell me: 'I'm better in certain strategies and I'm not so good in other strategies'. And, therefore, I will use the strategies where I'm better." [FT_4]

Quotation 51: *“On the other hand, I think that with more years of experience it’s easier (and with a better degree of certainty) for PT to choose a more adequate intervention plan.” [FT_8]*

Quotation 52: *“The patient’s role is fundamental, because the patient has the final word.” [FT_3]*

Quotation 53: *The patient’s role is fundamental! Fundamental, in the way that my intervention will be directed to the patient’s needs and problems. Therefore, I have to accord with the patient what he/she wants to see resolved. It’s not what I want to see resolved as a professional, but it’s what he/she wants to see resolved as a patient. Therefore, he/she has to be very clear in what he/she wants and I have to present the intervention strategy. (...) ‘I have ‘X’ time to solve the problem, what strategies can I apply in this time?’; ‘I have more time, I maybe use this type of strategy, I have less time, I use another one.’; ‘What do I want?’; ‘What can I do?’. Therefore, the patient is fundamental. It’s the fundamental part! Physical therapy has to center its care based on the patient. (...) Each patient is unique...” [FT_4]*

Quotation 54: *“... speaking of the less benign musculoskeletal conditions, the evidence clearly points, in the vast majority of them, to a very good prognosis and good spontaneous evolution. I think that there’s often an excess of treatment or excess of intervention in this level. (...) We have to be skeptical on our practice ... (...) we have to be skeptical to the point of realizing: ‘This got better, but it got better because I did it, or it got better because it was going to get better anyway?’; Or is it better for something else?’ – I can’t prove it – therefore, we must always be informed by the evidence and be skeptical of the results we obtain.” [FT_1]*

Quotation 55: *“... especially when working with older population they have many beliefs that aren’t very actual ...” [FT_3]*

Quotation 56: *“The scientific evidence exists in some studies, but with little scientific strength.” [FT_4]*

Quotation 57: *“If there’s a relatively solid proof of a certain thing, even if we have an opposite opinion, I think that our personal opinion should not superimposed science. What our opinion should do is, taking into account that information and taking into account what we know about our cases, adapt it to science and not the other way around (adapt science to our beliefs is almost making studies ‘cherry picking’ to try to prove what we think).” [FT_1]*

Quotation 58: *In the studies samples there exists millions or thousands of patients, so our practice turns out to be not ideal and highly biased.” [FT_1]*

Quotation 59: *“I often try to go with what’s written ... I put more weight on the balance in the papers...we often believe that who do intensive studies is always a little more right than those who don’t.” [FT_10]*

Quotation 60: *“And I think that we can be neither ‘8 nor 80’. Not everything that we find in the literature is effective and not everything that’s not studied isn’t effective. (...) ... imagine that I have 20 knee injury cases and I always establish the same exercise plan and, with that exercise plan, those 20 persons had good results. Although, perhaps, not all exercises are documented as useful, I can see that those*

exercises actually had an effect. We should try to make our practice evidence guided, but also not just rule ourselves by it. We always have to try to find alternatives.” [FT_9]

Quotation 61: “... I think that, often, the problem isn’t that the technique has results or not, but often it has to do with how we explain the technique. I’ll give you an example...it might be easier. Let’s assume a massage technique. An issue of manual therapy always achieves very small effect sizes. There are always huge doubts about the effects of manual therapy. But a few years ago, the way it was explained was based on purely biomechanical reasoning ... let’s ‘loosen a contracture’. Today, the explanation is in light of the neurophysiological effects. If I consider that to obtain certain neurophysiological effects, massage is a good therapeutic resource, then I use it. Despite knowing that some manual therapy techniques have no evidence, if it aligns with the effects I want, i.e., if that mechanical stimulus I need influences the patient’s nervous system, then I use it.” [FT_7]

Quotation 62: “I think the discussion between the academic and the working class is very important, because the studies must be guided by the daily clinical practice doubts and the daily clinical practice must be based by the recommendations of science.” [FT_1]

Quotation 63: “Sometimes more simplified studies are needed to help us in our daily practice ... more applicable relatively to treatments.” [FT_2]

Quotation 64: “Of course, sometimes combining the patient’s preferences with the best available evidence – if those preferences are subject to some beliefs, some prejudices or based on previous experiences – we have to choose a prior work on education, deconstruct some ideas that can be wrong, and try to show that, ‘ok’, the patient may prefer this, but we consider that in the light of what was our assessment the best solution is another one.” [FT_7]

Quotation 65: “Even we sometimes like and would like to apply certain things that we saw in a spectacular study and that we think will have a great result, many times people don’t want them, or often they are ‘standing back’. And we realize, even that we can apply it, it will not work in the same way ...” [FT_3]

Quotation 66: “I always use this parallelism. From the moment when a person comes to us, this will be a co-joint work. We both have to ‘row’ in the same direction, and we must always be aligned because what interests me is to be – and sorry for the expression – Cristiano Ronaldo in applying a certain technique, the best in the world to do that, if I haven’t the patient with me. In other words, I believe that it’s necessary to reach a consensus here.” [FT_7]

Quotation 67: “If I have a patient who needs, for example, TENS but doesn’t like it, then I will not apply it, because I think I will make it worst by applying it. (...) ... for example, I use electroacupuncture a lot...I think that it has interesting results. I have patients that, although I realize that they will feel better, but as they don’t like needles, the worst thing that I can apply to them. It increases their pain. So, in those patients, despite many studies show good results, I don’t use it.” [FT_10]

Quotation 68: "... there's often the idea that who works on the basis of evidence don't see the patient as a whole ... or ceases to be concerned with the relationship with the patient, seeing only numbers. I don't agree. Most of the evidence that exists shows that it's super important to create a therapeutic relationship ... an appropriate therapeutic alliance. Empathy – and the context – that's created is super important. Work in this way isn't going against what the evidence is, on the contrary." [FT_7]

Quotation 69: "However, the choice and decision about treatment must be shared with the patients. So it makes perfect sense if in evidence there's more than one option, that this is made known to the patient. And if the patient is properly informed, he/she will be able to have a shared view on the treatment." [FT_8]

Quotation 70: "We have to adjust our communication to the knowledge that the patient brings. (...) It's the PT's responsibility to adapt his/her language in order to make an assertive and positive communication with the patient." [FT_4]

Quotation 71: "And, on one hand, inform and correct the information he/she brings. It's obvious that, today, access to information is very easy for everyone. Currently, what any patient does with a problem, is going to the Internet and analyze everything that's written or, at least read (doesn't mean analyzing, but reading) what's written about his/her problem or similar problems in which then they cannot find the difference. And therefore, it's up to us, PTs, when we have this type of patients, to demystify the wrong information that they can bring, make an assertive communication, and inform and educate the patients about that situation, empower the patients with correct health information." [FT_4]

Quotation 72: "It's our role, as connoisseurs of science, to transmit what science says to them ..." [FT_1]

Quotation 73: "...because there's no patient adherence and this is a real barrier, especially when working with an older population that has many beliefs which, of course, aren't always as current or aren't always so ready for everything." [FT_3]

Quotation 74: "It's the PT's problem, because he/she has to be an excellent health communicator." [FT_4]

Quotation 75: "... then we have to see something, which is: 'The patient doesn't want to do it, why?'. This is the first step, to understand why: 'Is it because he/she had a negative experience with that technique or approach?'; 'Is it because he/she has a wrong idea about this approach?'. And then the work is done according to reason. Usually, in my first session this always happens: 'This is the best I have to offer, it will happen this way, we will try to make gains here and there, using these strategies. Do you agree with this approach?' I put everything 'in the table'. If the patient does not agree, in case it's possible to make some adaptations, without neglecting what's the rational reasoning that led me to decide like that, perfect! If we see that there's no agreement, of course, either I forward to a colleague who uses another technique that's preferred by the patient, or the ideal scenario is that we can actually reach a consensus. But above all, start by understanding what's the reason for the patient's positioning.

If it's a previous negative experience, if it's a wrong idea. First work on that part, or take care of that part, and then reach a therapeutic consensus." [FT_7]

Quotation 76: "... patients' preference 'ok', but in a way that's not harmful and I think even if we have to do a treatment that will be considered a placebo no matter how much the patient demands it, we should be as frontal as possible and say that the effects aren't that good..." [FT_1]

Quotation 77: "... what I normally do in these situations is to explain scientifically why this is a placebo but I say: 'Ok, I've no problem doing that' (as long as I think it won't do any harm) ... but I use it as a strategy to get into more active therapies that I know they work. So, 'yes, we do this, but we also do this and that'. And, generally, the patient ends up giving in. In the overall treatment, I always reinforce more active strategies and I try to empower the patient so that he/she, in face of what he/she thinks is good for him/her, also try other strategies and get him/her to have more control over his problem and not just depend on other placebo treatments that may, eventually, be addictive. (...) So, the placebo has results ... certainly it does ... but do that, do nothing, or do something else that we know that has no effect is often the same thing. If the patient believe that he/she will improve with that, he/she will actually improve...it's important to go according to the patient' expectations. So I think it's a way of gaining the patient's confidence and, from there, take him/her to what should be better ..." [FT_1]

Quotation 78: "But, for me, this is the most difficult! Dealing with the patient's expectations, when his/her expectations are completely different. But our role as educators comes in, because the PT isn't the 'applicator of techniques' and isn't just a 'caregiver'. The PT is also an educator." [FT_5]

Quotation 79:"... for example, doctors have the Hippocrates oath that says that they mustn't do anything that causes harm to patients ... and we, even if we don't have it, I think we should go that way." [FT_1]

Quotation 80:" First, and foremost, I try to explain. But if the patient wants to do it, what I have to think is whether it's or not contraindicated. If contraindicated, I don't do it and explain why I don't do it. I have the right not to do it." [FT_3]

Quotation 81: "We have to be beneficent, not maleficent, and fair. If the technique that the patient wants to do and believes in, will not be harmful to him/her ... I could allow the use of the placebo, and then move on to other strategies. Of course, without a doubt. I explain and inform the patient, but if he/she insists on doing that technique, he/she has to sign an informed consent. If I think it's not maleficent, if I think it can have some result (even if it's psychological), if I explain what it's all about, then I would do it if he insists on it. If maleficent, no, I don't do it." [FT_4]

Quotation 82:" It's logical that afterwards there are limits to everything. Patients' beliefs. Certain religions – I don't even know very well – but there are religions that don't allow blood transfusions. This is a patient's belief. It's logical, if the patient has a life-threatening problem, a brutal hemorrhage, if he doesn't take the blood transfusion he can die. The doctor has to make a decision ... even if the patient is unconscious. And, sometimes, it goes against the patient's expectations." [FT_5]

Quotation 83: "If I think it's not beneficial, I explain, show and prove why it's not beneficial or advised in that situation and, usually, I don't do it. If the patient insists, he/she has to sign an informed consent. (...) if the patient insists a lot, as long as he/she assume responsibility, I do it ..." [FT_10]

Quotation 84: "Q: Do you consider that you do an EBP in your professional context?
I try to do it whenever possible. I think that yes, I do, but it's still not ideal. But it's the best it can be right now." [FT_1]

Quotation 85: "We have an open space that's perfect to do exercises with most of the materials needed for exercising. We have cycle ergonomists, we have treadmills, we have good stretches. So I'm thinking in terms of treatment techniques, but we also have access to the internet to read things ... (...) there's no one to say: 'You can't go this way you have to go that way'. So, we are autonomous in our decisions. Most of the time, at least in musculoskeletal area, I get to do most of the treatments I idealized." [FT_8]

Quotation 86: "First of all, more knowledge on my behalf...everything globally, from evaluation, prognosis, interventions ... I think I still have a lot to learn." [FT_1]

Quotation 87: "I will assume my computer ignorance. Just for using Skype, I said: 'Oh my God! I never spoke on Skype!' (...) Twenty years ago, informatics weren't as evolved as nowadays. We didn't use the computer like now. And I have some difficulty in reaching some fields ..." [FT_6]

Quotation 88: "... if we see the published studies the PTs, and I assume my own blame, aren't as motivated as the nurses in making publications ... in doing studies ... it doesn't exist." [FT_10]

Quotation 89: "... I just can't do an EBP when I'm 'fixed' to a medical prescription. (...) ... I have already worked in a clinic with a medical prescription context, in which there was no flexibility on the part of the doctor to manage prescriptions together ... and then I was unable to manage the treatments properly." [FT_2]

Quotation 90: "Almost all. Regarding material, I think that sometimes I could have more of this or that – I even think that things are getting in the way – but overall I can't complain much. (...) Some weights and resistance bands are missing, which sometimes I feel that if I had them it would be a bit more helpful." [FT_1]

Quotation 91: "I don't have the right resources. It's almost like homework. In other words, all the studies I search are done at home. External to my working hours, on my personal computer." [FT_2]

Quotation 92: "... I wouldn't say that the conditions are absolutely ideal, but I wouldn't say that there's a lack of conditions either. So the basic things exist, some need renovation, others could exist, but there's no money for everything." [FT_3]

Quotation 93: "Q: So, lack of money it's not the reason why resources do not appear. Maybe it's because you never thought or suggested buy new products or materials. Is it?
I think so. If we show our institution, where I work, that it's really important, they buy it." [FT_6]

Quotation 94: "Because when we have imposed rules that don't let us ... let me see if I can explain ... the continuous care unit worked a lot with bureaucracy, bureaucracy, bureaucracy. The important thing was to have the papers in order, and not the patients' wellbeing, literally. (...) Because, firstly, it was the papers and, secondly, it was the patients." [FT_10]

Quotation 95: "... I don't really know why I found these three databases, but I know that I read it somewhere and pointed them out, but I confess ... I haven't explored them yet due to lack of time." [FT_6]

Quotation 96: "... I was responsible for a nursing home with 52 elderly persons plus a continuous care unit with 24 patients. It was too many patients for only one person. Especially at the nursing home...because in the nursing home there's a lot that could be done. And I wasn't able to do everything I wanted, due to lack of time." [FT_10]

Quotation 97: "Because patients often come with a slightly restricted mentality, even when they come from other institutions where it's heat, massage, and other elements and 'you're walking out from here'. And if we want to do something a little bit different, we can have a little bit of difficulties. But I think it's more in the first phase. After people get to know us, seeing that we actually have results, then they change their position a little bit. (...)

Q: So it's more related to ... for example, patients are more used to passive treatments and you try to apply more active therapies ...

Exactly, that's right. And until we definitely do it, it's a little bit difficult. But once we can change it, they can see that it has actually worked, it's much easier for us, I think." [FT_9]

Quotation 98: "Q: Do you think that in Portugal, Portuguese PTs do an EBP?

I don't think so. For what I see and talk with some colleagues, I think that probably, colleagues who actually do an EBP are still a minority. However, I think that, in recent years (mainly because of some changes and maybe even through dissemination), I notice a greater concern with these issues. So, this makes me hopeful on this issue." [FT_7]

Quotation 99: "I think most of the time they aren't even aware or don't want to know. So, they finish the bachelor's degree and from there they have 'fully access' to work according to what they know. Sometimes, it's not so much formal training, but a person try to keep up to date with what's there, and it's something that doesn't happen at all yet. At least in the vast majority of the cases I know. (...) The easy answer is: 'But I do it this way and it works and as long as the patient feels good' ... totally disrespect for science is the main reason. Because if a PT looks for how science works and perceives that it's his/her ethical obligation to provide what's properly proven to the patient and not exactly what I think is best. When the PT realizes this, he/she starts to come up with another clinical rational. I believe that the main reason is this, that a lot of people doesn't realize it and ends up saying: 'Oh no, but this has results and it's good ... they taught me this and the person feels much better and therefore I will do this' ..." [FT_1]

Quotation 100: "So, I think there are many PTs who have a hard time getting information. I think there are many PTs who don't really have a scientific literacy. I. e., it's difficult to read studies, it's difficult to

choose between good studies and less good studies, they fail to make an appraisal of what they read, and therefore, they also say that there's evidence for everything ..." [FT_8]

Quotation 101: "My other colleagues just don't do training, they don't read, they don't want to know, they still think that heat in an ankle sprain is the best thing in the world ..." [FT_10]

Quotation 102: "...on the other hand it's a matter of facilitism... 'What's it to do? TENS, US and heat?... ok, it's fine for me'. A person doesn't even have to think much, doesn't have to do a clinical rational... the diagnosis and intervention are already done, so just apply and get to the end of the day and earn the same. (...) ...there are many PTs who aren't at all concerned and do it in the easiest way (or seems best to them), not taking evidence into account. Because, in fact, working based on evidence is a hard task, it's necessary for a person to search, keep up to date, make an evaluation and have a clinical reasoning." [FT_1]

Quotation 103: "... there's often the PTs' laziness. It's easier to have a 'recipe' for everything and always apply the same way." [FT_7]

Quotation 104: "On the other hand, in physical therapy it's very easy to have results, or at least patients say they are better. And since there's neither a culture of evaluation and reassessment, the PTs end up being happy with their own practice. Then, the patients get better, but maybe it wasn't the direct result of the PT treatments ..." [FT_8]

Quotation 105: "One of them is a lot of misinformation and an inability to search in databases. This is what I see with my older colleagues. They don't know how to search, they don't know how to build a search phrase, they can't even create a search base. For example, in Pubmed 500,000 articles appear that have nothing to do with what the person is looking for. They don't even know how to close a search expression. Then, in older colleagues, what I feel, is that they have already tried the therapy 'a, b, c and d', and they know that, in cases of lower back pain it always goes well with that therapy and they can't extrapolate a little bit and see what's new, or what might be better ..." [FT_2]

Quotation 106: "... I can tell you that I have colleagues who graduated like me in 1987 and I never saw them in a congress. I assure you that I have been to many congresses, especially to the physical therapy national congresses I went to all ..." [FT_5]

Quotation 107: "... now there exists all these electronic databases and when I was studying, we still didn't have that much." [FT_6]

Quotation 108: "... I have to say that in my age group they aren't so concerned with training ..." [FT_7]

Quotation 109: "In older PTs, there's not exactly an appreciation of evidence and training and, therefore, people end up being demotivated. As they never saw the training being valued, they never update. It's not mandatory to do training and I think that makes anyone – who has other important areas in life – ending up disconnecting a little bit from the profession. Because, at least in the public sector, people continue to work regardless of their training or education level." [FT_8]

Quotation 110: "I think that 12 years ago, when I finished my bachelor degree, in schools EBP was not discussed a lot." [FT_10]

Quotation 111: "... PTs follow other professions, namely osteopathy, chinese traditional medicine, etc., which have very little evidence and which aren't even our profession, and therefore don't even make sense." [FT_1]

Quotation 112: "... I believe that – perhaps it's not just our profession – but it works a lot by the vogue interventions. In other words, there was a time when manual therapy took on a great preponderance (almost all training courses were in manual therapy). At this moment, we are turning a little more towards exercises. Therefore, I think it also has to do with the development and the changes that are happening in the profession." [FT_7]

Quotation 113: "I think that PTs in Portugal like a lot alternative therapies, especially in private practice, and I think it destroys a little the real appreciation that our profession should have." [FT_8]

Quotation 114: "... we are an emerging profession, with a few years in Portugal and as such, sometimes, we aren't recognized by the peers. (...) But this has to do with the threats that we create for other professions. These professions are the 'chiefs of the tribe' and are the 'sorcerers of the tribe', who don't want to be threatened ... they don't want to have their position on risk. So we've been having a hard time. Look what happened, not so long ago, with the creation of professional bodies. I don't know if you have an idea of this, but APFISIO is claiming the creation of an PTs profession body since 1999. How is it possible to be able to create the profession body 20 years later, when you had all the rights, all the requirements under the legislation? It's weird, 'right'?" [FT_5]

Quotation 115: "... but generally speaking in terms of society, the physical therapy idea is a little bit wrong. In other words, there's still a lot of connection to manual therapy, to massages and I believe that a large part of the population – perhaps less informed – is a little mistaken of what we do and what differentiates us." [FT_7]

Quotation 116: "I think we are still far from what we [PTs] and the profession could be and to the level that it could reach. I think that, for example, people still confuse us a lot with masseuses and that we only do massages. I. e., they think that this is just our work and not just a technique. (...) I think there are still many functions usurpations, particularly from the rehabilitation nurses." [FT_9]

Quotation 117: "For example, at the nursing home it went very well, because there was a nurse who thought that physical therapy was an interesting area, and we worked as a team. At the continuous care unit, this was no longer the case. Physical therapy was completely set aside. And when you work with nurses, as nurses want to do anything and everything, it ends up not being able to give truly importance to the profession. (...) ... at the continuous care unit, for about 7 years, I was the one who did all the respiratory physical therapy. After a certain moment, nurses started to do it. 'Why?' Because 3 [nurses] did a specialization in rehabilitation, and then they thought they could do everything." [FT_10]

Quotation 118: "... the PT is a movement specialist and works much more on quality of life than quantity of life. And that also limits us in terms of revindication rights capacity. (...) But while the most evolved

countries are already able to realize the importance of quality of life for the country's development, here in Portugal there's still some difficulty in realizing this." [FT_5]

Quotation 119: "... I think things are still very badly set up. Because primary health care at the moment isn't providing answers. There are almost no PTs in primary health care ..." [FT_8]

Quotation 120: "I left school 15 years ago and at that time the PT was more recognized than he/she is today. For example, monetary we were going through a better phase. (...) I think that more and more people are looking for physical therapy although, monetarily, we sometimes have to go through some more difficult phases." [FT_6]

Quotation 121: "... I would increase the PTs salary so they don't have multiple jobs, running around, not having time for anything and subjecting themselves to precarious working conditions." [FT_5]

Quotation 122: "But I also think that it's very difficult to produce good studies in our daily practice. Because it's very difficult to be able to comply with all parameters (treat patients and be able to give the treatments that patients are expecting to receive and are paying for), and still manage to find time to do a study." [FT_9]

Quotation 123: "Because, for example, it can't be required to PTs to do more training, to have an EBP, if they don't even know very well what an EBP is. There are PTs who think that EBP is merely reading articles. And it's not, as I explained earlier. If there exists training in this direction it would help." [FT_5]

Quotation 124: "... but I think that here in Portugal there are very few ways for us to update. Indeed, there are some interesting trainings, but many of the trainings bring us nothing based on the evidence. And I think that here, in Portugal, there's a lack of congresses/conferences where there's sharing of really good information." [FT_8]

Quotation 125: "... we also have to see that training isn't that cheap. And there may be PTs that don't have the financial capacity to participate on it ..." [FT_10]

Quotation 126: "... in clinics subsidized by the national health system, the PT is required to treat 10 patients per hour. This will have to be regulated ... this can't be happening. Also because there's no way to do an EBP." [FT_5]

Quotation 127: "As the system is assembled. The lack of the PT responsibility, in most clinics, regarding the expected results. The PT doesn't have to decide which strategy to apply. In the physical medicine and rehabilitation clinics, the system devalues the PT intellectual capacity, his decision making and in his concern with health outcomes and scientific evidence. There's, usually, a medical prescription and a strategy previously established. The PT doesn't think, he/she only executes the technique and, therefore, doesn't have to make decisions. By not having to make decisions in the intervention plan, he/she isn't concerned with scientific evidence." [FT_4]

Quotation 128: "... nowadays if we want to read an article, it has to be in English ... maybe in 10, 7 are in English." [FT_10]

Quotation 129: *“Probably schools also don’t go in this direction, which will lead to the fact that PTs later don’t appreciate it. (...) I don’t know if in schools, we neglect the importance of EBP, the importance of a certain posture and attitude in situations. I don’t know if it’s neglected. But somehow the message doesn’t get there. On the other hand, there is the reality of the new generations. They are different generations, and perhaps the way to reach them is that it hasn’t yet been discovered. (...) Probably schools aren’t getting there ...”* [FT_5]

Quotation 130: *“I think that schools – speaking of my bachelor school – I think it’s quite outdated regarding the contents. Because a person should leave school with the best evidence available and this often doesn’t happen.”* [FT_1]

Quotation 131: *“As an autonomous professional, without a doubt, it’s necessary to reinforce this information. It’s very important that people know it. Because we know, we fight for it, but then who contacts us doesn’t always know it and that’s important to communicate to the population. There’s a PT who is an independent professional, who can function as a first contact for your health, or as a second contact for your health and that professional will then stay in contact with the rest of the health team, namely the family doctor. In other words, autonomous but not isolated.”* [FT_4]

Quotation 132: *“The legislation allows PTs to make and develop their intervention without the need for a physiatrist’s prescription.”* [FT_5]

Quotation 133: *“Evaluate, evaluate, evaluate and register. (...) Never treat a patient without evaluating and recording everything you see. (...) So, I think that was the first thing I would do: implement mandatory registrations and mandatory assessment forms (more standardized it would maybe be easier).”* [FT_10]

Quotation 134: *“Not only an open discussion, but a written report should be mandatory, so that all patients who reach the PT have an entry report and an exit report. Not just verbal discussion. Verbal discussion is very important, so that the PT can discuss the clinical case with the physiatrist or with any other doctor. It’s essential. But more important than this discussion, is writing. Keep the written reports, what was the initial assessment, what was the moment of discharge from physical therapy ... what were the values obtained at the beginning and what were the values obtained at the end. Maintaining written information is essential, more important than oral [communication]. Because the oral [communication] is lost and doesn’t exist.”* [FT_4]

Quotation 135: *“... because the main resource for me, for an EBP, is time. It’s not impossible, but it’s much more difficult if a PT is treating many patients per hour. And having the opportunity, as I have, to treat one patient per hour, you can do a more EBP.”* [FT_1]

Quotation 136: *“Another thing that would be important is the physical therapy consultation. Physical therapy consultation should be instituted and mandatory. We must differentiate the consultation from the treatments. There should be an initial consultation, a reevaluation consultation, and a final consultation. It’s not possible to conceive a physical therapy patient consultation to be done at the same time as the treatment, and the treatment at the same time as the consultation, and then the discharge*

is made on the last day. It's not always planned that well. The system should change and the physical therapy consultation should be mandatory. Once a week. On Monday the physical therapy consultation, then on Tuesday, Wednesday and Thursday the treatments. And every two weeks the intervention plan is reviewed, or every week, according to the PT objectives. Imagine that we have muscle strengthening to do in 3 weeks, we will apply, we will reevaluate, and in 3 weeks we will evaluate the results of muscle strengthening to see if we have progressed, if we haven't progressed, or what we have done." [FT_4]

Quotation 137: "I think it would make a difference, a motivation from bosses, so that there's a constant update in terms of evidence. Whether by giving, for example, 10 minutes ... whatever ... during working hours for the PT to look for a study, or to clarify about any issue that arises from a patient, or some pathology. And in a certain way, sharing a scientific study between colleagues should be a constant thing. For example, in a team meeting there's a study sharing that came out, on some topic that's common to all." [FT_2]

Quotation 138: "I think that, if PTs were obliged and valued for training and for updating their academic degree, it would be very good. (...) There should be more incentive for training ... (...) At first, I wasn't exactly very well interpreted. I think I ended up winning a place by talking to my colleagues, saying why I did this why I didn't do it another way. And we started to have some important discussions, which I think helped a lot. Both for me to continue reading and keep updating, and for some of my colleagues that also want to know more. Right now, we have weekly meetings, where we talk about all patients, and the discussions end up helping a lot. Someone who has read something about a topic, or who knows more about one topic than others. It also helps the team a lot to keep us up to date. We also adopted a policy of when we have a new patient, we make a treatment plan with established goals and timing. In other words, we evaluate a patient who has this problem to be treated at this time, with the hope of trying to reach a certain goal. It help to better control the patients' admissions and release. (...) I think team discussion of cases is important. What I would like to see in my service. Do case studies, monthly, or have some work scheduled on patients, on new techniques, on new thinking, on certain areas, to also share to the team. And I think that in the service if there's more of this team dynamics, in the sense of doing the best job possible, this is encouraged, I think that people end up motivating themselves and also end up looking for more training and information." [FT_8]

Quotation 139: "... when there's some time between patients, what we sometimes try to do is, for example, searching in electronic databases that are a little bit simpler, such as Google Scholar (I don't like to use it so much, but for most people who don't find it very easy to search in electronic databases, such as Pubmed, it turns out to be a little bit easier). For example, 'about low back pain, this new article came out'. I have a 60-year-old colleague, who sometimes asks what's new – because he/she has always treated patients in the same way – and sometimes I send her the study. If I think it's a new article, and that I can thus influence his/her practice.

Q: And she accepts it well?

Yes, he/she accepts. But I think it's because of his/her personality. Like another colleague, around 40 years old, who has some difficulty and sometimes asks for help to build search expressions, when he/she has to find something. And I explain how it's done." [FT_2]

Quotation 140: "I will tell you how this will improve even more. First, a tutored practice in the early years of the profession. I never reflected on how many years, I don't know if it's two, if it's four, if it's five, but a real tutored practice. (...) The ideal would be for a newly licensed PT to be with a more experienced PT and to work with him/her (but this isn't always possible, I know very well ... I know the reality of our country very well). But do as psychologists do. They have a tutor and every week, or every 15 days, or every month, young clinical psychologists go to their tutor to present and discuss cases, situations and others." [FT_5]

Quotation 141: "They have to ask for help! PTs have to understand this! There's no problem! I'm not a temporomandibular expert, I never decided to invest time and money in temporomandibular. When two or three cases with temporomandibular appear, I send them to a specialist, a PT who only treats temporomandibular. PTs have to realize that we are taking care of patients! But anyway ..." [FT_5]

Quotation 142: "Q: How can we prepare a country for an EBP?

I think that as long as the PTs don't have an open mind to accept that we don't know everything and that we have to be in constant formation, we will not be able to achieve this. (...) ... there's one thing that I believe, that the students who are being trained at this moment, their way of EBP thinking is already different. And they already feel that we don't know everything and that we need to study." [FT_10]

Quotation 143: "You can only do an EBP! Any other type of practice isn't acceptable. Any practice other than an EBP can diminish our image. Physical therapy isn't quackery, it's not art ... it's science and, as such, only an EBP is acceptable. Any other type isn't acceptable." [FT_4]

Quotation 144: "... I think that working with an EBP is an excellent way of valuing it, compared to other health professions but also to the population. I think doing an EBP is important, and explaining and speaking the same language, and not talking so much about more esoteric things. (...) ... don't mix, with the same professional being involved in several areas ... some with little evidence." [FT_1]

Quotation 145: "PTs have to be the firsts to set an example, and positive results are undoubtedly the best way to value the profession ... (...) Therefore, what would be necessary is improving the physical therapy care. There are still many places where care doesn't correspond to what physical therapy is." [FT_3]

Quotation 146: "And then, if we see the studies, the PTs – and it's pointed also to me – aren't as motivated as the nurses, in making publications. (...) As long as it's not the PTs that have this type of attitude, and show: 'No! We are capable! We are going to publish, we are going to do studies.', the things will not change." [FT_10]

Quotation 147: "I think by specialization. For example, today I treated a lady who uses a dental device and the dentist who put the device on her found it strange that I say that headaches and neck pains may

come from the device adjustments. So, there are many areas that are still unknown and that we can and should explore.” [FT_6]

Quotation 148: “And even as some professions do, awareness actions on the street, television or radio advertising about the importance of physical therapy in general.” [FT_1]

Quotation 149: “I think that through a more intensive dissemination of the profession of our work and all of our areas to other health professionals and the general population. Because many people are unaware of the intervention areas that we have.” [FT_2]

Quotation 150: “At this point, in my opinion, an information campaign to the community about the value of physical therapy would be necessary. Advertising campaigns, clearly about: ‘What’s a PT?’, ‘What does he/she do?’, ‘Where can he/she be found?’, ‘How can you reach them?’. And really what’s it that can contribute to people’s health.” [FT_4]

Quotation 151: “How can we change? Well ... showing quality. In other words, doing an EBP.” [FT_7]

Quotation 152: “If the PTs earned more money in their workplace, working 7 or 8 hours a day, starting at 8 a.m. and leaving at 4 p.m., maybe, after 4 until 6 or until 7, they could have time to do other things. (...) That’s why I was telling you to give and create better working conditions ... earning more money isn’t for the PTs to be richer ... it has nothing to do with it. It’s for them not to need to work at 2 or 3 workplaces to have a minimally decent standard living ... not to be in a standard living for survival.” [FT_5]

Quotation 153: “It would most likely start at the base. I. e., I would be much more concerned with the way bachelors and masters degrees are taught. EBP should be promoted right from the beginning. Because it’s a matter of habit. If a person spend years doing the same thing, he/she gets used to do it that way. If you’re constantly encouraged to feed into knowledge, to enjoy searching, to enjoy seeing results and to understand why they happen, and to increase your knowledge, this has to be stimulated and taught right from the beginning. The habit has to be created, and of course, if we manage to change a little bit what the transmitted concepts are during the bachelor level, this will help a lot. Because we are going to train professionals with a different mind openness and a capacity for themselves, at some point, to feel the need to cultivate knowledge. That would be the first option for me.” [FT_7]

Quotation 154: “... another issue that I have already mentioned: the importance of schools in this attitude. I know that, at this moment, meetings are taking place between the physical therapy departments coordinators courses at national level in different schools to start finding a curriculum and a common practice in teaching physical therapy in different schools. I know they are doing that ... right now they are working on it. Hopefully, things will change.” [FT_5]

Quotation 155: “... also having professional bodies doesn’t mean anything. The professional bodies must work, work well and on the right path.” [FT_1]

Quotation 156: “It would also be important to pressure national, political and health organizations to attribute more competencies to PTs. Because, at the moment, we have a highly qualified profession,

but small competences are attributed at a professional level. It's obvious that it's necessary to have an assembled structure. We still have little political weight, but I believe now with the appearance of professional bodies, this can slightly reverse the weights of the balance and we can start being able to put a little more pressure on the institutions." [FT_4]

Quotation 157: *"... I now hope that with the PT professional bodies creation an important leap will take place."* [FT_5]

Quotation 158: *"I think that above all, in addition to the trainings that usually come up with the technique 'a, b, c and d', I think that it could exist – maybe for PTs who have graduated along time ago, in which evidence wasn't given so much importance – short trainings in order motivate people and teach them to search and to help modifying their practice. We also don't always manage to change people's beliefs, but at least we can change some knowledge that can help them. And I think that would make a difference in the clinical practice of PTs. Because I believe that younger PTs, who have been practicing for less years, it is easier, but for the older there's a lack of someone or a training that gives them some kind of basis."* [FT_2]

Quotation 159: *"The PTs professional bodies consider that it should be mandatory every 'X' years for PTs to show formal or informal training credits, verifying that the PT hasn't been stagnant. And this is important to us, it's important to the community and patients who really recognize our value."* [FT_4]

Quotation 160: *"I think it should exist an entity regulating the practice. Because, if there's nothing or nobody to regulate, everyone can do whatever he/she want. If there's someone, superior to us, who says: 'No! To maintain the quality of services, in order to be effective, at least as to be X time'. So, from then on, putting this rule to all of us, that people can also see the difference. (...) But the fact that we (as in other countries, for example, England), every 2 years have to take an exam or a test to validate our skills, as a PT. I think that if we, in order to be able to practice physical therapy, had to do that, we would more easily apply an EBP at work ..."* [FT_9]

Quotation 161: *"I hope that with the creation of the PT professional bodies we will have someone who says: 'No! This function is in this professional category.'"* [FT_10]

**Chapter 3.3 – Physical Therapists Choices, Views and
Agreements Regarding Non-Pharmacological and Non-Surgical
Interventions for Knee Osteoarthritis Patients: A Mix-Methods
Study**

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Physical Therapists Choices, Views and Agreements Regarding Non-Pharmacological and Non-Surgical Interventions for Knee Osteoarthritis Patients: A Mix-Methods Study

Abstract / Resumo

Objectives. Knee osteoarthritis is one of the most prevalent type of arthritis in today society. For managing it, health-care practitioners could choose among surgical and non-surgical interventions. Between the non-surgical options, the physical therapy related interventions are considered the first stage in managing these patients by the major of clinical practice guidelines. However, there are several interventions to choose from, some more evidence-based related than others. The choices and their related factors are still not fully understood in the Portuguese context. So, the aims of this study are to collect the most common non-pharmacological and non-surgical interventions used by the Portuguese physical therapists in their knee OA patients, and deeper understand the factors associated to their interventions choices.

Material and Methods. This study incorporated a mixed-methods design (quantitative and qualitative). In an attempt to ensure the correct population sample, a national professional association e-mail database and the e-mails of past students from national schools were requested. For the quantitative data it was choose an e-survey, with 25 close-end questions, retrieving sociodemographic and self-reported practice on knee osteoarthritis information. It was analyzed response frequencies and associations between variables with logistic regression analyses. For the qualitative data, it was choose to perform semi-structured interviews in purposefully selected physical therapists to include different sociodemographic factors (especially those found to be statistically significant in the logistic regression) and survey responses regarding the physical therapists' interventions chosen. After the interviews, the audios were collected, anonymized and verbatim transcribed, and the texts explored by the thematic approach.

Results and Conclusions. From the 277 physical therapists that shown interest in participating in the study, 120 fully completed the questionnaire and, from those, 10 participated in the interviews. In the Portuguese physical therapists context the most important interventions are Exercise (specially, Resistance Training), Manual Therapy, Nutrition/Weight Loss and Self-care/Education. Furthermore, it seems that physical therapists' individual characteristics (age, experience and clinical reasoning), patient's characteristics (clinical findings and preferences), and work related factors (facility type, work environment and available resources) are the main actors responsible for the use (or not) of an intervention.

Keywords / Palavras-chave

knee; osteoarthritis; physical therapy; non-pharmacologic; non-surgical;

Manuscript / Artigo

1 Introduction

Osteoarthritis (OA) is the most common form of arthritis and, from all joints, the knee OA is the most prevalent (1-6). Current knee OA rehabilitation strategy is a complex process, where it may be used surgical and non-surgical interventions (3, 7-12). There are several non-pharmacological and non-surgical interventions that can be used to manage knee OA patients, the majority physical therapy related (13-23). Despite being widely used to manage knee OA patients, physical therapy practice has been subjected to decades of criticism for its lack of research, and is often perceived as a profession that bases its practice largely on anecdotal evidence, using treatment techniques that have little scientific support (24). This was identified, as early as 1969, to be a significant issue for the physical therapy profession (25). Over the years, many efforts were made to increase physical therapy research (26) and to shift from the traditional models of practice (guided on the therapist tacit knowledge and opinion) to a more evidence-based practice (EBP) overtime (24, 27, 28).

So, the aims of this study are to collect the most common non-pharmacological and non-surgical interventions used by the Portuguese PTs in their knee OA patients, and deeper understand the factors associated to their interventions choices.

2 Material and Methods

This study incorporated a concurrent mixed-methods design (29-34) and followed the Ethical Principles of the Helsinki Declaration (2013) (35). Furthermore, it was approved by the Porto University Faculty of Sport ethics committee (CEFADE24-2019).

2.1 Sample

In an attempt to ensure the correct population sample, the national physical therapy professional association e-mail database was requested for the Portuguese PTs working class recruitment. Also, in an attempt to increase the number of enrolled participants, the e-mails of past students from all physical therapy national schools were requested.

2.2 Design – Quantitative

For the quantitative data, it was chosen to apply a self-administered e-survey. The e-survey was evaluated, designed, administered, conducted and collected according to established guidelines (36-39).

The e-survey was initially e-mailed as a formal e-mail with a cover letter containing a small study's information (background, justification and aims). The e-survey included 25 close-ended questions, divided in 2 main stages:

1. Sociodemographic information. From the sociodemographic information, the PTs could not proceed to the next e-survey stage if they (Table I):

2. Most frequently used non-pharmacological and non-surgical interventions applied in knee OA patients. The respondents were invited to rank by preference 5 non-pharmacological and non-surgical interventions for managing knee OA patients, from 31 available interventions options. The interventions options were achieved after a preliminary literature search. In order not to bias the PTs interventions choices, the interventions appeared in a random order, not repeating its order from e-survey to e-survey. For helping to contextualize, a knee OA clinical vignette was provided (translated to Portuguese from the Holden et al. (40) study).

Previously to sending the e-survey by e-mail, the e-survey was pre-tested by the authors and evaluated in its completion time, design, questions order, attractiveness, syntax, clarity, logic, correct question type and response format. Also, it was permitted to the respondents to review and change their answers. The sample size goal for this study was 373 responses, based in a 95% confidence level, a margin of error of 5% and a 50% response distribution (41). To ensure that the sample size goal was achieved, after two, four and six weeks respectively, a thank you note and a reminder containing the e-survey link was e-mailed.

2.3 Design – Qualitative

For the qualitative data collecting, it was chosen to apply semi-structured interviews with open-ended questions on the PTs. The interviews were conducted by 1 author, blinded to the PTs characteristics and prior questionnaire answers, using a videoconference software. Only audio-recorded was performed – excluding any face-to-face or written contact. There was no relationship between the interviewer and the PTs prior to the study, and the interviewees were recruited by completing the study previous stages. Following a review of questionnaire responses, the sample was purposefully selected to include different sociodemographic factors and interventions responses for knee OA patients. To ensure a high participation rate, after one, two and four weeks respectively, a thank you note, a reminder containing the interview objectives and a request to provide their most convenient dates/times for the interview, were e-mailed. The semi-structured interviews were performed according to Leech et al. (42) guidelines. The questions in the interview script were constructed according to Qu et al. (43), and properly validated by an expert panel. The interview script was tested on the first participant who, after the interview, was asked for feedback on the interview conduction, structure, design and phrasing of questions.

2.4 Data Analysis – Quantitative

Response frequencies were analyzed using Microsoft Excel and IBM SPSS 26.0 software.

After examining the response frequencies, the variables categories were collapsed. In the interventions choices, the “1st”, “2nd”, “3rd”, “4th” and “5th” were combined so that a 2-category response was obtained: “Present” (if the PT chooses 1st, 2nd, 3rd, 4th or 5th) or “Absent” (no intervention choice). Additionally, in sociodemographic data where subsamples were smaller, we collapsed categories in an effort to derive stable models. The Certificate and Baccalaureate degrees into the same category (Baccalaureate) – as in Portugal they are the minimum required professional entry-level – and our sample included only 1 PT who indicated a professional Post-Doctorate degree, so we included him/her with others PhD degrees. After item categories were collapsed, logistic regression analyses were conducted to examine the associations with the PTs’ characteristics. An alpha level of 0.05 was used to determine whether a model was to be reported. Odds ratios (OR) and their 95% confidence intervals (CIs) were determined for each level of the independent variables in those models that were significant (44).

2.5 Data Analysis – Qualitative

The data was analyzed with a Computer Assisted Qualitative Data Analysis Software, namely the NVivo v12 (45). The audios collected in the interviews were anonymized and verbatim transcribed. Then the texts were explored by 3 authors with the thematic approach (46). The original classification tree was analyzed and further discussed with an expert panel, where some categories were collapsed, eliminated or renamed. Quotations were identified to report the findings and illustrate the content, and were translated from Portuguese to English. To ensure complete and transparent data reporting, the methodology was conducted according to established guidelines (47-53).

3 Results

3.1 Quantitative

From the 227 PTs that shown interest in participating in the study, only 120 (52.9%) fully completed the questionnaire (Figure 1). The average time to complete the e-survey was 7 minutes. The descriptive statistics of the PTs personal and practice characteristics are presented in Table II.

The six most chosen interventions were Resistance Exercise (14.5%), Manual Therapy (14.3%), Nutrition/Weight Loss (13.7%), Self-care/Education (9.8%), Stretching (7.8%) and Aquatic Exercise (7.7%). The interventions medium chosen were Elastic Tape, Electrical Stimulation Therapies (Interferential Current [IFC], Neuromuscular Electrical Stimulation [NMES] and Transcutaneous Electrical Nerve Stimulation [TENS]), Aerobic Exercise, Balance Exercise, Thermal Agents, Ultrasound Therapy (US) and Walking Aids – all between 6.5 and 1.5%. The least chosen interventions were Non-elastic Tape, Braces, Complementary Therapies (Acupuncture, Electroacupuncture, Moxibustion, Tai Ji and Yoga), Vibration, Extracorporeal Shockwave Therapy, Insoles, Laser Therapy (High Level and Low Level), Magnetic Field Therapy – all below 1% – highlighting the Balneotherapy/Spa, Cupping Therapy and Leech Therapy

interventions, as they were not chosen by any PT (0%). Regarding the interventions ranking, Manual Therapy was the most chosen for 1st (30.8%), Resistance Exercise for 2nd and 3rd (20.8 and 19.2%, respectively), Nutrition Therapy/Weight Loss for 4th (15.8%) and tied with Aquatic Exercise for 5th (both with 14.2%). The descriptive statistics of the PT's interventions choices are presented in Table III and Figure 2.

Additionally, from the 93 intervention combinations found, the two most commonly used were: Balance Exercise + Manual Therapy + Nutrition/Weight Loss + Resistance Exercise + Self-care/Education; and Manual Therapy + Nutrition/Weight Loss + Resistance Exercise + Self-care/Education + Stretching (both combinations with 4.2%). Given the high heterogeneity of interventions used across different combinations, 67.5% were chosen only once (<1%) (Table IV).

From the 1200 interventions relations, the two interventions more strongly linked were Manual Therapy + Resistance Exercise (n=62; 5.2%), followed by Nutrition/Weight Loss + Resistance Exercise (n=59; 4.9%), Manual Therapy + Nutrition/Weight Loss (n=57; 4.8%), Resistance Exercise + Self-care/Education (n=46; 3.8%), Nutrition/Weight Loss + Self-care/Education (n=41; 3.4%), and Manual Therapy + Self-care/Education (n=40; 3.3%). In a note, 75 interventions relations were only found once. From the 28 interventions, the interventions more associated to others were Manual Therapy (n=25; 6.4%), followed by Nutrition/Weight Loss and Aquatic Exercise (n=24; 6.2%), Resistance Exercise (n=23; 5.9%), Stretching (n=22; 5.6%), and Self-care/Education (n=21; 5.4%). Figure 3 summarizes and illustrates the intervention interactions.

Regarding the statistically significant associations between PTs' characteristics and the most used knee OA interventions, Aerobic and Resistance Exercises were more likely to be chosen by the least experienced therapists, in comparison to more experienced PTs (OR 30.000 [95% CI: 3.337; 269.716] and OR 7.500 [95% CI: 1.469; 38.280]). Still in the Resistance Exercise intervention, the moderate experienced PTs (5-10 years) were 3.9 times more likely to choose it, in comparison to the most experienced therapists. The same pattern was found within the PTs age, where Resistance Exercise was less likely to be chosen by elderly therapists in comparison to their younger peers (20-29 years – OR 9.943 [95% CI: 2.629; 37.605]; 30-39 years – OR 4.898 [95% CI: 1.609; 14.911]; and 40-49 years – OR 9.429 [95% CI: 1.603; 55.447]). Additionally, Self-care was 3.1 times more likely to be chosen by PTs that belong to a professional practice-orientated organization, in comparison to those who do not belong to it. In contrast, PTs that participated in continuing education courses were 74% less likely to choose Balance Exercise, in comparison to other PTs that did not participate in continuing education courses. Additionally, Thermal agents were less likely to be chosen by baccalaureate and PTs that worked in a private sector, comparatively to their academic and doctorate peers (OR 0.077 [95% CI: 0.013; 0.467] and OR 0.108 [95% CI: 0.020; 0.599], respectively). Table V gathers a more detailed information.

3.2 Qualitative

From the 120 PTs that completed the e-survey only 67 (55.8%) volunteered for the interviews. From those, 23 PTs were selected, but only 10 responded to the emails. The participants' characteristics in the qualitative study are outlined in Table VI.

With the interviews the main themes identified were: Interventions (applied, eventually applied, and not applied); Intervention plan rational; Physical therapy sessions frequency; and Principal and secondary knee OA symptoms.

3.2.1 Interventions Applied

The stated applied interventions to manage knee OA patients were: Self-care/Education; Electrical Therapy; Exercise; Kinesio Tape (KT); Manual Therapy; Thermal Agents; US; and Vertical Bed. The PTs' choose to use these interventions because: (1) after the patient assessment, they are the interventions that best respond to the patients' signs and symptoms, as well as the treatment objectives created; (2) are in accordance to an EBP; and, (3) give priority to more active interventions (Quotations 1, 2 and 3).

In relation to Self-care/Education, it was performed with the aim of: (1) informing the patient about its condition, OA related issues and intervention plan; (2) ending OA related myths; (3) explaining how to manage their problems alone, including giving some home interventions that could help improving their condition; (4) promoting an healthy life style, such as weight loss; and, (5) during all treatments sessions, explaining how to perform the intervention properly and why they are doing it (Quotations 4, 5, 6, 7 and 8). As a note, a PT added that it is important to adapt the information to the patient's health literacy/academic qualifications, for him/her to receive and better understand the transmitted information (Quotation 9).

In the Electrical Therapy group, TENS, Iontophoresis, IFC and NMES were used. Except for NMES, all Electrical Therapy group interventions were applied to reduce pain (Quotations 10 and 11). Between the different analgesic techniques, their choices depended on: (1) what the interventions that health insurers companies contributed financially were; and, (2) which medical devices were present at the health care units (Quotations 12 and 13). Despite this, two PTs were against their use, since their benefits were limited and there is some evidence non-recommendation (Quotation 14). In other hand, NMES was the least stated intervention in this group and it was mainly used as a complementation of active exercises, or as an initiation stage for more debilitated patients (not able to perform active exercises) to gain some strength (Quotations 15 and 16).

Exercises were the most frequent intervention used for managing knee OA patients. The interventions stated in this group were: Aerobic exercises; Active mobilizations/Rage of Motion (ROM) gain/Stretching exercises; Resistance exercises; and Functional

training/exercises. From all, Resistance exercises were the most used, mainly because of OA progression characteristics (namely, strength loss). Within these exercises, the PTs preferred to start performing isometric exercises, only progressing to other contractions types and exercises after the patients reveal a good strength standard base (Quotation 17). Regarding the Aerobic exercises, they were performed to promote knee movement, reduce impacts, as well as maintain the physical condition, being then a form of preparation for more intense exercises (Quotation 18). With similar objectives were the Active mobilizations/ROM gain/Stretching exercises. The PTs used these exercises not only to increase (or at least maintain) a “normal” knee ROM, but also to decrease the muscular and articular tensions (Quotations 19, 20 and 21). Lastly, they also reported the use of Functional training/exercises. These exercises were applied to train the activities of daily life (such as, stand and sit, stability training and gait training), equipping/educating the patient with a range of strategies to reduce some daily constraints (Quotation 22). The intervention choices in the Exercise group depended, not only on the patients’ condition and the OA degree (such as, obesity, ROM limitation and knee inflammation), but most importantly pain. PTs evaluated their patients’ pain level and in which exercises the pain intensified more. The aim was always to do pain free exercises, giving to the patients a good movement experience and sensation (Quotation 23).

The use of KT was only indicated by 2 PTs. In both cases, although it was used by them, none considered it to be a core intervention. The intervention was considered as complementary. Additionally, in both situations, they were somewhat reticent and septic about its clinical efficacy. The main reason for this mistrust was due to the results found in evidence, which often discredited its use and deconstructed some efficacy related-myths. Nevertheless, its use was mainly for pain relief and knee biomechanical corrections (Quotations 24 and 25).

Likewise Exercise, Manual Therapy was one of the most intervention groups mentioned and used by the PTs. Within this group, the most common interventions applied were: Massage; Passive mobilizations; and, Soft tissues mobilization/manipulation techniques (Quotations 26 and 27). Additionally, Maitland and Mulligan techniques were also referred in this group, however just one PT confirmed their use (Quotation 28). The overall objectives of these interventions were soft tissue relaxation (harmonize muscular tensions, stabilize muscular tonus and release soft tissues), drainage, pain decrease and ROM improvement (Quotation 29). Nevertheless, one PT did not recommend the use of Massage on these patients, because it will not offer any of the overall intended benefits, which are providing mobility and functionality (Quotation 30). Additionally, another PT do not recommend the use of Passive mobilization. He/She preferred to spend most of the time doing more active interventions (Quotation 31).

Although the PTs use Thermal Agents, this intervention group was far from gathering consensus. In this group, the two interventions stated were Heat and Ice. All PTs considered Thermal Agents to be a complementary intervention. In fact, most of them just use it because the patient asks for it (Quotation 32). Their use depended on the patient’s condition, nonetheless the aim was to decrease pain (Heat and Ice), promote muscular relaxation (Heat)

and reduce the inflammatory process (Ice) (Quotations 33, 34 and 35). Despite these advantages, some PTs did not recommend their use. For the Heat interventions, they did not use them because it could increase the knee inflammation process (Quotation 36). Regarding the Ice interventions, the PTs said that it could increase some of the patients' signs and symptoms (Quotation 37).

Likewise, US were used by the PTs, however there was some reluctance in its use. In fact, some stated that they only use it because they have to follow the medical prescription (Quotation 38). The main objective was pain reduction (Quotation 39).

Vertical Bed use was only stated by one PT. The intention of its use is for lower limb stretching, load stimulus and imposing knee extension. This could be important for patients who cannot perform exercises or have an excessive knee flexion (Quotation 40).

3.2.2 Interventions Eventually Applied

Still, some interventions were mentioned as interventions that could be applied in very specific situations or could eventually be included in future intervention plans. Those interventions were: Acupuncture; Aquatic exercises; McConnell Tape; Tai Ji; and Yoga (Quotations 41, 42 and 43).

The inclusion of these interventions was highly dependent on: (1) the intervention cannot harm the patient; (2) previously, the patient needs to have a good intervention experience; (3) interventions need to have some evidence support; (4) in the absence of results from more evidence-based interventions, PTs could try these interventions; (5) has to be recommended by colleagues; (6) PTs have to do prior intervention training; and, (7) the intervention effects and objectives rationale must be plausible and appropriate (Quotations 44, 45, 46 and 47).

3.2.3 Interventions Not Applied

As it can be deduced, there was no consensus on the ideal intervention plan for these patients. Some interventions chosen by one PT could be rejected by another PT and vice-versa. In addition to the aforementioned interventions (such as, Electrical Therapy, Passive Mobilization, Thermal Agents and US), the PTs also mentioned Cupping Therapy, Laser Therapy, Magnetotherapy, Manipulation, Myocrochetage, Radiofrequency Therapy, Shockwave Therapy (Quotations 48, 49, 50 and 51).

In addition to the already mentioned reasons in the previous section, the PTs did not use or stopped using because they: (1) are not evidence-based; (2) do not bring enough benefits to

the patient; (3) are not a priority; and, (4) the PTs are septic in believing that the clinical results are a consequence of their use (Quotations 52, 53, 54 and 55).

Although these therapies are not widely used by PTs, some still used them because: (1) they are placebo and do not harm the patient; (2) the patient asks for it; and (3) there is a medical prescription and an obligation to perform them (Quotations 56 and 57). Nevertheless, sometimes it is important to use some of these interventions as they could work as an “open door” to other interventions. As the PT gives in on these less evidence-based interventions desired by the patient, the patient-PT confidence rise and then he/she can negotiate with the patient with other more evidence-based interventions, integrating them into the treatment plan and making more effective sessions.

3.2.4 Other

The PTs reported that, whenever possible, they used an EBP to define the knee OA patients' intervention plan. So, to accomplish it, they have to rely on the information gathered in the evidence, do a proper patients' clinical signs and symptoms evaluation, integrate the patient's preferences, collect the patients' socioeconomic status information and co-morbidities, listen to the patient's main issues and goals, and delimit by their clinical experience what are the most mastered interventions (Quotations 58 and 59). However, it was also not uncommon to find that many of them feel more limited in their practice because they have to follow the physiatrist's intervention plan prescription (Quotation 60 and 61).

Regardless of how the intervention plans are designed, to combine and order the various interventions during the treatment session, the rationale will depend on the effects that the PT defines for each intervention. Usually, to order the treatment plan interventions the previous intervention, in addition to have a specific effect, will also help in carrying out the succeeding interventions. For example, a PT referred that in addition to the effect of reducing stiffness and muscle tension (which itself can be beneficial for the patient), the use of Heat as a first intervention can facilitate the performance of other techniques, such as Massage and afterwards Exercises (Quotation 62).

Interventions are applied (more often) 2 to 3 times per week (Quotation 63). However, there are still patients who are treated daily (Quotation 64). The number of sessions applied depends on the workplace and the treatment session “recovery” (patients' signs and symptoms easing) (Quotations 65 and 66). Nevertheless, with the patients' clinical state evolving positively, treatments sessions could be once per week or twice per month, until patients are discharged and be self-sufficient in managing their difficulties (Quotation 67).

As showed, the patient's signs and symptoms have a very important role in both treatment plan interventions selection, and the treatment sessions per week decision and progression.

There are several signs and symptoms related with OA stated by the PTs (Quotations 68, 69 and 70). The most important OA sign and symptom was knee pain, followed by activities of daily living limitations, lower limb muscular weakness and knee ROM limitations. By far, knee pain was the most important OA sign and symptom (referred 58 times in the PTs discourses) (Quotation 71). Although PTs believe that many of the signs and symptoms are related to pain, they also point out that most of the times, in a superficial analysis, pain may seem as the main patient problem, but when doing a deeper analysis to the patient's speech at the anamnesis, his/her real problem is not being able to perform his/her activities of daily living (Quotations 72, 73, and 74). Therefore, while they still consider pain as the main sign and symptom, the importance given to activities of daily living limitations should be reviewed.

As a form of summary, the PTs found it essential to reinforce that: (1) physical therapy interventions are vital to manage knee OA patients; (2) there are still few PTs in the primary health care, which can be fundamental in managing knee OA progression; and, (3) it is necessary to change the national health system, giving to the PTs more competence and autonomy (Quotation 75).

The summary of the qualitative results are described in the Figure 4.

4 Discussion

In the present Portuguese context and after all the data gathering, the most important interventions to manage knee OA patients are: Exercise, Manual Therapy, Nutrition/Weight Loss, and Self-care/Education.

4.1 Exercise

In the Exercise group, the most important interventions were: Aquatic exercises, Balance exercises, Resistance exercises and Stretching.

From those, more emphasis needs to be given to Resistance exercises. Resistance exercises was the most chosen intervention in Exercise group (73%), being in 2nd and 3rd place in the general level of importance. This was also found in other countries (40, 54). The PTs used it mainly because in knee OA it is expected that patients lose strength progressively (55, 56). This strength loss may influence not only pain level, but also the patients' biomechanics, function, ROM limitations, quality of life, and activities of daily living (56-64). This intervention is highly recommended by evidence for this population (A), being referred in several studies as a "core intervention" for most of the clinical outcomes (55, 57, 59, 61, 63-74).

The second most important intervention in the Exercise group was Stretching (39%). A similar importance was already reported by United Kingdom (UK) PTs (40). Stretching exercises are generally associated in the literature with Resistance exercises, as these interventions combined show more clinical importance than Stretching alone (55, 70). Based in the PTs clinical experience, Stretching may help to relieve muscular tension, and maintain knee ROM and function. Likewise Stretching, Balance exercises was important to the Portuguese (33%) and UK (40) PTs. However, its use should also be integrated in the Resistance exercises and individualized according to the patient clinical evaluation (55, 59, 65-68). So, when a patient has muscular weakness and proprioceptive deficits (which can alter balance and postural control), Balance exercises should be integrated in the intervention plan (75). This proper patient clinical evaluation importance was further shown in the qualitative and quantitative data, as Balance and Stretching were the only differences in the two most common interventions plans used.

Despite Resistance exercises are easy to perform, safe, effective and do not increase the OA progression (76), the PTs explored other exercises options. One of the most referred was Aquatic exercises (18%), scoring the 5th place in the general importance level. UK and United States of America PTs also found it important to incorporate them in knee OA patients' management (14, 40, 77). Although evidence support, Aquatic exercises use can be conditioned (59, 61, 64-66, 68, 69, 78). Despite often encompasses aspects of aerobic fitness exercises and exercises for enhancing joint ROM, in a low-impact environment (66, 68, 79), the reasons for this conditioning is (65): accessibility issues; risk of accidental injury (fall or skin problems); financial burden; poor patients or PTs adhesion. But, as in recent systematic reviews non-differences were found between land-based and Aquatic exercises, it could be a good alternative for more "fragile" and reluctant patients (78, 79).

Although all patients should be advised to perform exercises to improve both physical and psychological outcomes, they should be patient appropriate (59, 61, 73, 80-82). As confirmed in the qualitative data, the exercises movements should be pain free and should respond to the patients' preferences and clinical findings. So, firstly, preliminary pain relief interventions can be used to allow pain free exercises practice, secondly, patients' exercises preferences and pain tolerance should be addressed and, thirdly, the exercises should be adapted and adjusted to their individual physical, physiological, social and emotional characteristics, kinesiophobia, co-morbidities, and other clinical findings. All this will ensure a better exercises plan adhesion and participation (57, 66, 73, 80-84).

4.2 Manual Therapy

Although a substantial decrease in its use was found compared to previous Portuguese studies (85, 86), Manual Therapy was still the most important intervention for the Portuguese PTs. In fact, 31% of the PTs chose it in 1st place. This importance may be explained by: (1) Therapy related factors; and (2) Profession related factors.

Manual Therapy is a very versatile intervention, has a highly interventions variation, and could be easily combined with other interventions in the PT daily practice (for example, in our study 25 interactions were found in a 28 interventions sample) (23, 87). As referred by the PTs (and confirmed in the literature (88)), the most used interventions in this group were massage, passive mobilizations, and soft tissues mobilization/manipulation techniques. Although different clinical results are expected according to the chosen intervention, their application were conditioned by the patients' signs and symptoms, clinical findings and other co-morbidities (89). Nevertheless, for the Portuguese PT context, the overall objectives were soft tissue relaxation, drainage, pain decrease and ROM improvement. Additionally, Manual Therapy interventions are generally economic and secure (23, 64, 66, 90-94), and the patients, even if the Manual Therapy is considered placebo, feel more comfortable and more enthusiastic if there is a direct contact between PT-patient (23, 94, 95). So, psychological and human behavior influences may play a role in this intervention (89, 96, 97). Even, as referred by the PTs in the qualitative data, some patients prefer to have an all-passive intervention plan, as active interventions could demand too much physical effort. Unfortunately, this is found in other countries where the patients seek for an ultimate "cure" (98).

In addition to the factors explained, Manual Therapy is one of the oldest interventions, and has been used all over the world since ancient times (90). Furthermore, for many years, physical therapy treatments were based (almost exclusively) in Manual Therapy, distinguish it from other health professions (87, 94, 95, 97, 99). Moreover, the hand/fingers/palpation is still widely to access soft tissues texture abnormalities or musculoskeletal dysfunctions, and feeling thickness, swelling, or tightness (94, 95, 97). Additionally, touch can be used as a non-verbal communication in the PT-patient interaction (94). Furthermore, in Portugal the physical therapy symbol is a hand, so unintentionally could influence the PTs to use it more. Moreover, although there was not possible to know it in the Portuguese context, in several physical therapies schools worldwide Manual Therapy still plays an important role in the academic curriculums (95, 97, 99). For example, in a study with English and Australian PTs it was found that the main reason for using massage is due to initial training (100). So, this could be a "cycle hard to break".

Despite being widely used by Portuguese PTs, there is still evidence non-agreement in its use as some conditionally recommend (23, 55, 57, 67, 69) and others do not recommend or recommend against (62, 64-66). Although there was found evidence in pain reduction, and physical performance and function improvements in knee OA patients (88-90, 101), the main reasons for this uncertainty are (23, 55, 57, 89, 97, 102): lack of expertise of the healthcare professional (knowledge and skills); there is no complete evidence-based support; difficulty in blind treatment providers and study participants; more than one treatment provider in the studies; and heterogeneity in the studies' intervention application (technique, force, amplitude, rate, repetition and duration). Other explanations may include (103): natural history of disease; regression to the mean; placebo effect; and patient usual behavior change (Hawthorne effect). Even in our PT sample, there is no agreement in its use, as some PTs thought that Manual Therapies techniques can be too passive and do not provide the desired effects. So, it is recommended whenever possible to combine Manual Therapy with Exercise

and avoid an exclusively Manual Therapy isolated intervention plan (55, 66, 67). This was further confirmed in the quantitative data where the two most strongly linked interventions were Manual Therapy and Resistance Exercise. More studies are required to clarify the importance of Manual Therapy in the knee OA management.

4.3 Nutrition/Weight Loss

Although not often associated to the physical therapy profession, Nutrition/Weight Loss was considered important by the PTs (14%). This choice may be a response to a common knee OA patient characteristic, obesity (57, 68). Weight loss can be achieved by nutritional monitoring and/or exercises (59, 61, 68, 104, 105). Despite being nutritionists professional related and that may arise a lack of PTs' confidence in providing specific orientations, PTs may also help in the nutritional monitoring by educating the knee OA patients in having a healthy life style and changing some unhealthy alimentary habits (91). Nevertheless, as exercises are more PT profession related, many PTs feel more comfortable to mention and advise exercise than weight lose through nutrition or diet (106). Besides Resistance exercises, PTs could also use Aerobic and/or Aquatic exercises. They are all considered to be highly evidence supported (A) (57, 59, 65, 66, 69, 72, 74, 107) and, as showed in the qualitative data, their choice will depend on: patients' preferences, adhesion and individual characteristics; clinical findings and patients' co-morbidities; signs and symptoms types and severity; and workplace and PT's characteristics.

4.4 Self-care/Education

In relation to Self-care/Education, this intervention achieved mixed results. Although in the quantitative data it is not the most chosen intervention, in the qualitative data PTs considered it as the most important. One reason for this discrepancy is that PTs considered it as a mandatory intervention and should be present in all patients "since day 1". In fact, although not often prescribed, PTs naturally performed it. As so, many of the PTs could not choose it in our e-survey, as they almost see it as a moral duty and not so much as an intervention. Nevertheless, this intervention was integrated in the 4th most chosen interventions combination, being easily associated with other interventions (21 interactions in a 28 interventions sample), and used in all signs and symptoms approached. To proper perform it, it is important to adapt the information to the patients' health literacy and provide different information supports (oral and written) (61, 108). If the PT do not adapt the information to the patient's health literacy or provide it in just one way, the information transmitted could be lost or misunderstood. To ensure that the patient truly understand the information given, a simple test could be performed, the so-called "Kieran O'Sullivan test". This test suggests that the PT should ask the patients to describe how they will explain the information given to their family (or significant other) when they come back to home. Evidence highly recommends its use in these patients (A) (57, 59, 61, 64-66, 69, 71, 72, 74), since practitioners should continually provide their patients with necessary information about: OA disease progression; knee anatomy; pathophysiology; joint protection; home exercises and self-care techniques; and overall lifestyle changes. The objective is to promote hope, optimism, and a positive expectation of the benefits of the intervention plan (57, 59, 61, 64, 65, 72, 83, 108). Furthermore, during PT-patient communication, PTs should avoid using "wear and tear", "it's

your age”, “nothing can be done for you”, or “give up” expressions, as they could result in negative feelings in the patients regarding the intervention plan and the OA progression (109).

4.5 Other

As shown, other interventions were applied due to personal, patient and work related factors. Similar factors were found in other countries and health care professions, showing that they could condition the interventions choice (100, 110, 111).

In the personal factors, PTs’ age and experience may have an important role in the intervention plan design. In our study, Exercise modalities were more chosen in young and less experienced PTs. This may be explained by evidence access and given importance (112). Younger PTs could be more technologically advanced and could access evidence quicker compared to their older peers. Furthermore, in their intervention plan rational, they cannot balance evidence and clinical experience equally, as they have experience deficits. In other hand, older and more experienced Portuguese PTs may have less ability to reach evidence and tend to follow more their clinical experience (86). In fact, it is expected that only half of the PTs use databases to aid in clinical decision-making (112). Additionally, personal doubts about evidence and treatment effectiveness may also exist (110). Explanation for this may include (112, 113): poor quality evidence; contradictory clinical practice guidelines (CPGs) s recommendations; poor quality in the information transmission; PTs inability to understand statistical data; lack of skills in searching and critically appraise evidence; lack of data generalization for the patient; and not enough explored OA factors, such as economic aspects of recommendations or the patients’ co-morbidities influence. Facilitators may include (113, 114): regular clinical cases and evidence peers discussion; higher quality studies; CPGs concordance; better information reaching with an user-friendly format; CPGs should become patient-focused rather than disease-driven. Academic degree, belonging to a practice-oriented organization, and participate in continuing educational courses may also influence the Portuguese PT practice, however further studies are needed to understand their true importance.

Patient was a central piece on the decision-making process puzzle. Almost all PTs reported that the interventions choice was from the patients’ signs and symptoms, co-morbidities, and other clinical findings (such as pain, ROM limitations, muscular weakness, and activities of daily living restrictions). There were similar to evidence-reported most important factors (19, 20, 115-117). As the interventions are applied in the patients, the PTs also though that their preferences have an important role. Nevertheless, in a deeper analysis, the PTs used it in their clinical-making intervention plan more as a way to decide between two equal effective interventions, or as “bargaining chip” to introduce more evidence-based interventions. Therefore, a better PT-patient communication and interaction is mandatory, as well as more importance needs to be given to their preferences, providing them with a more active participation in the intervention plan decision (19, 98, 118). Patients are often septic and pessimist about interventions and OA progression (82, 118). So, other factors may also be

important to increase the knee OA patients' optimism, satisfaction and security, such as (98, 118): good PT accessibility, deviation, convention, prioritizing therapeutic over financial consideration; PT competence; feeling that their opinions and preferences are taken into account; and their intervention plan is individualized.

The structure of the system in which PTs worked influenced their knee OA treatment approach. In this factor, two main issues raised, money and time. As in Portugal the salaries are low and the PTs services are considered as cheap, sometimes the PTs have to give in to the patients demands (even if the PT do not agree with the intervention efficacy) as they could lose a client and consequently money (since most of the small health care units are client-financially dependent). In other hand, there are bigger health care units that are stated-financially dependent, so many times the PTs have to do what is medically prescribed and stated funded. In fact, 88-90% of the Portuguese knee OA patients reach physical therapy after general practitioners consultation and prescription (85, 86). Lack of money could also result in a lack of resources (such as, technological clinical equipment or computers), influencing the interventions choice (112). Similar to what was found in other studies (112), time was one of the most work-related barrier. In our study, the PTs needed time to evaluate, review and treat patients, and for extra work activities such as evidence or skills improvements. Comparable concepts were found in UK PTs (73).

Also, the workplace environment could be a barrier (112). One of the most important barrier to the Portuguese PTs is that in the workplace it is not given enough importance if they do (or not) an EBP (86). Other barriers found in the literature include (112): lack of support from employer; and colleagues not favorable to EBP.

5 Conclusion

In conclusion, for the Portuguese PTs context the most important interventions are Exercise (specially, Resistance Training), Manual Therapy, Nutrition/Weight Loss and Self-care/Education. PTs individual characteristics (age, experience and clinical reasoning), patient's characteristics (clinical findings and preferences), and work related factors (facility type, work environment and available resources) are the main actors responsible for the use (or not) of an intervention.

6 Limitations

One limitation of this study was the number of valid questionnaires. The 373 sample size goal was not reached. Therefore, the results could not truly represent the Portuguese PTs practice. Another limitation was found in the qualitative data, where the instruments used in the patients evaluation and follow-up were not fully explored and understood.

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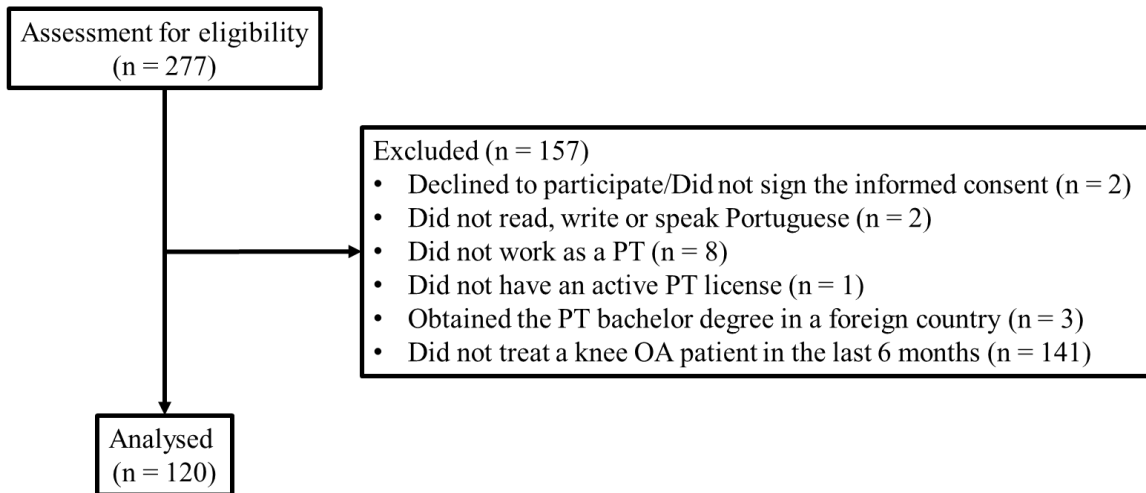
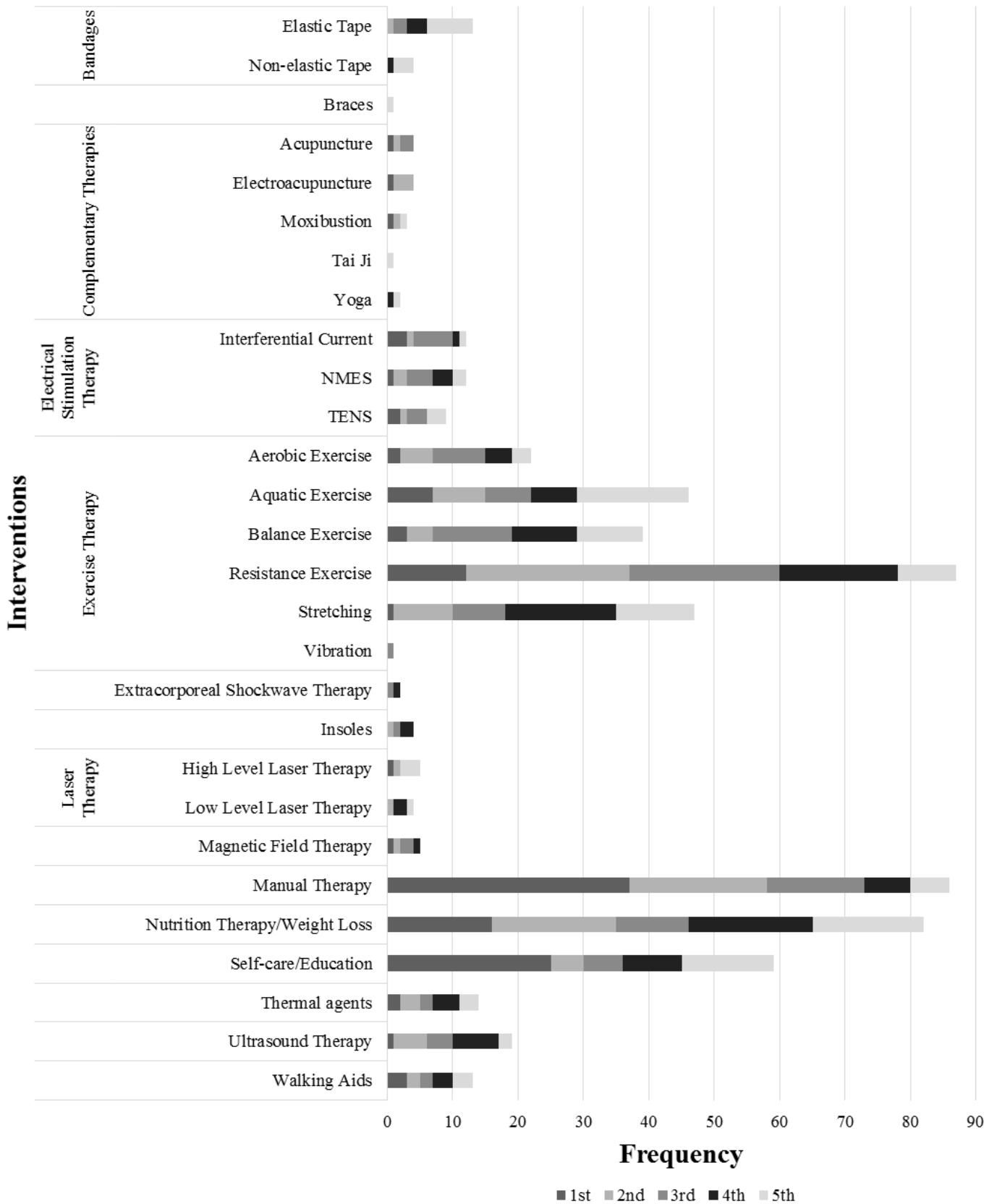


Figure 1 – Questionnaire Participation and Completion



Abbreviations: NMES – Neuromuscular Electrical Stimulation; TENS – Transcutaneous Electrical Nerve Stimulation.
Note: As Balneotherapy/Spa, Cupping Therapy and Leech Therapy interventions were not chosen by the PTs, they are not displayed.

Figure 2 – PT’s Interventions Choices



Figure 3 – Interventions interactions.

The line represents an interaction between two interventions. Its thickness is proportional to the interventions pairs frequency.

The dot represents an intervention. Its size is proportional to the number of interventions links.

Abbreviations: HLLT – High Level Laser Therapy; LLLT – Low Level Laser Therapy; NMES – Neuromuscular Electrical Stimulation; TENS – Transcutaneous Electrical Nerve Stimulation.

Note: In interventions pairs representing less than 1% it was applied transparency in the line.

INTERVENTION PLAN RATIONAL

PTS' INDIVIDUAL RATIONAL

- Best evidence available
- Patients' socioeconomic status, preferences, and individual issues and goals
- Clinical findings (patients' signal and symptoms), experience, and PT's most master interventions

FREE EBP

WORK, ECONOMIC, AND PATIENT-PT RELATION

- Physiatrist prescription
- Intervention subsidized financially
- Medical devices present at the health care unit
- Patient/Client demand

LIMITED

WHY / CONDITIONS

APPLIED INTERVENTIONS

ADL limitations	Education; Exercises
Crepitus	Education
Instability	Education; Exercises
Limp	Education; Exercises; KT
Muscular alterations	Education; Electrical Therapy; Exercises; Manual Therapy; Thermal Agents; Vertical Bed
Pain	Education; Electrical Therapy; KT; Manual Therapy; Thermal Agents; US
ROM limitations	Education; Exercises; Manual Therapy; Vertical Bed
Sensibility changes	Education; Electrical Therapy
Stiffness	Education; Exercises
Swelling	Education; Manual Therapy; Thermal Agents

THE SEVERITY WILL DEFINE THE INTERVENTIONS APPLIED AND THE SESSIONS FREQUENCY

THE INTERVENTIONS ORDER WILL DEPEND ON THEIR INDIVIDUAL EFFECT

IN CERTAIN CONDITIONS THEY WERE APPLIED,

EVENTUALLY APPLIED INTERVENTIONS

WHY / CONDITIONS

- Cannot harm the patient
- Patient need to have a previous pleasantly intervention experience
- Need to have some physiological and evidence support
- Absence of results from more evidence-based interventions
- Need to have peer recommendation
- PT need to have previous intervention training
- Is appropriated to the intervention plan overall goals

IN CERTAIN CONDITIONS THEY WERE APPLIED,

NOT APPLIED INTERVENTIONS

WHY / CONDITIONS

- Demand too much time applying it
- Are too passive
- Are placebo or their effects could harm the patient
- Are not clinical important or only have short-term effects
- The PTs are septic about their true results

KNEE OA PATIENT MANAGEMENT

Figure 4 – Qualitative data summary and conceptual framework of factors that influence knee OA patient management.

Abbreviations: ADL – Activities of Daily Living; US – Ultrasound Therapy; KT – Kinesio Tape.

Table I – Inclusion and Exclusion criteria

<u>Inclusion</u>	<u>Exclusion</u>
have an active physical therapy license;	do not have an active physical therapy license or have another profession than PT;
obtained at least the physical therapy bachelor degree;	obtained the physical therapy bachelor degree in a foreign country;
work or have worked as a PT in the past 6 months in Portugal;	do not work in Portugal;
be able to read, write and speak Portuguese.	do not be able to read, write or speak Portuguese; be a physical therapy bachelor student.

Table II – PTs Personal and Practice Characteristics

Characteristic	Frequency (%)	Characteristic	Frequency (%)
<i>Sex</i>		<i>Working Hours per Week</i>	
Male	36 (30%)	20-30	18 (15%)
Female	84 (70%)	31-40	44 (36.7%)
<i>Age Groups</i>		> 40	58 (48.3%)
20-29 years	34 (28.3%)	<i>Patients per Day</i>	
30-39 years	54 (45%)	1-5	13 (10.8%)
40-49 years	13 (10.8%)	6-10	39 (32.5%)
≥ 50 years	19 (15.8%)	11-15	30 (25%)
<i>Valid License</i>		> 15	38 (31.7%)
< 5 years	18 (15%)	<i>Number of PTs in the Facility</i>	
5-10 years	41 (34.2%)	0	23 (19.2%)
11-15 years	30 (25%)	1-5	56 (46.7%)
> 15 years	31 (25.8%)	6-10	21 (17.5%)
<i>Degree</i>		11-15	9 (7.5%)
Certificate	3 (2.5%)	> 15	11 (9.2%)
Baccalaureate	81 (67.5%)	<i>Percentage of Total Work Time in:</i>	
Master	30 (25%)	<i>Patient Care</i>	
Doctorate	5 (4.2%)	5-25%	5 (4.2%)
Post-doctorate	1 (0.8%)	30-50%	12 (10%)
<i>Pursue a Higher Academic Degree</i>		55-75 %	32 (26.7%)
Yes	80 (66.7%)	80-100 %	71 (59.2%)
No	16 (13.3%)	<i>Researcher</i>	
Do Not Know	24 (20%)	0%	55 (45.8%)
<i>Participate in Continuing Education</i>		5-25%	53 (44.2%)
Yes	172 (89.1%)	30-50%	10 (8.3%)
No	21 (10.9%)	55-75%	2 (1.7%)
<i>Belong to a Practice-oriented Organization</i>		<i>Teacher</i>	
Yes	107 (89.2%)	0%	74 (61.7%)
No	13 (10.8%)	5-25%	28 (23.3%)
<i>Instructor</i>		30-50%	9 (7.5%)
Yes	59 (49.2%)	55-75 %	6 (5%)
No	61 (50.8%)	80-100 %	3 (2.5%)
<i>Certificate/Baccalaureate School</i>		<i>Location of the Facility</i>	

Characteristic	Frequency (%)	Characteristic	Frequency (%)
ESSATLA	9 (7.5%)	Rural	8 (6.7%)
ESSCVP	4 (3.3%)	Suburban	18 (15%)
ESSUA	1 (0.8%)	Urban	94 (78.3%)
ESSL	3 (2.5%)	<i>Facility District</i>	
ESSP	8 (6.7%)	Açores	4 (3.3%)
ESSS	9 (7.5%)	Aveiro	9 (7.5%)
ESSA	25 (20.8%)	Braga	5 (4.2%)
ESSVA	4 (3.3%)	Bragança	2 (1.7%)
ESSVS	5 (4.2%)	Castelo Branco	2 (1.7%)
ESSLD	9 (7.5%)	Coimbra	9 (7.5%)
ESSEM	4 (3.3%)	Faro	1 (0.8%)
ESSJP – Vila Nova de Gaia	4 (3.3%)	Guarda	3 (2.5%)
ESSJP – Viseu	1 (0.8%)	Leiria	7 (5.8%)
ESTeSC	18 (15%)	Lisboa	44 (36.7%)
ESTeSL	8 (6.7%)	Madeira	3 (2.5%)
ISSAA	3 (2.5%)	Portalegre	1 (0.8%)
UFP	5 (4.2%)	Porto	14 (11.7%)
		Santarém	2 (1.7%)
		Setúbal	8 (6.7%)
		Viana do Castelo	3 (2.5%)
		Vila Real	1 (0.8%)
		Viseu	2 (1.7%)
		<i>Type of Facility</i>	
		Town Hall	1 (0.8%)
		Physical Medicine and Rehabilitation Center	21 (17.5%)
		Health Center	3 (2.5%)
		Geriatric Center/Resting Home	15 (12.5%)
		Private Clinic	28 (23.3%)
		Sports Club	1 (0.8%)
		Home Care	2 (1.7%)
		Physiotherapy Office	13 (10.8%)
		Private Hospital	3 (2.5%)
		Public or Public-Private Partnership Hospital	20 (16.7%)
		Continuing Care Unit	13 (10.8%)

Characteristic	Frequency (%)	Characteristic	Frequency (%)
		<i>Majority of Patients Condition</i>	
		Cardiovascular/pulmonary	5 (4.2%)
		Palliative Care	8 (6.7%)
		Hospital Health Care	4 (3.3%)
		Sport	4 (3.3%)
		Aging	19 (15.8%)
		Aquatic Physiotherapy	2 (1.7%)
		Orthopedic	62 (51.7%)
		Neurological	12 (10%)
		Pediatric	2 (1.7%)
		Women's Health	1 (0.8%)
		Other	1 (0.5%)
		<i>Majority of Patients Age Group</i>	
		Pediatric (≤ 18 years)	2 (1.7%)
		Adult (19–64 years)	75 (62.5%)
		Geriatric (≥ 65 years)	43 (35.8%)
		<i>Work Sector</i>	
		Public	33 (27.5%)
		Private	80 (66.7%)
		Academic	7 (5.8%)
		<i>Work Modality</i>	
		Own Account	30 (25%)
		Someone Else's Account	90 (75%)

Abbreviations: ESSATLA – Escola Superior de Saúde Atlântica; ESSCVP – Escola Superior de Saúde da Cruz Vermelha Portuguesa; ESSUA – Escola Superior de Saúde da Universidade de Aveiro; ESSL – Escola Superior de Saúde de Leiria; ESSP – Escola Superior de Saúde do Porto; ESSS – Escola Superior de Saúde de Setúbal; ESSA – Escola Superior de Saúde de Alcoitão; ESSVA – Escola Superior de Saúde do Vale do Ave; ESSVS - Escola Superior de Saúde do Vale do Sousa; ESSLD – Escola Superior de Saúde Dr. Lopes Dias; ESSEM – Escola Superior de Saúde Egas Moniz; ESSJP – Escola Superior de Saúde Jean Piaget; ESTeSC – Escola Superior de Tecnologia e da Saúde de Coimbra; ESTeSL – Escola Superior de Tecnologia e da Saúde de Lisboa; ISSAA – Instituto Superior da Saúde do Alto Ave; UFP – Universidade Fernando Pessoa

Table III – PT’s Interventions choices

Interventions	Response options (n; %)					
	1 st	2 nd	3 rd	4 th	5 th	Total
Balneotherapy/Spa	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Bandages						
Elastic Tape	0 (0.0%)	1 (7.7%)	2 (15.4%)	3 (23.1%)	7 (53.8%)	13 (2.2%)
Non-elastic Tape	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	3 (75.0%)	4 (0.7%)
Braces	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (0.2%)
Complementary Therapies						
Acupuncture	1 (25.0%)	1 (25.0%)	2 (50.0%)	0 (0.0%)	0 (0.0%)	4 (0.7%)
Cupping Therapy	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Electroacupuncture	1 (25.0%)	3 (75.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.7%)
Leech Therapy	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Moxibustion	1 (33.3%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	1 (33.3%)	3 (0.5%)
Tai Ji	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (0.2%)
Yoga	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	1 (50.0%)	2 (0.3%)
Electrical Stimulation Therapy						
IFC	3 (25.0%)	1 (8.3%)	6 (50.0%)	1 (8.3%)	1 (8.3%)	12 (2.0%)
NMES	1 (8.3%)	2 (16.7%)	4 (33.3%)	3 (25.0%)	2 (16.7%)	12 (2.0%)
TENS	2 (22.2%)	1 (11.1%)	3 (33.3%)	0 (0.0%)	3 (33.3%)	9 (1.5%)
Exercise Therapy						
Aerobic Exercise	2 (9.1%)	5 (22.7%)	8 (36.4%)	4 (18.2%)	3 (13.6%)	22 (3.7%)
Aquatic Exercise	7 (15.2%)	8 (17.4%)	7 (15.2%)	7 (15.2%)	17 (37.0%)	46 (7.7%)
Balance Exercise	3 (7.7%)	4 (10.3%)	12 (30.8%)	10 (25.6%)	10 (25.6%)	39 (6.5%)
Resistance Exercise	12 (13.8%)	25 (28.7%)	23 (26.4%)	18 (20.7%)	9 (10.3%)	87 (14.5%)
Stretching	1 (2.1%)	9 (19.1%)	8 (17.0%)	17 (36.2%)	12 (25.5%)	47 (7.8%)
Vibration	0 (0.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)
EST	0 (0.0%)	0 (0.0%)	1 (50.0%)	1 (50.0%)	0 (0.0%)	2 (0.3%)
Insoles	0 (0.0%)	1 (25.0%)	1 (25.0%)	2 (50.0%)	0 (0.0%)	4 (0.7%)
Laser Therapy						
High Level Laser Therapy	1 (20.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	3 (60.0%)	5 (0.8%)
Low Level Laser Therapy	0 (0.0%)	1 (25.0%)	0 (0.0%)	2 (50.0%)	1 (25.0%)	4 (0.7%)
Magnetic Field Therapy	1 (20.0%)	1 (20.0%)	2 (40.0%)	1 (20.0%)	0 (0.0%)	5 (0.8%)
Manual Therapy	37 (43.0%)	21 (24.4%)	15 (17.4%)	7 (8.1%)	6 (7.0%)	86 (14.3%)

Interventions	Response options (n; %)					
Nutrition Therapy/Weight Loss	16 (19.5%)	19 (23.2%)	11 (13.4%)	19 (23.2%)	17 (20.7%)	82 (13.7%)
Self-care/Education	25 (42.4%)	5 (8.5%)	6 (10.2%)	9 (15.3%)	14 (23.7%)	59 (9.8%)
Thermal Agents	2 (14.3%)	3 (21.4%)	2 (14.3%)	4 (28.6%)	3 (21.4%)	14 (2.3%)
Ultrasound Therapy	1 (5.3%)	5 (26.3%)	4 (21.1%)	7 (36.8%)	2 (10.5%)	19 (3.2%)
Walking Aids	3 (23.1%)	2 (15.4%)	2 (15.4%)	3 (23.1%)	3 (23.1%)	13 (2.2%)

Abbreviations: EST - Extracorporeal Shockwave Therapy; IFC – Interferential Current; NMES – Neuromuscular Electrical Stimulation; TENS – Transcutaneous Electrical Nerve Stimulation.

Table IV – Frequency of the Combined Use of Different Interventions for Treating Knee OA Patients.

Aerobic Exercise	Aquatic Exercise	Balance Exercise	Manual Therapy	Nutrition/ Weight Loss	Resistance Exercise	Self-care/ Education	Stretching	Ultrasound Therapy	N (%)
		•	•	•	•	•			5 (4.2%)
			•	•	•	•	•		5 (4.2%)
•			•	•	•	•			4 (3.3%)
	•		•	•	•	•			4 (3.3%)
	•		•	•	•			•	4 (3.3%)
•		•		•	•	•			3 (2.5%)
	•			•	•		•	•	3 (2.5%)
		•	•	•	•		•		3 (2.5%)
•	•			•	•	•			2 (1.7%)
•				•	•	•	•		2 (1.7%)
	•	•	•		•		•		2 (1.7%)
		•	•		•	•	•		2 (1.7%)

Note: Most interventions combinations (67.5%) were used by <1% of physical therapists and are not displayed.

Table V – Association Between PTs’ Characteristics and Frequent Use of Knee OA Interventions.

Interventions (Present)	Factor - Level	Odds Ratio (95% CI)	P	R² ^a
Aerobic Exercise	<i>Years of License</i>		0.005	0.208
	< 5	30.000 [3.337; 269.716]	0.002	
	5-10	5.143 [0.586; 45.153]	0.140	
	11-15	7.500 [0.844; 66.613]	0.071	
	> 15	Reference ^b		
Balance Exercise	<i>Participated in Continuing Education Courses</i>		0.025	0.059
	Yes	0.255 [0.077; 0.840]		
	No	Reference ^b		
Resistance Exercise	<i>Age</i>		0.003	0.168
	20-29	9.943 [2.629; 37.605]	0.001	
	30-39	4.898 [1.609; 14.911]	0.005	
	40-49	9.429 [1.603; 55.447]	0.013	
	≥ 50	Reference ^b		
	<i>Years of License</i>		0.022	0.120
	< 5	7.500 [1.469; 38.280]	0.015	
	5-10	3.867 [1.360; 11.000]	0.011	
	11-15	2.578 [0.885; 7.538]	0.084	
	> 15	Reference ^b		
Self-care/Education	<i>Belong to a Professional Practice-orientated Organization</i>		0.028	0.058
	Yes	3.141 [1.134; 8.700]		
	No	Reference ^b		
Thermal Agents	<i>Academic Degree</i>		0.016	0.124
	Baccalaureate	0.077 [0.013; 0.467]	0.005	
	Master	0.200 [0.031; 1.293]	0.091	
	Doctorate	Reference ^b		
	<i>Work Sector</i>		0.036	0.098
	Public	0.238 [0.040; 1.403]	0.113	
	Private	0.108 [0.020; 0.599]	0.011	
	Academic	Reference ^b		

^a Nagelkerke R²; ^b In logistic regression, one level of the independent variable serve as reference against which the odds of the other levels occurring are determined.

Table VI – PTs’ characteristics in the qualitative study

Characteristics	Physical Therapists									
	FT 1	FT 2	FT 3	FT 4	FT 5	FT 6	FT 7	FT 8	FT 9	FT 10
Sex	Male	Female	Female	Male	Male	Female	Male	Female	Female	Female
Age	20-29	20-29	20-29	40-49	< 50	30-39	30-39	30-39	20-29	30-39
Years of License	> 5	> 5	> 5	< 15	< 15	11-15	5-10	5-10	5-10	11-15
Academic Degree	Bac.	Bac.	Bac.	Doc.	Mas.	Bac.	Mas.	Mas.	Bac.	Bac.
Working Hours	31-40	20-30	20-30	< 40	< 40	31-40	< 40	31-40	< 40	31-40
Patients Day	6-10	6-10	11-15	6-10	1-5	11-15	6-10	11-15	11-15	6-10
PTs in the Facility	1-5	1-5	1-5	< 15	0	1-5	0	6-10	6-10	0
% Time in:										
<i>Patient Care</i>	80-100%	55-75%	55-75%	30-50%	5-25%	80-100%	55-75%	30-50%	80-100%	80-100%
<i>Researcher</i>	5-25%	5-25%	30-50%	5-25%	5-25%	0%	5-25%	5-25%	0%	5-25%
<i>Teacher</i>	0%	0%	0%	55-75%	80-100%	0%	30-50%	5-25%	0%	0%
Majority of Patients	Adult	Geriatric	Geriatric	Geriatric	Adult	Geriatric	Adult	Adult	Adult	Adult
Work Sector	Private	Private	Public	Academic	Academic	Private	Private	Public	Private	Private
Work Mode	Others Account	Own Account	Own Account	Others Account	Others Account	Others Account	Own Account	Others Account	Others Account	Own Account

Abbreviations: Bac., Baccalaureate; Mas., Master; Doc., Doctorate;

Note: All include PTs Pursue a Higher Academic Degree, Participate in Continuing Education Courses and Belong to a Practice-Orientated Organization.

Quotation 1: "... I try to apply interventions that give movement to the knee, trying in some way to respect the symptoms and using strategies to reduce them ... (...) I give priority to evidence-based interventions." [FT_1]

Quotation 2:" Always according to the initial assessment made and the patient's signs and symptoms, obviously. (...) Usually, we do the subjective examination – the subjective examination is extremely important – i. e., the patient tells us exactly his problems and then we will try to transform this into compatible signs. In the case of an elderly OA person, the structure tests don't seem to be the most important, for me. Here it's easy to see if there's a change in alignment, other changes in dimension, etc., that may appear during the mobility of the structure. But I focus a lot and worry a lot about the patient's activities and participation. And that's when I start to do my objective tests and start by observing the gait, watching walking the stairs up and down, asking how he/she does his day-to-day chores, dressing, undressing, going to bathroom, all activities, etc., in which the knee may disturb. Within activities, that's where I worry. That's when I'm going to be very concerned." [FT_4]

Quotation 3: "... it's much more a question of I clinically realizing that maybe the results offered are not that good, and a question of evidence. Regarding that second possibility [patients], despite at this moment it doesn't happen so much (although it does happen from time to time), but the patients still come with the idea of conventional physical therapy and be a little reticent when we show that what we do here is a little different ... the work is different. They are waiting for a purely passive treatment and, suddenly, I show them by 'a + b' that there are other more active strategies with better long-term results and that can help them more. And patients often preferred to arrive, lie down on the table and someone will treat them. And a lot of the work I do is, initially, explain and show why is important to do something else ... to take another approach. In other words, it's not the patients' preference that led me to change this, but the question of evidence and the question of considering that in the short, medium and long term the results are better with other techniques." [FT_7]

Quotation 4: "Even, sometimes, prove to the person that he/she can move and should move the knee without pain... that the fact of having knee OA isn't: 'Oh! This is a chronic problem and now I will have knee pain for life.' It's necessary to deconstruct this myth and prove that it's possible to move the knee and walk without pain. (...) ... education is present from the beginning to the end. Sometimes isolated, but I try whenever it's possible to associate education with movement. While the person is moving, or while resting in a certain exercise: 'Oh, you see, we did this, we did that'." [FT_1]

Quotation 5: "... in many cases in people with pain and kinesiophobia it's important to educate the person ... however, often, it's not prescribed ..." [FT_2]

Quotation 6: "So I have to rely a lot on the patient's educational model. I have to teach how to do exercises at home. It's not enough to do the intervention at the clinic. (...) Therefore, my practice goes a lot with the patient's education to avoid risk factors, overweight, immobility and exercise instruction." [FT_5]

Quotation 7: "But, of course, in these people ... we try to privilege the increase of physical activity in general, because they are usually coming with the idea that their knees are like 'tires', i. e., the more they walk, the more they wear out. Deconstructing these ideas, trying to increase the level of physical activity globally, and gradually exposing them to more specific lower limbs exercises ... (...) ... simple things, like some tips in sleep hygiene, some education in relation to fear of movement, and then the question of increasing activity levels and specific exercises" [FT_7]

Quotation 8: "Especially in the beginning of education, people often come with the belief that it's 'massage, heat, and electrotherapy' ... and, many times, people come with bad beliefs that 'they can't move because they are going to get worse' and, throughout the treatments, what I tried to do is demystify it. If the person actually had these kinds of beliefs. (...) And for knee OA, care should all be done in primary care, with exercise, with education to people, with explanation to people of what they should do to prevent the progression of the disease or, at least, to maintain functionality. (...) Yes, no doubt. People will receive treatment for knee OA completely misguided. People's beliefs are always ointments and surgery. It never drifts that much. Because: 'if it hurts we have to be still'." [FT_8]

Quotation 9: "Q: Do you educate the patient for his own pathology?"

Yes. And according to the patient's health literacy/academic qualifications in general (which often end up being a limitation). I always explain and believe that patients always want to know what they have, what the prognosis is and what is expected to happen there. Therefore, sometimes going into very scientific details about the etiology of the problem and everything, it's possible with some metaphors to briefly explain this, what people most want to know: 'Will I stay like this forever?'; 'How can I improve?'; 'What can I do?'; 'What can't I do?'. And then yes, I explain ... I always try to find time, either at the beginning or at the end of the session to do it. Yes, education is important." [FT_1]

Quotation 10: "Then some electrical therapy analgesic techniques, such as iontophoresis, US and TENS. That's what we usually do." [FT_4]

Quotation 11: "... then, some electrophysical therapeutic means for pain control, namely IFC or TENS. I don't go much further than that and only with the analgesic objective." [FT_5]

Quotation 12: "... I have to respect the prescription, because the act is paid by the health insurance company ... being TENS, massage, among others." [FT_2]

Quotation 13: "Yes, thermotherapy, radiofrequency... I'm thinking of the devices that we have ...
Q: Laser, is also very ...

No ... at the moment, we don't have a laser at the clinic. The only devices we have are TENS, radiofrequency and shock waves." [FT_9]

Quotation 14: "... there's a very small percentage of patients who actually feel relief ... and that takes a lot of session time, for the gains that they have. And, at this moment, I don't use it, because there was a recommendation for not using it at all or against TENS use." [FT_8]

Quotation 15: "I tend to use it less to reduce pain. I use it as a form of strengthening, but from the moment he/she can do it without help, he/she does it actively" [FT_7]

Quotation 16: "In some cases, if we see that there was already a decrease, even in terms of musculature, we tried to use NMES for strengthening together with exercises, at the same time. This would be more for the increase of the musculature." [FT_9]

Quotation 17: "We usually do strength exercises, yes. It will depend on the patients' condition and complaints. We can do isometric exercises or we can then progress to slightly different ones. But yes, they are usually strength exercises." [FT_3]

Quotation 18: "So, squats, in an acute situation, I never done it. Because it was loaded. I try to do more muscle strengthening exercises in an open kinetic chain at an early stage. Or without load, to try to minimize the impacts and then yes, progress to more loading exercises.

Q: Regarding unloaded exercises is it, for example, stationary bike? Or do you never used this strategy?

I also do the elliptical sometimes. Although it depends. In the nursing home, I do a lot of elliptical exercises because they don't have to do much knee flexion. And pedalboard ... I also use a lot of pedalboard." [FT_10]

Quotation 19: "I usually use unloading active exercise training to increase amplitudes (always active techniques)." [FT_4]

Quotation 20: "... I also do a lot of muscle chains stretching to relieve tension (myotensive). I stretch the entire muscle chain and this will lessen joint tension. (...) This is more based on

experience. But the fact is that when I start working on the flexibility in a more global perspective, with muscle chains, every OA patients improves. Sometimes, I don't start it in the first sessions. I begin first with more active mobilizations. But after 2 or 3 sessions, when I start to introduce a more serious myotensive work, with more flexibility, it's when I see more improvements. It's interesting!" [FT_5]

Quotation 21: "Besides education, I use mobilization with stretches, in an attempt to maintain joint amplitudes." [FT_8]

Quotation 22: "... and then functional training (from the basics to sitting and getting up, standing and sitting, gait training) ..." [FT_1]

Quotation 23: "... of course it depends on the stage, the overall health condition and the pain degree. (...) ... promote low load movement initially and as pain free as possible. Create a good movement experience for the patient with movements that are important for him/her (activities of daily living, such as walking, standing, sitting, squatting, etc.)." [FT_1]

Quotation 24: "There are always new and trendy interventions ... like KT. There was a time when a lot of people with OA were walking with KT. Nowadays, within the various limitations that Kinesio has, we often get relief from symptoms immediately by repositioning the patella, when the problem is in the patellofemoral compartment. And so, sometimes it can be a good strategy for immediate symptom relief. When a person gets there with pain he/she always goes a little better after it. Now, a patient will not always walk with that. It's necessary to do another type of work to help to give more quality of live...." [FT_1]

Quotation 25: "Then there are things that sometimes surprise us ... like KT. I forgot to mention that in these situations [knee OA patients] I apply KT. (...)

Q: Are you saying it's a placebo?

Yeah...but today I don't say that. I don't say that anymore, because there's already some evidence. I think that some things that are said about KT are a lie, and in the studies that I developed with undergraduate and master students in the institution where I am, we have been proving that some things that Mr. Kenso Kase said don't correspond to the truth. But, in terms of clinical effectiveness, in some cases it's very interesting ... I don't know if it's a placebo, but in fact it's very interesting." [FT_5]

Quotation 26: "... manual therapy like massage or physiological and accessory mobilizations ..." [FT_3]

Quotation 27: Objectively, when I use much more specific techniques, like tonus reduction, tissue release ... they are very localized techniques for that moment ... for the mobilization of soft tissues ...” [FT_4]

Quotation 28: “... I’m not an osteopath, but I’m a manual therapist. I use a lot of manual therapy ... (...) But – if you want me to be very concrete – I use Maitland techniques for accessory movements, for gaining amplitude and pain relief, and I use Mulligan techniques with mobilization with movement...” [FT_5]

Quotation 29: “Q: What are the goals of manual therapy?

It would be more at the level of relaxation. Because there are always some muscle tensions, more on one side than the other. Harmonize muscle tensions and to help in some inflammation.

Q: So, drainage of some edema that could be present. And pain, no?

Yes. that too.” [FT_9]

Quotation 30: “I think that for the treatment purposes of today, massage doesn’t meet the real treatment goals. If we want more mobility and functionality of the patient, he/she has to be active and participative. So it’s not massage that will solve it. For that, he/she needs action, he/she needs to participate. (...) I think that massage no longer responds to the needs that we have.” [FT_4]

Quotation 31: “... passive mobilizations (although sometimes I still do it, I try to do it as physiological and active possible).” [FT_1]

Quotation 32: “For example heat. Although at this point I end up doing it, I only do it for the patient’s preferences. The patient asks it and sometimes it’s necessary to give him/her certain things in order to have greater confidence and take him/her on other paths ...” [FT_1]

Quotation 33: “... we often use some kind of heat, which helps with stiffness, helps to reduce muscle tension, and facilitates the work that we do afterwards...” [FT_3]

Quotation 34: “I use ice for exaggerated inflammatory processes.” [FT_6]

Quotation 35: “... sometimes people like heat or ice and, at the end of the sessions, I chose to apply what the patient said most relieved him/her.” [FT_8]

Quotation 36: “I once read in a study that the knee was already a joint, very prone to fluids. So if we put heat on it we would increase the amount of fluids and we could be harming instead of benefiting.” [FT_6]

Quotation 37: “Yes. It’s interesting, because there’s a group of OA patients that gets worse with the cold. Makes a reaction to the cold. Despite being in an inflammatory process, interesting, ‘isn’t it?’” [FT_5]

Quotation 38: “Yes, I use others. That, I’m being very honest, I only do it because it’s part of it. In other words, I have a medical prescription that although isn’t fixed, we have to respect it. In other words, we have to do everything that is prescribed. (...) ... but often laser, US and electrical therapy are also prescribed ...” [FT_3]

Quotation 39: “... or simple TENS, US and massage, basically what I do for pain.” [FT_10]

Quotation 40: “We also use verticalization a lot. (...) ... despite being able to load, they do it with an exaggerated knee flexion (if not on an inclined plane). We also often use verticalization to stretch, to give the load stimulus.” [FT_6]

Quotation 41: “... even the McConnell Tape that I already used in knee OA ...” [FT_1]

Quotation 42: “... it always depends on the evaluation, but I don’t use the pool because we don’t have it...I don’t have it available where I work. However, I have already worked with some patients who used the pool in another place, articulating what they did there with another PT or exercise professional who usually follows them.” [FT_7]

Quotation 43: “In relation to Yoga and Tai Chi, and modalities that are a little more active and that distract the patient in some way ... (...) ... it may make sense for patients with pain and with important psychosocial factors and central awareness. (...) ... if it helps patients to disconnect a little bit of the pain itself, the condition itself. I think that this may make sense and maybe even, perhaps, recommend to the patient as an adjunct to physical therapy, to do this type of sessions. (...) ... but it’s more like as adjunct therapies, in selected patients. There isn’t really strong evidence about them...but okay. Then, in relation to patients’ preferences, there are patients who felt very good with acupuncture (personally, I don’t do acupuncture, I’m a PT and at this moment acupuncture isn’t part of the physical therapy scientific profession).” [FT_8]

Quotation 44: “If in fact the patient had a good experience with that and if it wouldn’t harm I could try it, in the failure of the most recommended treatment. (...) ... if colleagues said ‘oh, this intervention relief in the symptoms ... it worked for me’, if the evidence supports and the practice that I used don’t produce the expected results, it could be a way of trying to produce results...so yes, I would use it. Either way, I would consider other types of strategies, like referral to another professional or reassessment to see if something hadn’t been done so well or other red flags that could better indicate another condition. So, in the failure of the first line interventions, after a

better patient exploration and after trying other things that may helped, I would introduce a technique that, despite not being properly validated, had good recommendations from colleagues.” [FT_1]

Quotation 45: “Of course, I would be able to use them if there was scientific evidence that shows me that they are being discussed or used. And that they could be suitable for my patient. I. e., not all patients accept the same intervention techniques. I also try to make a selection of the interventions to use on each patient and I can try and even be able to use it, if I know some new intervention on which I can base, which I can understand the principles and that there’s some research around it. I can experiment to use it and understand the real results. I wouldn’t use any intervention that I don’t know that it’s being studied scientifically (although the evidence may be low). Because here, the problem with physical therapy, is the evidence level ... the strength of the evidence. Because the evidence is there, but the evidence strength it’s not always the best.” [FT_4]

Quotation 46: “It must have a plausible rational. Although studies may be lacking, if there’s an important and strong physiological basis of that treatment type have and, at least, that it doesn’t have any kind of major contraindication or that may harm patients in some way, in very selected patients, I may consider its use. (...) But effectively the patient have to already tried it and felt very good at the time ... maybe I will not recommend it but I have an open mind to say that: ‘Ok, you can try it’.” [FT_8]

Quotation 47: “I would use it, or at least try it, if I have enough training for that. I am very reticent about these things. I don’t do something that I don’t know 100% how to do it. First, I have to study it, I would have to be informed for that.” [FT_10]

Quotation 48: “... laser, US, electrical therapy” [FT_3]

Quotation 49: “... there are things that were close to ‘witchcraft’, namely magnetotherapy. I really stopped using it.” [FT_5]

Quotation 50: “... cupping therapy, manipulations, myocrochetage, electrical therapy ... (...) ... but the ones I have listed, yes, I tend to avoid them.” [FT_7]

Quotation 51: “... radiofrequency and shockwave therapy aren’t used in case of OA.” [FT_9]

Quotation 52: “... they aren’t evidence-based ...” [FT_1]

Quotation 53: “So, in my opinion, they aren’t essential, they are adjuvants, so to speak. If I could do ‘X’ treatments, I wouldn’t prioritize these.” [FT_3]

Quotation 54: *“And you’re not going to ask me for lasers and stuff, because I don’t believe in any of that, ‘okay?’” [FT_5]*

Quotation 55: *“... I don’t use it right now. Because I consider that ‘one way or the other’ either doesn’t work at all (I didn’t see results), or I found better strategies ...” [FT_7]*

Quotation 56: *“... there are interventions that aren’t evidence-based, but many times the patient feels better, or asks for it, and often comes with this stigma. And often I end up giving in to the beginning and then go on to work for more active strategies ...” [FT_1]*

Quotation 57: *“Yes, the physiatrist prescribes it. Although I also noticed some curious things, like ... the patient’s beliefs also count, and whether I agree or not, there’s also the placebo effect associated with the thing and ... there are many of the elderly who believe that laser is good. If through the placebo effect helps, since I have to do it, ok! ... that’s fine for me. There are patients who specifically say they feel better, and ‘why?’ ... ‘maybe it was because of the laser.’” [FT_3]*

Quotation 58: *“I always try to design the intervention plan between the PT and the patient. Of course, most of the treatments come from the PT, but I always try (more and more) from dialogue, to create goals that are important to the patient and, from there, the intervention is built, of course according to what science says.” [FT_1]*

Quotation 59: *“It all depends on the case-by-case assessment. But, we tend to make an assessment ... especially if we are talking about OA, we are talking about a situation that has been going on for some time, a progressive situation. Therefore, what I normally do is, from the outset, the assessment always considers the exclusion of red flags, i. e., other things besides those of OA, which maybe contraindications or need more care or a more in-depth assessment. From there, I try to understand within what ... is chronic pain and the pain of the patient, and try to understand to what extent of all is formed. I. e., what slice size does the tissue injury component itself have, what slice size does the component of other factors that are usually not considered (issues such as sleep, fear of movement, physical inactivity). Make this assessment more global, to understand the extent on which I will have to act in each field. From that moment on, direct the strategies, depending on the assessment that’s being made.” [FT_7]*

Quotation 60: *“... patients go the physiatrist’s consultation before initiating physical therapy ...” [FT_3]*

Quotation 61: *“Usually it’s the physiatrist who sends a clinical indication of what are techniques that needs to be used and normally, as a PT, I try to adapt the techniques (I have the ability to select them for the situation, obviously discussed with the patient what we can do). But normally*

we don't deviate much from the clinical indication and change only the techniques that are within our reach (the most functional techniques). We normally maintain, electrical therapy techniques, or physical agents – if they are appropriate – the ones that are prescribed.” [FT_4]

Quotation 62: “... what we usually do is, first, a component of tissue muscle relaxation (we often use some kind of heat, which helps with stiffness, helps to reduce muscle tension, and facilitates the work that we do afterwards), then we use manual therapy (massage, physiological and accessory mobilizations), and exercise or balance training and gait training to patients that need it.” [FT_3]

*Quotation 63: “Q: How many sessions do you do per week?
2 or 3 sessions” [FT_10]*

*Quotation 64: “Q: And those knee OA patients, how many sessions they do per week?
At the unit, they do it every day.” [FT_6]*

Quotation 65: “Q: Taking in consideration these patients, how many sessions do they do per week?

I only go to the clinic twice a week, so maximum twice and minimum once.” [FT_5]

*Quotation 66: “Q: How many sessions do they normally have at the clinic?
Usually twice a week.*

Q: Why twice a week? Who define that number?

Usually, it's us [PTs], and in our evaluation. In particular, they do it on average twice a week, because it's the period that we saw that they were able to recover. For example, the day after the session they are a little more 'slaughtered', with the exercises and everything, and then spacing 2 or 3 days each intervention, it was the time that we saw that they were able to have more benefits.

Q: For example, do it on a Monday and a Thursday.

Or Tuesday and Friday, yes.

Q: Ok. Give at least 48-72 hours of rest. Is that it?

Exactly. Which I think, (I'm not sure) what most articles say. That OA treatment should be two to three times a week...” [FT_9]

Quotation 67: “Q: How many sessions they do per week?

This is usually defined at the beginning ... I already had patients doing two to three times per week, as patients doing two sessions each two weeks, and then going on only weekly or twice per month.

Q: For some particular reason?

For me it has a lot to do with the question that the patient has completed the exercise, or is able to make a plan at home or not. Sometimes there are patients who are working and we try to see what the patient's schedule. If the patient isn't very available for physical therapy, what I try to do is trying to talk to the patient and as long as he/she stick to the established plan, at home, it's perfectly plausible to have weekly sessions." [FT_8]

Quotation 68: "Q: For you, and according to your experience, what are the most important signs and symptoms in knee OA?

The first is pain, which is why people come to us. And then joint stiffness, decreased strength and eventually knee ROM limitation. There are also other symptoms that are frequent, such as knee crepitus. Although, I personally don't value it so much and don't put it in the same level of pain, stiffness or decreased strength." [FT_1]

Quotation 69: "Q: And for you, what are the main signs and symptoms of the OA population? Pain, joint limitation, sensibility changes, muscular weakness, instability ..." [FT_5]

Quotation 70: "Q: And what about the patients who sought physical therapy?

In terms of clinic, for pain.

Q: Pain. Any other important sign or symptom?

It's mostly pain. Patients, I think, only remember to do treatments for pain, not so much for prevention. At least here.

Q: And the other way around, for you, what are the main signs and symptoms of the OA population?

It's limp, pain, inflammation ... that's what many of them have when they come to me, and limitations.

Q: Limitations? You're talking about joint limitations, correct?

Yes.

Q: Here when you talk about limitation, can we also include some activities of daily living limitations?

Yes, consequently they couldn't do it afterwards, especially women, ... it's dramatic because they couldn't do many activities." [FT_10]

Quotation 71: "Q: According to the patients who arrived with knee OA, what are the most important signs and symptoms that they referred?

Pain ... mostly pain." [FT_8]

Quotation 72: "Q: Try to remember the signs and symptoms that are more common in this type of pathology. What are the reasons for people seek physical therapy?

It's like that, I would tend to respond directly, pain. Although, I consider that it's not quite true. Because when we go to talk to the patient and explore a little bit what he/she wants, it's to make their lives more independently and with a greater capacity. In other words, what normally leads them to look for it, I believe, it's the question of pain, it's the sign. Because this is actually something that then limits them. But ... I saw a study some time ago (but then I lost it), which was almost a ranking of problems. I. e., what were the outcomes that the patient was expecting, and what were the outcomes that the PTs consider important ... and the thing didn't match well. Normally we are always concerned with ROM and with pain, and patients want functionality and disability reduction. So, generally, I would tend to say that the main and most direct cause is pain, and then people report something more than pain: 'I stopped being able to walk my dog', or 'I stopped being able to pick up my grandson or play with him/her on the floor because I can't get up'. When we go more in detail, the concern is more this, i. e., the inability to perform activities of daily living." [FT_7]

Quotation 73: "Q: And what are the reasons why they seek physical therapy?

I work in a village, in a very small area, and have a lot of rural population. And, above all, it's to maintain functionality. They come to us when they have difficulty shopping, going to the garden or doing other activities of daily living. So, it's mainly for maintenance and improvement of functionality.

Q: Any other secondary reason for seeking physical therapy?

Yes. To also relieve pain.

Q: Functionality and pain, with functionality first and pain second ...

Yes, exactly." [FT_9]

Quotation 74: "Q: And what activities did they missed the most?

So, for men it was more not being able to go to the farm. Because I live in a country place and they couldn't go because they had a lot of pain ... women, it was more domestic chores." [FT_10]

Quotation 75: "... I think things are still very badly set up. Because primary health care at the moment isn't providing answers. There are almost no PTs in primary health care. People continue to think that surgery is completely unavoidable.

(...)

Q: But don't you think that this is a little bit influenced by how the system is currently set up? I. e., before a patient start doing physical therapy, he/she usually goes to a doctor, and the doctor doesn't think that physical therapy can help in such cases...

Yes. That's why I also think that updating doctors would be very important. We should be the first contact in health centers. (...) Effectively, knee OA care should all be done in primary care, with

exercise, with educating people (explaining what they should do to prevent disease progression or, at least, to maintain functionality). In fact, surgery is an option, but only as a last option, and when other interventions have failed. Things are very badly set up.” [FT_8]

Chapter 4 – Discussion

Several important information has retrieved after performing the studies. The studies type and information gathered have been designed to be combined in order to achieve the main goal: develop a CPG to manage knee OA patients for the Portuguese PTs.

CPGs showed to be a key-factor for the EBP implementation in the Portuguese PTs context. For the Portuguese PTs, EBP and research are important in the daily practice (97.9% and 97.4%, Agreed or Strongly Agreed, respectively), and they acknowledge that using EBP improves their care quality (94.8% Agreed or Strongly Agreed). The use of evidence in their daily practice helps them to: (1) make more informed decisions; (2) justify their decision-making; and, (3) have more certainty in the diagnosis, prognosis and intervention plan. These advantages are similar to those pointed by Sackett et al. ⁵⁵. From the different studies types, the PTs preferred reading from what is in a higher level in the evidence hierarchy, such as meta-analysis, systematic reviews, reviews and CPGs. These choices are supported by evidence and associated with positive attitudes regarding EBP ⁵⁷⁻⁶⁰. In fact, the Portuguese PTs seek, use and are able to incorporate the patients preferences with CPGs (79.3%, 85.4% and 86.5%, Agreed or Strongly Agreed, respectively). Additionally, they reported being aware and access online available CPGs for topics of their interest (85%, 83.4% and 78.2%, respectively). Nevertheless, besides having insufficient time, the main barriers reported by the Portuguese PTs include difficulty applying the research to a specific patient or population (24.2%, 17.8% and 15.7%, respectively). The related factors outlined by the PTs include: being fully updated and reaching the best available evidence is difficult to achieve, as it is always evolving and very time-consuming; evidence is often inconclusive or in certain areas non-existent; there is still a vast lack of high quality physical therapy studies; recommendations are difficult to apply in practice and do not respond to the clinical practice “real” problems; most of the papers are written in English and difficult to read/understand. Similar barriers were reported in other countries ^{50,60,82,84-94}. These barriers could be lessened if: evidence is present in the facilities in a form of a lecture ⁹⁵; research evidence is more easy to access, time efficient, and relevant to practice ⁹⁶; and more national CPGs are accessible ^{97,98}. Therefore, if

a national clinical practice guideline is created for the Portuguese PTs context, not only it could improve the care quality of their patients, but also help to implement an EBP, since they ^{97,98}: offer explicit recommendations for practitioners who are uncertain about how to proceed; clarify which interventions are of proved benefit and document the quality of the supporting data; and alert practitioners to interventions ineffective/dangerous/unsupported by good science, improving the consistency and quality of clinical decisions/care.

CPGs, as in the EBP principals, are developed with clinical experience, patients' preferences and scientific evidence as main actors, providing to practitioners practice recommendations to manage a condition or the use of an intervention ^{55,64-66}. From the two "evidence" studies (umbrella review and systematic review) it was concluded that the interventions that showed to be the most promising for managing knee OA patients were: Acupuncture, Diathermy, Electroacupuncture, Exercise (Aerobic, Aquatic, Balance and Resistance), HLLT, IFC, KT, Manual Therapy, Mind-body Exercises (Tai chi and Yoga), Moxibustion, Mudpack, NEMS, Nutrition/Weight Loss, PEMF, Self-care/Education, Shock Wave Therapy, US and WBV. However, after comparing with similar systematic reviews and CPGs ^{30,35,68-77,99-103}, the interventions that maintained were: Exercise (Aerobic, Aquatic, Balance and Resistance), IFC, Manual Therapy, Mind-body Exercises (Tai chi and Yoga), Moxibustion, Nutrition/Weight loss, PEMF and Self-care/Education. Furthermore, other interventions were also considered important to manage these patients, namely: Balneotherapy/Spa, Stretching, Thermal Agents and Walking Aids. So, this significant evidence basis was created, important as a foundation for "build" the evidence-based CPG.

Theory, research, and practice are a continuum as the best theory is informed by practice and the best practice should be grounded in theory ¹⁰⁴. Sure, there is a "tension" between them, but they are not in opposition ¹⁰⁴. Theory and practice enrich one another by their dynamic interaction ¹⁰⁴. Researchers and practitioners may differ in their priorities, but the relationship between research and its application can and should move in both directions ¹⁰⁴. Although, research is important in developing theories, they must be tested iteratively in real-world contexts ¹⁰⁴. The closer the theory converges the clinical practice "real world" and

the closer the recommendations of the socio-cultural-economic context are, the more easily they will be followed by practitioners ¹⁰⁴. So, other important information that needed to be gathered was the most common non-pharmacological and non-surgical interventions used by the Portuguese PTs in their knee OA patients and deeper understand the factors associated to their interventions choices. For the Portuguese PTs the most important interventions were: Electrical Stimulation (IFC, NMES, TENS), Exercise (Aerobic, Aquatic, Balance and Resistance), KT, Manual Therapy, Nutrition/Weight Loss, Self-care/Education, Stretching, Thermal Agents, US and Walking Aids. Although, ideally, a group of experts should be gathered to discuss the recommendations, this thesis showed that, in general, the Portuguese PTs had positive beliefs, attitudes, knowledge and behaviors about EBP, and the majority of the PTs that participated in the studies had between 30-39 years of age with a clinical experience of 5-10 years, so their choices should be highly valued. Furthermore, if the two findings were combined, an important step to reach a CPG for the Portuguese PT context could be reached. In one hand, it could already be achieved if the interventions are (or not) evidence-based and, in the other hand, which interventions were the most effective according to evidence and clinical practice. So, for the Portuguese context, the “core” interventions are: Nutrition/Weight Loss, Resistance exercise and Self-care/Education. In certain conditions, it could be added to these interventions Aquatic Exercises, Manual Therapy and/or Stretching. The “silver” interventions are Aerobic Exercises, Balance Exercises, Thermal Agents and Walking Aids. The “bronze” interventions are Electrical Stimulation (IFC, NMES, TENS), KT and US.

The decision of adding other interventions or changing the level of the interventions is depended of the patients' preferences and clinical status/symptoms. Unfortunately, it was not possible to pinpoint the best and most used scales/tests in the Portuguese PT context. However, according to evidence, it should contain ^{22,105-116}: personal characteristics knee OA related gathering (e.g. age, BMI, sex, race, and past traumas), knee OA clinical inspection and classification (e.g., American College of Rheumatology criteria); knee-specific OA self-reported questionnaires (e.g., KOOS, ICOAP, and WOMAC); health status

self-reported questionnaires (e.g., Medical Outcomes Study – 36 item Short Form or Health Assessment Questionnaire); and physical examination tests (e.g., VAS, dynamometry, goniometry, 30-sec chair-stand test, 40-m fast-paced walk test, 11-step stair climb test, timed up and go test, and 6-min walk test). These scales/tests could be used simultaneously to have an overall assessment (bio-psycho-social) of the patient, not only in the first attendance but also throughout the intervention plan, in order to adapt the treatments to the patient's specific condition.

Table 36 and Figure 31 summarize the findings described earlier.

Table 1 – Portuguese Knee OA Clinical Practice Guideline Recommendations (preliminary)

Number	Recommendation	Level
1.	The main goal in the knee OA patients' management should be directed toward controlling pain, increasing and maintaining strength, preserving and improving the knee ROM, providing functional independency, and increasing the QoL. In order to reach these goals, management of knee OA should contain non-pharmacologic, pharmacologic, and, when necessary, surgical approaches (in this order). Additionally, the treatment should be tailored for each patient individually.	<i>Strong recommendation</i>
2.	In people with knee OA, assessments should use a bio-psycho-social approach, including: <ul style="list-style-type: none"> • Personal characteristics; • Knee-specific OA questionnaires; • Health status questionnaires; • Physical and clinical examination tests; • Knee OA inspection and classification. 	<i>Strong recommendation</i>
3.	Management of knee OA should be individualized according to: <ul style="list-style-type: none"> • Patient preferences; • OA severity; • Risk factors and red-flags; • Patient characteristics (such as age, sex and BMI); • Structural changes; • Level of pain, strength loss, function, knee ROM and imbalances; • Restriction of ADL and QoL impairments; • Societal participation. 	<i>Strong recommendation</i>
4.	Knee OA patients should receive an individualized management plan that includes the core non-pharmacological and non-surgical interventions, specifically: <ul style="list-style-type: none"> • <u>Nutrition/Weight Loss</u> <ul style="list-style-type: none"> a. Long term diet to maintain weight if normal BMI; b. Long term diet to weight loss if overweight/obese; c. Encourage and increase physical activity; d. Record regularly (weekly/monthly) nutritional intake and weight; e. Nutritional education and eating behaviors; • <u>Resistance Exercises</u> <ul style="list-style-type: none"> a. Low-intensity isokinetic muscular strengthen (start with isometric strength if the patient is more fragile); b. Focus on the knee extensors and hip muscles; c. Perform 3 or more times per week; d. Increase the exercises difficulties as the patient develops more physical capacities; 	<i>Strong recommendation</i>

Number	Recommendation	Level
	<ul style="list-style-type: none"> e. The exercises chosen should always be patient-appropriate, pain free and must pay attention to the specific kinesiophobia; • <u>Self-care/Education</u> <ul style="list-style-type: none"> a. A self-care knee OA program should be performed, such as the <i>osteoarthritis of the knee self-management program</i>; b. Always adapt the information to the patient's health literacy; c. Perform 1:1 meetings, supported by written, oral and/or digital types of information; d. Give other overall information, such as OA disease progression, prognosis, knee anatomo-physiology, OA pathophysiology, overall lifestyle changes and joint protection, home exercises and self-care techniques; e. Beside informing the patient of his/her condition to improve his/her educational capability, the objective is to promote hope, optimism, and positive expectations; f. Although initial instruction is required, the aim is that knee OA patients learn to undertake on their own in their own environment. 	
5.	<p>To the core interventions and to respond to a specific condition, it could be added:</p> <ul style="list-style-type: none"> • <u>Aquatic Exercises</u> <ul style="list-style-type: none"> a. If the patient is overweight, has a major muscular weakness and instability; b. Progressively increase the difficulty of the exercises, in order to transit to land based exercises; • <u>Manual Therapy</u> <ul style="list-style-type: none"> a. Adapt the technique, force, amplitude, rate, repetition, and duration to the patients signs and symptoms types and severities, clinical findings and other co-morbidities; b. Avoid a manual therapy isolated intervention plan; • <u>Stretching</u> <ul style="list-style-type: none"> a. If it is needed to relieve muscular tension and to maintain knee ROM and function. 	<i>Strong recommendation</i>
6.	<p>If the core and adjunctive interventions fail to respond to the patient's symptoms and needs, it could be performed:</p> <ul style="list-style-type: none"> • <u>Aerobic Exercises</u> <ul style="list-style-type: none"> a. If the patient is overweight, has a major muscular weakness, limited knee ROM and could not perform Resistance Exercises; b. Include low pressure soft cyclic movements, easy to learn and to perform; c. Increase the exercises difficulty progressively, in order to integrate Resistance Exercises in the treatment plan; d. Could be included in the Resistance Exercises plan, as a method of warm-up and/or cool-down; e. The objective is to increase joint lubrication and knee ROM; • <u>Balance Exercises</u> <ul style="list-style-type: none"> a. If the patient shows static and dynamic instability and proprioceptive deficits; 	<i>Moderate recommendation</i>

Number	Recommendation	Level
	<ul style="list-style-type: none"> b. Try to incorporate these exercises with the Resistance Exercises; c. The main goals are to increase lower limb stability and proprioception; <ul style="list-style-type: none"> • <u>Thermal Agents</u> <ul style="list-style-type: none"> a. It could be considered if it is a patient's preference and if the patient's clinical signs and symptoms justify their use (such as pain reduction and circulation improvement); • <u>Walking Aids</u> <ul style="list-style-type: none"> a. Assistive technology and adaptations at home and/or at work could be considered, to reduce pain and to increase QoL and social participation. 	
7.	<p>If the patient is still symptomatic, it could be considered:</p> <ul style="list-style-type: none"> • <u>Electrical Therapy</u> <ul style="list-style-type: none"> a. NMES if a patient has a major muscular deficit and is unable to perform exercises; b. TENS or IFC if a patient has a crippling pain and is unable to perform exercises; • <u>Ultrasound Therapy</u> <ul style="list-style-type: none"> a. Continuous 1 MHz, 2.5 W/cm², 15 min/session, 3 sessions/week; b. Use it as a response to pain and physical function; • <u>Kinesio Taping</u> <ul style="list-style-type: none"> a. Administer to improve QoL, and/or pain reduction, and/or improve joint stability and proprioception; • Avoid the excess use of these interventions, as they can be "addictive". As soon as possible, incorporate more active interventions. 	<i>Weak recommendation</i>
8.	<p>If none of the non-pharmacological and non-surgical interventions meet the patient's needs referral to an orthopedist or rheumatologist consultation:</p> <ul style="list-style-type: none"> • Further evaluation of the patient's clinical findings; • Consider to complement the interventions with pharmacological treatments; • Reflect on the possibility of the surgical option. 	<i>Strong recommendation</i>

A *Strong recommendation* means that the quality of the supporting evidence and the benefits is high. A *Moderate recommendation* means that the benefits exceed the potential harm, but the quality/applicability of the supporting evidence is not as strong. A *Weak recommendation* means the quality of the supporting evidence is low or the benefits were trivial, however the studies did not shown patient harms or important secondary effects after the intervention application.

Abbreviations: ADL – Activities of Daily Living; BMI – Body Mass Index; IFC – Interferential Current; min – Minutes; NMES – Neuromuscular Electrical Stimulation; OA – Osteoarthritis; QoL – Quality of Life; ROM – Range of Motion; TENS – Transcutaneous Electrical Neuromuscular Stimulation

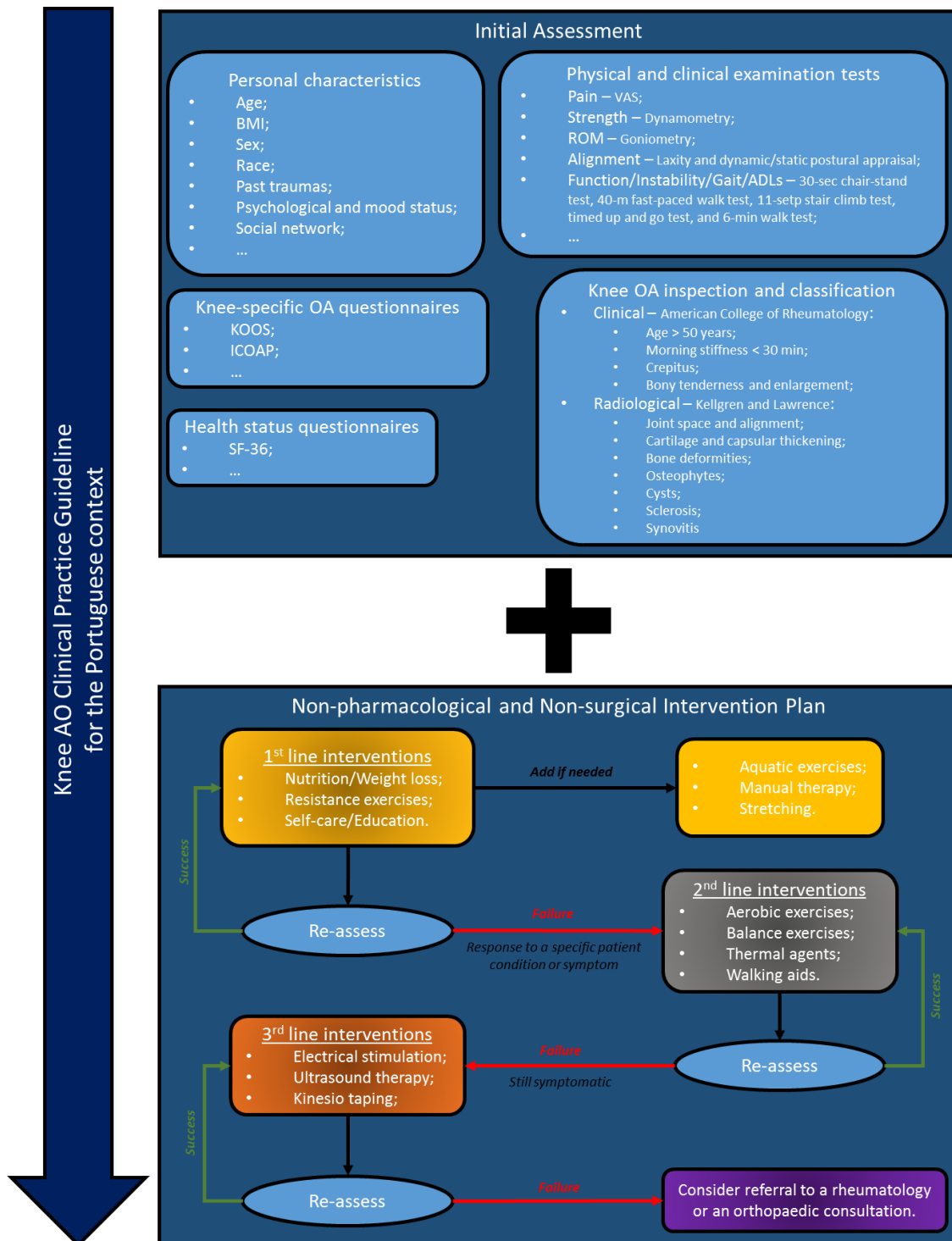


Figure 1 – Portuguese Knee OA Clinical Practice Guideline Flowdiagram (preliminary)

Abbreviations: *ADLs* – Activities of Daily Living; *BMI* – Body Mass Index; *ICOAP* – Intermittent and Constant OsteoArthritis Pain; *KOOS* – Knee injury and Osteoarthritis Outcome Score; *m* – meters; *min* – minutes; *ROM* – Range of Motion; *sec* – seconds; *SF-36* – 36 item Short Form or Health Assessment Questionnaire; *VAS* – Visual Analogue Scale

From the known international CPGs, the findings were more similar to the European Alliance of Associations for Rheumatology ⁷⁴, National Institute for Health and Care Excellence ⁷³, ESCEO ¹⁰² and OARSI ¹⁰³ CPGs (83%, 78%, 70% and 67% of agreement, respectively). Largest differences were found in the Agency for Healthcare Research and Quality ⁷⁶, Turkish League Against Rheumatism ⁷⁷ and American Academy for Orthopaedic Surgeons ¹¹⁷ (36%, 55% and 57% of agreement, respectively). These differences found are not only related to the evidence updating of the recommendations, but principally with the Portuguese context. Some interventions that evidence showed to have importance in the knee OA patients' management were not suitable in our context. For example, mind-body therapies have recommendations in some CPGs ^{68,72,76,77,102,103}, however in our context they were not considered a relevant intervention, since Tai chi and Yoga only represented 0.2% and 0.3% of all interventions chosen. Another example, but in an opposite direction, is the Manual Therapy use, where in the Portuguese context is highly valued (2nd most chosen intervention – 14.3%), however there is still some reluctance by the international CPGs in its use ^{75,103,118,119}. As with other types of evidence studies, with future updates of this CPG, it may be able to upgrade or downgrade these therapies (or others), changing their role both for the Portuguese PTs and for the Portuguese society.

Finally, it needs to be mentioned that an attempt to combine the patients' preferences with the studies within this thesis was made. The study thought was a mix-method study type, composed of a discrete-choice experiment (quantitative) and a semi-structured interview (qualitative) performed online with Portuguese knee OA patients. For the study, stakeholders, investigations groups and national associations were contacted, in order to get a correct and confirmed population. However, some constrains arose (e.g., Covid-19 and individual data protection related) making it difficult to perform this study. This topic is considered the biggest limitation of this thesis. So, in future updates, it is recommended to include a study that explores the Portuguese knee OA patients' preferences. Also, a team of health scientists, health practitioners (such as PTs, doctors, nurses, nutritionists, psychologists ...) and patient representatives should be

gathered to discuss, improve and validate the thesis knee OA managing recommendations.

Chapter 5 – Conclusion

Analyzing all data, it could be concluded that, for the Portuguese context, the “core” interventions are Nutrition/Weight loss, Self-care/Education and Resistance Exercise. In addition to these “core” interventions, in some cases, it could be applied Aquatic Exercise, Manual Therapy and/or Stretching. When these interventions fail to react to the patient’s signal and symptoms or in order to respond to a specific patient’s condition, the second level of interventions that may be applied are Aerobic Exercises, Balance Exercises, Thermal Agents and/or Walking Aids. When these interventions also fail, it could be applied Electrical Stimulation, US and/or KT. Once none of these therapies responds to the patient’s necessities, it should be considered referral to an orthopedist or rheumatologist to assist and assess the patient (not only to help identify other red flags, but also to advance to pharmacological or surgical options if needed). The results obtained in this thesis have a high relevance in the Portuguese PTs society, since not only EBP is valued, but also whenever possible the PTs try to incorporate CPGs in their daily clinical practice.

Chapter 6 – References

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Annexes

Annex I – PRISMA checklist

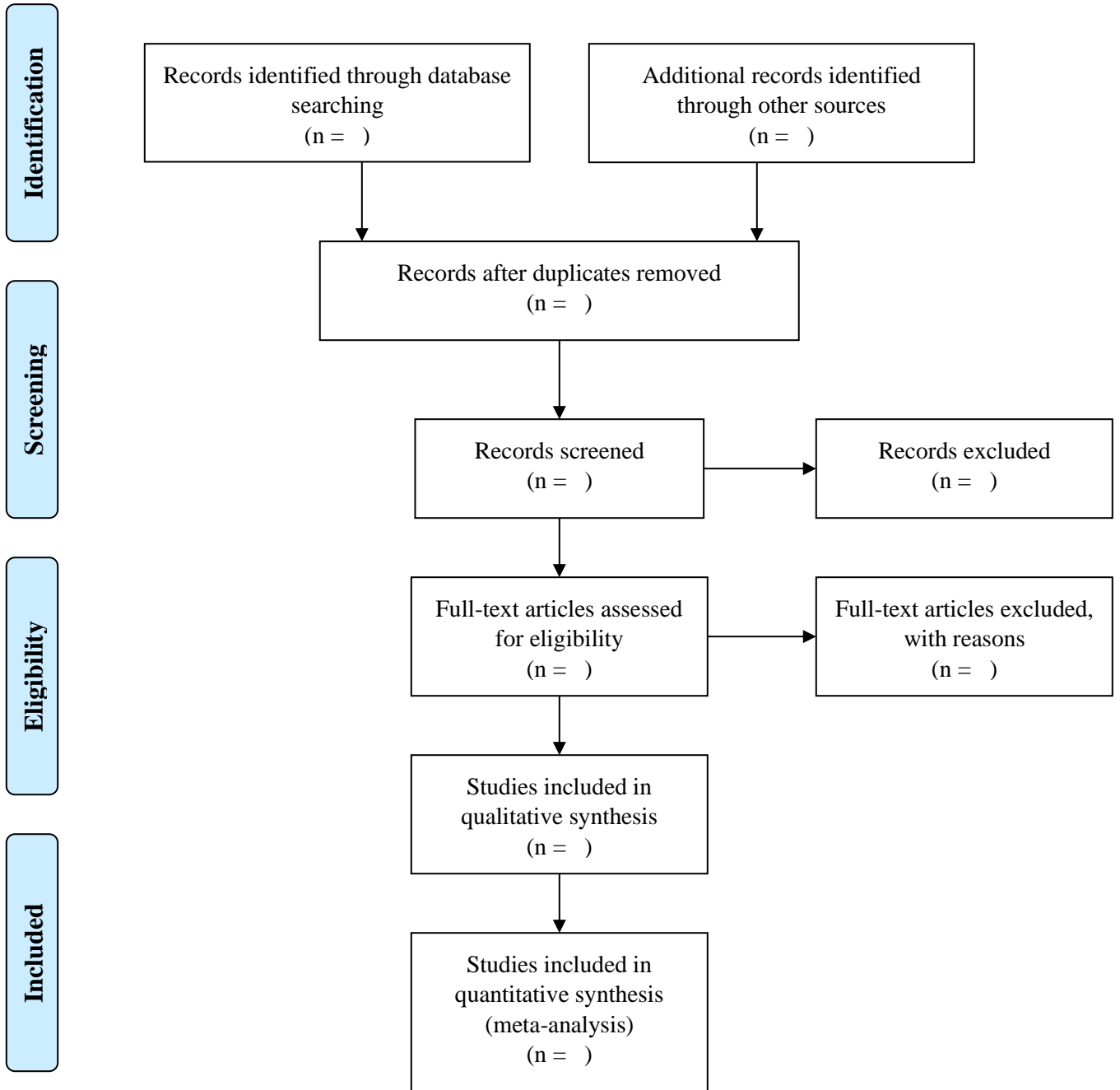
Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Annex II – PRISMA flow diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Annex III - R-AMSTAR 11-items questionnaire

1. **Was an “a priori” design provided?**

- (A) “A priori” design.
- (B) Statement of inclusion criteria.
- (C) PICO/PIPO research question (population, intervention, comparison, prediction, outcome).

If it satisfies 3 of the criteria → 4
If it satisfies 2 of the criteria → 3
If it satisfies 1 of the criteria → 2
If it satisfies 0 of the criteria → 1

2. **Was there duplicate study selection and data extraction?**

- (A) There should be at least two independent data extractors as stated or implied.
- (B) Statement of recognition or awareness of consensus procedure for disagreements.
- (C) Disagreements among extractors resolved properly as stated or implied.

If it satisfies 3 of the criteria → 4
If it satisfies 2 of the criteria → 3
If it satisfies 1 of the criteria → 2
If it satisfies 0 of the criteria → 1

3. **Was a comprehensive literature search performed?**

- (A) At least two electronic sources should be searched.
- (B) The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE).
- (C) Key words and/or MESH terms must be stated **AND** where feasible the search strategy outline should be provided such that one can trace the filtering process of the included articles.
- (D) In addition to the electronic databases (PubMed, EMBASE, Medline), all searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.
- (E) Journals were “hand-searched” or “manual searched” (i.e. identifying highly relevant journals and conducting a manual, page-by-page search of their entire contents looking for potentially eligible studie(s)).

If it satisfies 4 or 5 of the criteria → 4
If it satisfies 3 of the criteria → 3
If it satisfies 2 of the criteria → 2
If it satisfies 1 or 0 of the criteria → 1

4. **Was the status of publication (i.e. grey literature) used as an inclusion criterion?**

(Grey literature is literature produced at all levels of government, academia, business and industry in print and electronic formats, but is not controlled by commercial publishers. Examples can be but not limited to dissertations, conference proceedings.)

- (A) The authors should state that they searched for reports regardless of their publication type.
- (B) The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.
- (C) “Non-English papers were translated” or readers sufficiently trained in foreign language.
- (D) No language restriction or recognition of non-English articles.

If it satisfies 3 of the criteria → 4
If it satisfies 2 of the criteria → 3
If it satisfies 1 of the criteria → 2
If it satisfies 0 of the criteria → 1

5. **Was a list of studies (included and excluded) provided?**

- (A) Table/list/or figure of included studies, a reference list does not suffice.
- (B) Table/list/figure of excluded studies either in the article or in a supplemental source (i.e. online). (Excluded studies refers to those studies seriously considered on the basis of title and/or abstract, but rejected after reading the body of the text)
- (C) Author satisfactorily/sufficiently stated the reason for exclusion of the seriously considered studies.
- (D) Reader is able to retrace the included and the excluded studies anywhere in the article bibliography, reference, or supplemental source.

If it satisfies 4 of the criteria → 4
If it satisfies 3 of the criteria → 3
If it satisfies 2 of the criteria → 2
If it satisfies 1 or 0 of the criteria → 1

6. **Were the characteristics of the included studies provided?**

- (A) In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions **AND** outcomes.
- (B) Provide the ranges of **relevant** characteristics in the studies analyzed (e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.).
- (C) The information provided appears to be complete and accurate (i.e. there is a tolerable range of subjectivity here. Is the reader left wondering? If so, state the needed information and the reasoning).

If it satisfies 3 of the criteria → 4
If it satisfies 2 of the criteria → 3
If it satisfies 1 of the criteria → 2
If it satisfies 0 criteria → 1

7. **Was the scientific quality of the included studies assessed and documented?**

- (A) “A priori” methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.
- (B) The scientific quality of the included studies appears to be meaningful.
- (C) Discussion/recognition/awareness of level of evidence.
- (D) Quality of evidence should be rated/ranked based on characterized instruments. (Characterized instrument is a created instrument that ranks the level of evidence, e.g. GRADE [Grading of Recommendations Assessment, Development and Evaluation.])

If it satisfies 4 of the criteria → 4
If it satisfies 3 of the criteria → 3
If it satisfies 2 of the criteria → 2
If it satisfies 1 or 0 of the criteria → 1

8. **Was the scientific quality of the included studies used appropriately in formulating conclusions?**

- (A) The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review.
- (B) The results of the methodological rigor and scientific quality are **explicitly stated** in formulating recommendations.
- (C) To have conclusions integrated/drives towards a clinical consensus statement.

If it satisfies 4 of the criteria → 4
If it satisfies 3 of the criteria → 3
If it satisfies 2 of the criteria → 2
If it satisfies 1 or 0 of the criteria → 1

(D) This clinical consensus statement drives toward revision or confirmation of clinical practice guidelines.

9. Were the methods used to combine the findings of studies appropriate?

(A) Statement of criteria that were used to decide that the studies analyzed were similar enough to be pooled?

(B) For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2).

(C) Is there a recognition of heterogeneity or lack of thereof.

(D) If heterogeneity exists a “random effects model” should be used and/or the rationale (i.e. clinical appropriateness) of combining should be taken into consideration (i.e. is it sensible to combine?), or stated explicitly.

(E) If homogeneity exists, author should state a rationale or a statistical test.

If it satisfy 4 of the criteria → 4
If it satisfy 3 of the criteria → 3
If it satisfy 2 of the criteria → 2
If it satisfy 1 or 0 of the following criteria → 1

10. Was the likelihood of publication bias (a.k.a. “file drawer” effect)

assessed?

(A) Recognition of publication bias or file-drawer effect.

(B) An assessment of publication bias should include graphical aids (e.g., funnel plot, other available tests).

(C) Statistical tests (e.g., Egger regression test).

If it satisfies 3 of the criteria → 4
If it satisfies 2 of the criteria → 3
If it satisfies 1 of the criteria → 2
If it satisfies 0 of the criteria → 1

11. Was the conflict of interest stated?

(A) Statement of sources of support.

(B) No conflict of interest. This is subjective and may require some deduction or searching.

(C) An awareness/statement of support or conflict of interest in the **primary** inclusion studies.

If it satisfies 3 of the criteria → 4
If it satisfies 2 of the criteria → 3
If it satisfies 1 of the criteria → 2
If it satisfies 0 of the criteria → 1

Retrieved from: Kung, J., Chiappelli, F., Cajulis, O. O., Avezova, R., Kossan, G., Chew, L., & Maida, C. A. (2010). From systematic reviews to clinical recommendations for evidence-based health care: validation of revised assessment of multiple systematic reviews (R-AMSTAR) for grading of clinical relevance. *The open dentistry journal*, 4, 84.

Annex IV – PEDro Scale

1. eligibility criteria were specified	no <input type="checkbox"/> yes <input type="checkbox"/> where:
2. subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	no <input type="checkbox"/> yes <input type="checkbox"/> where:
3. allocation was concealed	no <input type="checkbox"/> yes <input type="checkbox"/> where:
4. the groups were similar at baseline regarding the most important prognostic indicators	no <input type="checkbox"/> yes <input type="checkbox"/> where:
5. there was blinding of all subjects	no <input type="checkbox"/> yes <input type="checkbox"/> where:
6. there was blinding of all therapists who administered the therapy	no <input type="checkbox"/> yes <input type="checkbox"/> where:
7. there was blinding of all assessors who measured at least one key outcome	no <input type="checkbox"/> yes <input type="checkbox"/> where:
8. measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	no <input type="checkbox"/> yes <input type="checkbox"/> where:
9. all subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by "intention to treat"	no <input type="checkbox"/> yes <input type="checkbox"/> where:
10. the results of between-group statistical comparisons are reported for at least one key outcome	no <input type="checkbox"/> yes <input type="checkbox"/> where:
11. the study provides both point measures and measures of variability for at least one key outcome	no <input type="checkbox"/> yes <input type="checkbox"/> where:

The PEDro scale is based on the Delphi list developed by Verhagen and colleagues at the Department of Epidemiology, University of Maastricht (*Verhagen AP et al (1998). The Delphi list: a criteria list for quality assessment of randomised clinical trials for conducting systematic reviews developed by Delphi consensus. Journal of Clinical Epidemiology, 51(12):1235-41*). The list is based on "expert consensus" not, for the most part, on empirical data. Two additional items not on the Delphi list (PEDro scale items 8 and 10) have been included in the PEDro scale. As more empirical data comes to hand it may become possible to "weight" scale items so that the PEDro score reflects the importance of individual scale items.

The purpose of the PEDro scale is to help the users of the PEDro database rapidly identify which of the known or suspected randomised clinical trials (ie RCTs or CCTs) archived on the PEDro database are likely to be internally valid (criteria 2-9), and could have sufficient statistical information to make their results interpretable (criteria 10-11). An additional criterion (criterion 1) that relates to the external validity (or "generalisability" or "applicability" of the trial) has been retained so that the Delphi list is complete, but this criterion will not be used to calculate the PEDro score reported on the PEDro web site.

The PEDro scale should not be used as a measure of the "validity" of a study's conclusions. In particular, we caution users of the PEDro scale that studies which show significant treatment effects and which score highly on the PEDro scale do not necessarily provide evidence that the treatment is clinically useful. Additional considerations include whether the treatment effect was big enough to be clinically worthwhile, whether the positive effects of the treatment outweigh its negative effects, and the cost-effectiveness of the treatment. The scale should not be used to compare the "quality" of trials performed in different areas of therapy, primarily

because it is not possible to satisfy all scale items in some areas of physiotherapy practice.

Last amended June 21st, 1999

Notes on administration of the PEDro scale:

- All criteria **Points are only awarded when a criterion is clearly satisfied.** If on a literal reading of the trial report it is possible that a criterion was not satisfied, a point should not be awarded for that criterion.
- Criterion 1 This criterion is satisfied if the report describes the source of subjects and a list of criteria used to determine who was eligible to participate in the study.
- Criterion 2 A study is considered to have used random allocation if the report states that allocation was random. The precise method of randomisation need not be specified. Procedures such as coin-tossing and dice-rolling should be considered random. Quasi-randomisation allocation procedures such as allocation by hospital record number or birth date, or alternation, do not satisfy this criterion.
- Criterion 3 *Concealed allocation* means that the person who determined if a subject was eligible for inclusion in the trial was unaware, when this decision was made, of which group the subject would be allocated to. A point is awarded for this criteria, even if it is not stated that allocation was concealed, when the report states that allocation was by sealed opaque envelopes or that allocation involved contacting the holder of the allocation schedule who was “off-site”.
- Criterion 4 At a minimum, in studies of therapeutic interventions, the report must describe at least one measure of the severity of the condition being treated and at least one (different) key outcome measure at baseline. The rater must be satisfied that the groups’ outcomes would not be expected to differ, on the basis of baseline differences in prognostic variables alone, by a clinically significant amount. This criterion is satisfied even if only baseline data of study completers are presented.
- Criteria 4, 7-11 *Key outcomes* are those outcomes which provide the primary measure of the effectiveness (or lack of effectiveness) of the therapy. In most studies, more than one variable is used as an outcome measure.
- Criterion 5-7 *Blinding* means the person in question (subject, therapist or assessor) did not know which group the subject had been allocated to. In addition, subjects and therapists are only considered to be “blind” if it could be expected that they would have been unable to distinguish between the treatments applied to different groups. In trials in which key outcomes are self-reported (eg, visual analogue scale, pain diary), the assessor is considered to be blind if the subject was blind.
- Criterion 8 This criterion is only satisfied if the report explicitly states *both* the number of subjects initially allocated to groups *and* the number of subjects from whom key outcome measures were obtained. In trials in which outcomes are measured at several points in time, a key outcome must have been measured in more than 85% of subjects at one of those points in time.
- Criterion 9 An *intention to treat* analysis means that, where subjects did not receive treatment (or the control condition) as allocated, and where measures of outcomes were available, the analysis was performed as if subjects received the treatment (or control condition) they were allocated to. This criterion is satisfied, even if there is no mention of analysis by intention to treat, if the report explicitly states that all subjects received treatment or control conditions as allocated.
- Criterion 10 A *between-group* statistical comparison involves statistical comparison of one group with another. Depending on the design of the study, this may involve comparison of two or more treatments, or comparison of treatment with a control condition. The analysis may be a simple comparison of outcomes measured after the treatment was administered, or a comparison of the change in one group with the change in another (when a factorial analysis of variance has been used to analyse the data, the latter is often reported as a group \times time interaction). The comparison may be in the form hypothesis testing (which provides a “p” value, describing the probability that the groups differed only by chance) or in the form of an estimate (for example, the mean or median difference, or a difference in proportions, or number needed to treat, or a

relative risk or hazard ratio) and its confidence interval.

Criterion 11 A *point measure* is a measure of the size of the treatment effect. The treatment effect may be described as a difference in group outcomes, or as the outcome in (each of) all groups. *Measures of variability* include standard deviations, standard errors, confidence intervals, interquartile ranges (or other quantile ranges), and ranges. Point measures and/or measures of variability may be provided graphically (for example, SDs may be given as error bars in a Figure) as long as it is clear what is being graphed (for example, as long as it is clear whether error bars represent SDs or SEs). Where outcomes are categorical, this criterion is considered to have been met if the number of subjects in each category is given for each group.

Retrieved from: Cashin, A. G., & McAuley, J. H. (2019). Clinimetrics: Physiotherapy Evidence Database (PEDro) Scale. *Journal of physiotherapy*, 66(1), 59-59.

Annex V – Evidence-based practice questionnaire for physical therapists: Original

This section of the questionnaire inquires about personal attitudes toward, use of, and perceived benefits and limitations of EBP.

For the following items, place a mark X in the appropriate box that indicates your response.

1. Application of EBP is necessary in the practice of physical therapy.
 Strongly disagree Disagree Neutral Agree Strongly Agree
2. Literature and research findings are useful in my day-to-day practice.
 Strongly disagree Disagree Neutral Agree Strongly Agree
3. I need to increase the use of evidence in my daily practice.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
4. The adoption of EBP places an unreasonable demand on physical therapists.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
5. I am interested in learning or improving the skills necessary to incorporate EBP into my practice.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
6. EBP improves the quality of patient care.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
7. EBP does not take into account the limitations of my clinical practice setting.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
8. My reimbursement rate will increase if I incorporate EBP into my practice.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
9. Strong evidence is lacking to support most of the interventions I use with my patients.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
10. EBP helps me make decisions about patient care.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
11. EBP does not take into account patient preferences.
 Strongly Disagree Disagree Neutral Agree Strongly Agree

For the following items, place a mark X in the appropriate box that indicates your response for a typical month.

12. Read/review research/literature related to my clinical practice.
 ≤1 article 2–5 articles 6–10 articles 11–15 articles 16+ articles
13. Use professional literature and research findings in the process of clinical decision making.
 ≤1 time 2–5 times 6–10 times 11–15 times 16+ times
14. Use MEDLINE or other databases to search for practice-relevant literature/research.
 ≤1 time 2–5 times 6–10 times 11–15 times 16+ times

The following section inquires about personal use and understanding of clinical practice guidelines. Practice guidelines provide a description of standard specifications for care of patients with specific diseases and are developed through a formal, consensus-building process that incorporates the best scientific evidence of effectiveness and expert opinion available.^b

For the following items, place a mark X in the appropriate box that indicates your response.

15. Practice guidelines are available for topics related to my practice.
 Yes No Do Not Know
16. I actively seek practice guidelines pertaining to areas of my practice.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
17. I use practice guidelines in my practice.
 Strongly Disagree Disagree Neutral Agree Strongly Agree
18. I am aware that practice guidelines are available online.
 Yes No
19. I am able to access practice guidelines online.
 Yes No
20. I am able to incorporate patient preferences with practice guidelines.
 Strongly Disagree Disagree Neutral Agree Strongly Agree

The following section inquires about availability of resources to access information and personal skills in using those resources.

For the following items, place a mark X in the appropriate box that indicates your response. In items referring to your "facility," consider the practice setting in which you do the majority of your clinical care.

21. I have access to current research through professional journals in their paper form.
 Yes No
22. I have the ability to access relevant databases and the Internet at my facility.
 Yes No Do Not Know

23. I have the ability to access relevant databases and the Internet at home or locations other than my facility.

- Yes No Do Not Know

24. My facility supports the use of current research in practice.

- Strongly Disagree Disagree Neutral Agree Strongly Agree

25. I learned the foundations for EBP as part of my academic preparation.

- Strongly Disagree Disagree Neutral Agree Strongly Agree

26. I have received formal training in search strategies for finding research relevant to my practice.

- Strongly Disagree Disagree Neutral Agree Strongly Agree

27. I am familiar with the medical search engines (eg, MEDLINE, CINAHL).

- Strongly Disagree Disagree Neutral Agree Strongly Agree

28. I received formal training in critical appraisal of research literature as part of my academic preparation.

- Strongly Disagree Disagree Neutral Agree Strongly Agree

29. I am confident in my ability to critically review professional literature.

- Strongly Disagree Disagree Neutral Agree Strongly Agree

30. I am confident in my ability to find relevant research to answer my clinical questions.

- Strongly Disagree Disagree Neutral Agree Strongly Agree

For the following item, place a mark X in one box in the row for each term.

31. My understanding of the following terms is:

Term	Understand Completely	Understand Somewhat	Do Not Understand
a) Relative risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Absolute risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Systematic review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Odds ratio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Meta-analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Confidence interval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Heterogeneity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Publication bias	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For the following items, rank your top 3 choices by placing numbers in the appropriate boxes (1=most important).

32. Rank your 3 greatest barriers to the use of EBP in your clinical practice.

- Insufficient time
- Lack of information resources
- Lack of research skills
- Poor ability to critically appraise the literature
- Lack of generalizability of the literature findings to my patient population
- Inability to apply research findings to individual patients with unique characteristics
- Lack of understanding of statistical analysis
- Lack of collective support among my colleagues in my facility
- Lack of interest

The following section inquires about personal demographic information.

For the following items, place a mark X in the appropriate box next that indicates your response.

33. What is your sex?

- Male Female

34. What is your age group?

- 20–29 y 30–39 y 40–49 y 50+ y

35. Do you currently hold a valid physical therapy license?

- Yes No

36. For how many years have you been licensed?

- <5 y 5–10 y 11–15 y >15 y

37. What is your entry-level degree for physical therapy?

- Certificate
- Baccalaureate
- Entry-level master's
- Entry-level doctorate
- Other

38. What is your highest degree attained?

- Baccalaureate
- Entry-level master's
- Advanced master's
- Entry-level doctorate
- Advanced doctorate
- Other

39. If you do not currently hold an advanced degree, do you intend to pursue one in the future?

- Yes
- No
- Do Not Know

40. Are you a clinical certified specialist? If so, in which speciality?

- Yes
- No
- Speciality: _____

41. Do you regularly (\geq once per year) participate in continuing education courses?

- Yes
- No

42. Do you belong to one or more professional practice-oriented organizations (eg, APTA)?

- Yes
- No

43. Are you a clinical instructor for physical therapist students/interns/residents?

- Yes
- No

44. On average, how many hours per week do you work?

- <20
- 20–30
- 31–40
- >40

45. On average, how many patients do you see daily?

- <5
- 5–10
- 11–15
- >15

46. How many full-time physical therapists are in the facility in which you do the majority of your patient care?

- <5
- 5–10
- 11–15
- >15

47. Please indicate the percentage of your total work time that you spend in each type of activity during an average month.

- a) Patient care %
- b) Research %
- c) Teaching %

48. Which of the following *best* describes the location of the facility in which you perform the majority of your patient care?

- Rural
- Urban
- Suburban

49. List the state(s) in which you practice.

50. Which of the following *best* describes the facility at which you do most of your patient care?

- Acute care hospital
- Acute rehabilitation
- Subacute rehabilitation
- Skilled nursing facility
- Privately owned outpatient clinic
- Facility-based outpatient clinic
- Home care
- School system
- University
- Other

51. Which of the following *best* describes the majority of patients and types of problems you see? Mark one box in each section.

- Orthopedic
- Neurological
- Cardiovascular/pulmonary
- Other
- Do not treat patients

- Pediatric (<18 y)
- Adult (19–64 y)
- Geriatric (65+ y)
- Other
- Do not treat patients

Retrieved from: Jette, D. U.; Bacon, K.; Batty, C.; Carlson, M.; Ferland, A.; Hemingway, R. D.; Hill, J. D.; Ogilvie, L. & Volk, D. (2003). Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. *Physical Therapy*, 83(9): 786-805).

**Annex VI – Permission to use and adapt the Jette et al. 2003
questionnaire**



Jette, Diane U. <djette@mghihp.edu>

Hoje, 16:15

Ricardo Luís de Almeida Maia Ferreira ↕

  Responder a todos | ▼

Please feel free to use the questionnaire. I have not updated it, but my understanding is that it has been translated and adapted in quite a few studies.

Diane Jette

...



Jette, Diane U. <DJETTE@MGHIHP.EDU>

Hoje, 03:46

Ricardo Luís de Almeida Maia Ferreira ↕

Please feel free to adapt the survey to fit your needs. Diane

**Annex VII – Evidence-based practice questionnaire for physical
therapis: Portuguese V1**

Questionário de Prática Baseada na Evidência (PBE)^a

Esta secção do questionário é sobre as atitudes individuais relativamente à PBE, ao seu uso, benefícios e limitações.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

1. A aplicação da PBE é necessária na prática da fisioterapia.
 Discordo totalmente Discordo Concordo Concordo totalmente
2. A literatura e os resultados de investigação são úteis na minha prática clínica diária.
 Discordo totalmente Discordo Concordo Concordo totalmente
3. Preciso de aumentar o uso da evidência na minha prática clínica diária.
 Discordo totalmente Discordo Concordo Concordo totalmente
4. A adoção da PBE coloca uma exigência excessiva nos fisioterapeutas.
 Discordo totalmente Discordo Concordo Concordo totalmente
5. Estou interessado em aprender ou melhorar as competências necessárias para incorporar a PBE na minha prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
6. A PBE melhora a qualidade dos cuidados aos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
7. A PBE não tem em consideração as limitações do meu contexto da prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
8. O meu rendimento financeiro poderá aumentar se eu incorporar a PBE na minha prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
9. Falta evidência forte para sustentar a maior parte das intervenções que eu uso com os doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
10. A PBE ajuda-me a tomar decisões acerca dos cuidados prestados aos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
11. A PBE não tem em consideração as preferências dos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta para um mês típico.

12. Leitura/revisão de investigação/literatura relacionada com a minha prática clínica.
 ≤1 artigo 2-5 artigos 6-10 artigos 11-15 artigos ≥16 artigos
13. Utilização de literatura especializada e resultados de investigação no processo de tomada de decisão clínica.
 ≤1 vez 2-5 vezes 6-10 vezes 11-15 vezes ≥16 vezes
14. Utilização da MEDLINE ou outras bases de dados para pesquisar literatura/investigação relevantes para a prática clínica.
 ≤1 vez 2-5 vezes 6-10 vezes 11-15 vezes ≥16 vezes

A secção seguinte é sobre o uso individual e a compreensão de normas de orientação clínica para a prática (*clinical practice guidelines*). As normas de orientação clínica para a prática oferecem uma descrição das especificações padrão para os cuidados prestados a doentes com doenças específicas e desenvolvem-se mediante um processo formal de construção de consenso, que incorpora a melhor evidência científica de efetividade e opinião especializada disponível.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

15. Estão disponíveis normas de orientação clínica para tópicos relacionados com a minha prática.
 Sim Não Não sei
16. Procuo ativamente normas de orientação clínica relacionadas com áreas da minha prática.
 Discordo totalmente Discordo Concordo Concordo totalmente
17. Uso normas de orientação clínica na minha prática.
 Discordo totalmente Discordo Concordo Concordo totalmente
18. Tenho conhecimento de que as normas de orientação clínica para a prática estão disponíveis *online*.
 Sim Não
19. Sou capaz de aceder *online* às normas de orientação clínica para a prática.
 Sim Não
20. Sou capaz de conciliar as preferências dos doentes com as normas de orientação clínica para a prática.
 Discordo totalmente Discordo Concordo Concordo totalmente

A secção seguinte é sobre recursos disponíveis para aceder a informação e competências individuais na utilização desses recursos.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta. Nos itens que referem o seu "local de trabalho", baseie-se na unidade onde presta a maioria dos cuidados aos doentes.

21. Tenho acesso a investigação atualizada através de revistas profissionais em formato de papel.
 Sim Não

22. Sou capaz de aceder a bases de dados eletrónicas no meu local de trabalho.
 Sim Não Não sei
23. Sou capaz de aceder a bases de dados eletrónicas em casa ou noutros locais sem ser no meu local de trabalho.
 Sim Não Não sei
24. No meu local de trabalho fomenta-se o uso de investigação atualizada na prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
25. Aprendi os fundamentos para a PBE, como parte da minha formação académica.
 Discordo totalmente Discordo Concordo Concordo totalmente
26. Recebi formação formal em estratégias de pesquisa para encontrar a investigação relevante para a minha prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
27. Estou familiarizado/a com os motores de pesquisa clínica (*por exemplo, MEDLINE, CINAHL, PEDro*).
 Discordo totalmente Discordo Concordo Concordo totalmente
28. Recebi formação formal para analisar criticamente a literatura científica como parte da minha preparação académica.
 Discordo totalmente Discordo Concordo Concordo totalmente
29. Tenho confiança na minha capacidade para ler criticamente literatura especializada.
 Discordo totalmente Discordo Concordo Concordo totalmente
30. Tenho confiança na minha capacidade para encontrar investigação relevante que responda às minhas questões clínicas.
 Discordo totalmente Discordo Concordo Concordo totalmente

Para o item seguinte, assinale a opção mais adequada para indicar a sua resposta para cada termo.

31. A minha compreensão dos seguintes termos:

Termo	Compreendo Perfeitamente	Compreendo Parcialmente	Não Compreendo
a) Risco relativo (<i>Relative risk</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Risco absoluto (<i>Absolute risk</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Revisão sistemática (<i>Systematic review</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Razão de probabilidade (<i>Odds ratio</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Meta-análise (<i>Meta-analysis</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Intervalo de confiança (<i>Confidence interval</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Heterogeneidade (<i>Heterogeneity</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Viés de publicação (<i>Publication bias</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Para os itens seguintes, ordene os 3 mais importantes (1 = mais importante).

32. Ordene as suas 3 principais barreiras ao uso de PBE na sua prática clínica.

- Tempo insuficiente
- Falta de recursos de informação
- Falta de competências de investigação
- Pouca capacidade para analisar criticamente a literatura
- Impossibilidade de generalizar os resultados da literatura à minha população alvo
- Incapacidade para aplicar os resultados da investigação a doentes com características específicas
- Falta de compreensão de análise estatística
- Falta de apoio coletivo por parte dos meus colegas de trabalho
- Falta de interesse

A secção seguinte é sobre informação demográfica individual.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

33. Qual é o seu sexo?

- Masculino Feminino

34. Qual é a sua faixa etária?

- 20–29 anos 30–39 anos 40–49 anos ≥50 anos

35. Tem atualmente uma cédula profissional de fisioterapeuta válida?

- Sim Não

36. Há quantos anos obteve a cédula profissional?

- <5 anos 5–10 anos 11–15 anos >15 anos

37. Qual o seu grau académico mais elevado?
- Bacharelato
 - Licenciatura
 - Mestrado
 - Doutoramento
 - Pós-doutoramento
 - Outro. Qual? _____
38. Tendo em conta o seu grau académico atual, gostaria de prosseguir os estudos no futuro?
- Sim
 - Não
 - Não sei
39. Participa com regularidade (≥ 1 vez por ano) em cursos de formação contínua?
- Sim
 - Não
40. Está inscrito nalguma organização profissional? (*por exemplo, Associação Portuguesa de Fisioterapeutas (APFISIO)*)?
- Sim
 - Não
41. É educador clínico/monitor de estudantes/estagiários de fisioterapia?
- Sim
 - Não
42. Em média, quantas horas trabalha por semana?
- <20 horas
 - 20–30 horas
 - 31–40 horas
 - >40 horas
43. Em média, quantos doentes atende por dia?
- 0
 - 1–5
 - 6–10
 - 11–15
 - >15
44. Quantos fisioterapeutas a tempo inteiro trabalham consigo no local de trabalho onde maioritariamente presta cuidados?
- 0
 - 1–5
 - 6–10
 - 11–15
 - >15
45. Por favor, indique a percentagem do seu tempo total de trabalho que leva em cada tipo de atividade durante um mês típico como (*responda números inteiros positivos múltiplos de 5; o total deve somar 100%*):
- a) Prestador de cuidados a doentes _____%
 - b) Investigador _____%
 - c) Professor _____%
46. Qual das seguintes opções melhor descreve o contexto demográfico do local de trabalho em que presta a maioria dos cuidados aos doentes?
- Aldeia
 - Vila
 - Cidade
 - Não trato doentes
47. Por favor, indique o distrito do local de trabalho em que presta a maioria dos cuidados aos doentes.
- Açores
 - Aveiro
 - Beja
 - Braga
 - Bragança
 - Castelo Branco
 - Coimbra
 - Évora
 - Faro
 - Guarda
 - Leiria
 - Lisboa
 - Madeira
 - Portalegre
 - Porto
 - Santarém
 - Setúbal
 - Viana do Castelo
 - Vila Real
 - Viseu
 - Não trato doentes

48. Qual das seguintes opções melhor descreve o local de trabalho em que presta a maioria dos cuidados aos doentes?

- Autarquia/Câmara Municipal
- Centro de Medicina Física e Reabilitação
- Centro de Saúde
- Centro Geriátrico/Estrutura Residencial para Idosos
- Clínica Privada
- Clube ou Associação Desportiva
- Cuidados ao Domicílio
- Empresa Comercial, Industrial ou outra
- Empresa de Prestação de Serviços de Saúde
- Gabinete de Estética
- Gabinete de Fisioterapia
- Ginásio/Fitness Center
- Hospital Privado
- Hospital Público ou Parceria Público-privada
- Instituição de Ensino Básico ou Secundário
- Instituição de Ensino Pré-escolar
- Instituição de Ensino Superior ou Centro de Investigação
- Piscina
- Spa
- Termas
- Unidade de Cuidados Continuados
- Outro. Qual? _____

Não trato doentes

49. Qual das seguintes opções melhor descreve a maioria dos doentes e o tipo de problemas com que se depara?

- Cardiorrespiratória
- Cuidados Continuados e Paliativos
- Cuidados de Saúde Hospitalar
- Cuidados de Saúde Primários
- Dermato-funcional
- Desporto
- Envelhecimento
- Fisioterapia Aquática
- Fisioterapia na Saúde dos Animais
- Músculo-esquelético
- Neurologia
- Pediatria
- Pessoas com Amputação
- Saúde da Mulher
- Saúde Mental
- Outro. Qual? _____

Pediátrico (≤ 18 anos)

Adulto (19-64 anos)

Geriátrico (≥ 65 anos)

Não trato doentes

^a Tradução e adaptação cultural para português europeu do *Evidence-Based Practice Questionnaire* (Jette, D. U.; Bacon, K.; Batty, C.; Carlson, M.; Ferland, A.; Hemingway, R. D.; Hill, J. D.; Ogilvie, L. & Volk, D. (2003). Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. *Physical Therapy*, 83(9): 786-805).

Annex VIII – Ethical Commission

Declaração

Para os devidos efeitos, declara-se que o projeto CEFAD 24 2019, intitulado “A mixed-method study of physiotherapists practice, beliefs and attitudes in knee osteoarthritis management.”, submetido à Comissão de Ética da Faculdade de Desporto da Universidade do Porto, por Ricardo Luis de Almeida Maia Ferreira, foi aprovado, por ter em conta os requisitos éticos recomendados.

Porto e Faculdade de Desporto, 27 de

Julho de 2019A Presidente da

Comissão de Ética



Zélia Maria Matos de Almeida Roque Pinto

**Annex IX – Evidence-based practice questionnaire for physical
therapis: Portuguese V2**

Questionário de Prática Baseada na Evidência (PBE)^a

Esta secção do questionário é sobre as atitudes individuais relativamente à PBE, ao seu uso, benefícios e limitações.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

1. A aplicação da PBE é necessária na prática da fisioterapia.
 Discordo totalmente Discordo Concordo Concordo totalmente
2. A literatura e os resultados de investigação são úteis na minha prática clínica diária.
 Discordo totalmente Discordo Concordo Concordo totalmente
3. Preciso de aumentar o uso da evidência na minha prática clínica diária.
 Discordo totalmente Discordo Concordo Concordo totalmente
4. A adoção da PBE coloca uma exigência excessiva nos fisioterapeutas.
 Discordo totalmente Discordo Concordo Concordo totalmente
5. Estou interessado em aprender ou melhorar as competências necessárias para incorporar a PBE na minha prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
6. A PBE melhora a qualidade dos cuidados aos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
7. A PBE não tem em consideração as limitações do meu contexto da prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
8. O meu rendimento financeiro poderá aumentar se eu incorporar a PBE na minha prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
9. Falta evidência forte para sustentar a maior parte das intervenções que eu uso com os doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
10. A PBE ajuda-me a tomar decisões acerca dos cuidados prestados aos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
11. A PBE não tem em consideração as preferências dos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta para um mês típico.

12. Leitura/revisão de investigação/literatura relacionada com a minha prática clínica.
 ≤1 artigo 2-5 artigos 6-10 artigos 11-15 artigos ≥16 artigos
13. Utilização de literatura especializada e resultados de investigação no processo de tomada de decisão clínica.
 ≤1 vez 2-5 vezes 6-10 vezes 11-15 vezes ≥16 vezes
14. Utilização da MEDLINE ou outras bases de dados para pesquisar literatura/investigação relevantes para a prática clínica.
 ≤1 vez 2-5 vezes 6-10 vezes 11-15 vezes ≥16 vezes

A secção seguinte é sobre o uso individual e a compreensão de normas de orientação clínica para a prática (*clinical practice guidelines*). As normas de orientação clínica para a prática oferecem uma descrição das especificações padrão para os cuidados prestados a doentes com doenças específicas e desenvolvem-se mediante um processo formal de construção de consenso, que incorpora a melhor evidência científica de efetividade e opinião especializada disponível.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

15. Estão disponíveis normas de orientação clínica para tópicos relacionados com a minha prática.
 Sim Não Não sei
16. Procuo ativamente normas de orientação clínica relacionadas com áreas da minha prática.
 Discordo totalmente Discordo Concordo Concordo totalmente
17. Uso normas de orientação clínica na minha prática.
 Discordo totalmente Discordo Concordo Concordo totalmente
18. Tenho conhecimento de que as normas de orientação clínica para a prática estão disponíveis *online*.
 Sim Não
19. Sou capaz de aceder *online* às normas de orientação clínica para a prática.
 Sim Não
20. Sou capaz de conciliar as preferências dos doentes com as normas de orientação clínica para a prática.
 Discordo totalmente Discordo Concordo Concordo totalmente

A secção seguinte é sobre recursos disponíveis para aceder a informação e competências individuais na utilização desses recursos.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta. Nos itens que referem o seu "local de trabalho", baseie-se na unidade onde presta a maioria dos cuidados aos doentes.

21. Tenho acesso a investigação atualizada através de revistas profissionais em formato de papel.
 Sim Não

22. Sou capaz de aceder a bases de dados eletrónicas no meu local de trabalho.
 Sim Não Não sei
23. Sou capaz de aceder a bases de dados eletrónicas em casa ou noutros locais sem ser no meu local de trabalho.
 Sim Não Não sei
24. No meu local de trabalho fomenta-se o uso de investigação atualizada na prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
25. Aprendi os fundamentos para a PBE, como parte da minha formação académica.
 Discordo totalmente Discordo Concordo Concordo totalmente
26. Recebi formação formal em estratégias de pesquisa para encontrar a investigação relevante para a minha prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
27. Estou familiarizado/a com os motores de pesquisa clínica (*por exemplo, MEDLINE, CINAHL, PEDro*).
 Discordo totalmente Discordo Concordo Concordo totalmente
28. Recebi formação formal para analisar criticamente a literatura científica como parte da minha preparação académica.
 Discordo totalmente Discordo Concordo Concordo totalmente
29. Tenho confiança na minha capacidade para ler criticamente literatura especializada.
 Discordo totalmente Discordo Concordo Concordo totalmente
30. Tenho confiança na minha capacidade para encontrar investigação relevante que responda às minhas questões clínicas.
 Discordo totalmente Discordo Concordo Concordo totalmente

Para o item seguinte, assinale a opção mais adequada para indicar a sua resposta para cada termo.

31. A minha compreensão dos seguintes termos:

Termo	Compreendo Perfeitamente	Compreendo Parcialmente	Não Compreendo
a) Risco relativo (<i>Relative risk</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Risco absoluto (<i>Absolute risk</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Revisão sistemática (<i>Systematic review</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Razão de chances (<i>Odds ratio</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Meta-análise (<i>Meta-analysis</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Intervalo de confiança (<i>Confidence interval</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Heterogeneidade (<i>Heterogeneity</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Viés de publicação (<i>Publication bias</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Para os itens seguintes, ordene os 3 mais importantes (1 = mais importante).

32. Ordene as suas 3 principais barreiras ao uso de PBE na sua prática clínica.

- ___ Tempo insuficiente
- ___ Falta de recursos de informação
- ___ Falta de competências de investigação
- ___ Pouca capacidade para analisar criticamente a literatura
- ___ Impossibilidade de generalizar os resultados da literatura à minha população alvo
- ___ Incapacidade para aplicar os resultados da investigação a doentes com características específicas
- ___ Falta de compreensão de análise estatística
- ___ Falta de apoio coletivo por parte dos meus colegas de trabalho
- ___ Falta de interesse

A secção seguinte é sobre informação demográfica individual.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

33. Qual é o seu sexo?

- Masculino Feminino

34. Qual é a sua faixa etária?

- 20–29 anos 30–39 anos 40–49 anos ≥50 anos

35. Tem atualmente uma cédula profissional de fisioterapeuta válida?

- Sim Não

36. Há quantos anos obteve a cédula profissional?

- <5 anos 5–10 anos 11–15 anos >15 anos

37. Qual o seu grau académico mais elevado?
- Bacharelato
 - Licenciatura
 - Mestrado
 - Doutoramento
 - Pós-doutoramento
 - Outro. Qual? _____
38. Tendo em conta o seu grau académico atual, gostaria de prosseguir os estudos no futuro?
- Sim
 - Não
 - Não sei
39. Participa com regularidade (≥ 1 vez por ano) em cursos de formação contínua?
- Sim
 - Não
40. Está inscrito nalguma organização profissional (por exemplo, Associação Portuguesa de Fisioterapeutas (APFISIO))?
- Sim
 - Não
41. É educador clínico/monitor de estudantes/estagiários de fisioterapia?
- Sim
 - Não
42. Em média, quantas horas trabalha por semana?
- <20 horas
 - 20–30 horas
 - 31–40 horas
 - >40 horas
43. Em média, quantos doentes atende por dia?
- 0
 - 1–5
 - 6–10
 - 11–15
 - >15
44. Quantos fisioterapeutas a tempo inteiro trabalham consigo no local de trabalho onde maioritariamente presta cuidados?
- 0
 - 1–5
 - 6–10
 - 11–15
 - >15
45. Por favor, indique a percentagem do seu tempo total de trabalho que leva em cada tipo de atividade durante um mês típico como:
- a) Prestador de cuidados a doentes
 - 0%
 - 5–25%
 - 30–50%
 - 55–75%
 - 80–100%
 - b) Investigador
 - 0%
 - 5–25%
 - 30–50%
 - 55–75%
 - 80–100%
 - c) Professor
 - 0%
 - 5–25%
 - 30–50%
 - 55–75%
 - 80–100%
46. Qual das seguintes opções melhor descreve o contexto demográfico do local de trabalho em que presta a maioria dos cuidados aos doentes?
- Aldeia
 - Vila
 - Cidade
 - Não trato doentes
47. Por favor, indique o distrito do local de trabalho em que presta a maioria dos cuidados aos doentes.
- Açores
 - Aveiro
 - Beja
 - Braga
 - Bragança
 - Castelo Branco
 - Coimbra
 - Évora
 - Faro
 - Guarda
 - Leiria
 - Lisboa
 - Madeira
 - Portalegre
 - Porto
 - Santarém
 - Setúbal
 - Viana do Castelo
 - Vila Real
 - Viseu
 - Não trato doentes

48. Qual das seguintes opções melhor descreve o local de trabalho em que presta a maioria dos cuidados aos doentes (selecione apenas um local de trabalho)?

- Autarquia/Câmara Municipal
 - Centro de Medicina Física e Reabilitação
 - Centro de Saúde
 - Centro Geriátrico/Estrutura Residencial para Idosos
 - Clínica Privada
 - Clube ou Associação Desportiva
 - Cuidados ao Domicílio
 - Empresa Comercial, Industrial ou outra
 - Empresa de Prestação de Serviços de Saúde
 - Gabinete de Estética
 - Gabinete de Fisioterapia
 - Ginásio/Fitness Center
 - Hospital Privado
 - Hospital Público ou Parceria Público-privada
 - Instituição de Ensino Básico ou Secundário
 - Instituição de Ensino Pré-escolar
 - Instituição de Ensino Superior ou Centro de Investigação
 - Piscina
 - Spa
 - Termas
 - Unidade de Cuidados Continuados
 - Outro. Qual? _____
- Não trato doentes

49. Qual das seguintes opções melhor descreve a maioria dos doentes e o tipo de problemas com que se depara (selecione apenas uma área de intervenção e um grupo etário)?

- Cardiorrespiratória
 - Cuidados Continuados e Paliativos
 - Cuidados de Saúde Hospitalar
 - Cuidados de Saúde Primários
 - Dermato-funcional
 - Desporto
 - Envelhecimento
 - Fisioterapia Aquática
 - Fisioterapia na Saúde dos Animais
 - Músculo-esquelético
 - Neurologia
 - Pediatria
 - Pessoas com Amputação
 - Saúde da Mulher
 - Saúde Mental
 - Outro. Qual? _____
- Pediátrico (≤ 18 anos)
- Adulto (19-64 anos)
- Geriátrico (≥ 65 anos)
- Não trato doentes

Retrieved from: Ferreira, R. M., Ferreira, P. L., Cavalheiro, L., Duarte, J. A., & Gonçalves, R. S. (2019). Evidence-based practice questionnaire for physical therapists: Portuguese translation, adaptation, validity, and reliability. *Journal of Evidence-Based Healthcare*, 1(2), 83-98.

**Annex X – Evidence-based practice questionnaire for physical
therapis: Online Version**

A secção seguinte é sobre informação demográfica individual.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

2. Quais são as suas competências na língua Portuguesa?
 - Sei ler, escrever e falar Português
 - Não sei ler nem escrever, mas sei falar Português
 - Sei ler e escrever, mas não sei falar Português
 - Não sei ler, escrever ou falar Português
3. Exerce atualmente ou exerceu recentemente (há pelo menos 6 meses) funções como fisioterapeuta em Portugal?
 - Sim
 - Não
4. Qual é o seu sexo?
 - Masculino
 - Feminino
5. Qual é a sua faixa etária?
 - 20-29 anos
 - 30-39 anos
 - 40-49 anos
 - ≥50 anos
6. Tem atualmente uma cédula profissional de fisioterapeuta válida?
 - Sim
 - Não
7. Há quantos anos obteve a cédula profissional?
 - <5 anos
 - 5-10 anos
 - 11-15 anos
 - >15 anos
8. Qual o seu grau académico mais elevado?
 - Bacharelato
 - Licenciatura
 - Mestrado
 - Doutoramento
 - Pós-doutoramento
 - Outro. Qual? _____
9. Tendo em conta o seu grau académico atual, gostaria de prosseguir os estudos no futuro?
 - Sim
 - Não
 - Não sei
10. Participa com regularidade (≥ 1 vez por ano) em cursos de formação contínua?
 - Sim
 - Não
11. Está inscrito nalguma organização profissional (*por exemplo, Associação Portuguesa de Fisioterapeutas (APFISIO)*)?
 - Sim
 - Não
12. É educador clínico/monitor de estudantes/estagiários de fisioterapia?
 - Sim
 - Não
13. Em média, quantas horas trabalha por semana?
 - <20 horas
 - 20-30 horas
 - 31-40 horas
 - >40 horas
14. Em média, quantos doentes atende por dia?
 - 0
 - 1-5
 - 6-10
 - 11-15
 - >15
15. Quantos fisioterapeutas a tempo inteiro trabalham consigo no local de trabalho onde maioritariamente presta cuidados?
 - 0
 - 1-5
 - 6-10
 - 11-15
 - >15
16. Por favor, indique a percentagem do seu tempo total de trabalho que leva em cada tipo de atividade durante um mês típico como:
 - a) Prestador de cuidados a doentes
 - 0%
 - 5-25%
 - 30-50%
 - 55-75%
 - 80-100%
 - b) Investigador
 - 0%
 - 5-25%
 - 30-50%
 - 55-75%
 - 80-100%
 - c) Professor
 - 0%
 - 5-25%
 - 30-50%
 - 55-75%
 - 80-100%
17. Qual das seguintes opções melhor descreve o contexto demográfico do local de trabalho em que presta a maioria dos cuidados aos doentes?
 - Aldeia
 - Vila
 - Cidade

 - Não trato doentes

18. Por favor, indique o distrito do local de trabalho em que presta a maioria dos cuidados aos doentes.

- | | |
|---|---|
| <input type="checkbox"/> Açores | <input type="checkbox"/> Leiria |
| <input type="checkbox"/> Aveiro | <input type="checkbox"/> Lisboa |
| <input type="checkbox"/> Beja | <input type="checkbox"/> Madeira |
| <input type="checkbox"/> Braga | <input type="checkbox"/> Portalegre |
| <input type="checkbox"/> Bragança | <input type="checkbox"/> Porto |
| <input type="checkbox"/> Castelo Branco | <input type="checkbox"/> Santarém |
| <input type="checkbox"/> Coimbra | <input type="checkbox"/> Setúbal |
| <input type="checkbox"/> Évora | <input type="checkbox"/> Viana do Castelo |
| <input type="checkbox"/> Faro | <input type="checkbox"/> Vila Real |
| <input type="checkbox"/> Guarda | <input type="checkbox"/> Viseu |

Não trato doentes

19. Qual das seguintes opções melhor descreve o local de trabalho em que presta a maioria dos cuidados aos doentes?

- Autarquia/Câmara Municipal
- Centro de Medicina Física e Reabilitação
- Centro de Saúde
- Centro Geriátrico/Estrutura Residencial para Idosos
- Clínica Privada
- Clube ou Associação Desportiva
- Cuidados ao Domicílio
- Empresa Comercial, Industrial ou outra
- Empresa de Prestação de Serviços de Saúde
- Gabinete de Estética
- Gabinete de Fisioterapia
- Ginásio/Fitness Center
- Hospital Privado
- Hospital Público ou Parceria Público-privada
- Instituição de Ensino Básico ou Secundário
- Instituição de Ensino Pré-escolar
- Instituição de Ensino Superior ou Centro de Investigação
- Piscina
- Spa
- Termas
- Unidade de Cuidados Continuados
- Outro. Qual? _____

Não trato doentes

20. Qual das seguintes opções melhor descreve o tipo de problemas com que se depara?

- Cardiorrespiratória
- Cuidados Continuados e Paliativos
- Cuidados de Saúde Hospitalar
- Cuidados de Saúde Primários
- Dermato-funcional
- Desporto
- Envelhecimento
- Fisioterapia Aquática
- Fisioterapia na Saúde dos Animais
- Músculo-esquelético
- Neurologia
- Pediatria
- Pessoas com Amputação
- Saúde da Mulher
- Saúde Mental
- Outro. Qual? _____
- Não trato doentes

21. Qual das seguintes opções melhor descreve a maioria dos doentes com que se depara?

- Pediátrico (≤ 18 anos)
- Adulto (19-64 anos)
- Geriátrico (≥ 65 anos)

Não trato doentes

22. Em que escola concluiu a sua licenciatura em Fisioterapia?

- Atlântica – Escola Universitária de Ciências Empresariais, Saúde, Tecnologias e Engenharia
- Escola Superior de Saúde da Cruz Vermelha Portuguesa
- Escola Superior de Saúde da Universidade de Aveiro
- Escola Superior de Saúde de Leiria
- Escola Superior de Saúde do Porto
- Escola Superior de Saúde de Santa Maria
- Escola Superior de Saúde de Setúbal
- Escola Superior de Saúde do Alcoitão
- Escola Superior de Saúde do Vale do Ave
- Escola Superior de Saúde do Vale do Sousa
- Escola Superior de Saúde Dr. Lopes Dias
- Escola Superior de Saúde Egas Moniz
- Escola Superior de Saúde Jean Piaget – Silves
- Escola Superior de Saúde Jean Piaget – Vila Nova de Gaia
- Escola Superior de Saúde Jean Piaget – Viseu
- Escola Superior de Tecnologia da Saúde de Coimbra
- Escola Superior de Tecnologia da Saúde de Lisboa
- Instituto Superior de Saúde do Alto do Ave
- Universidade Fernando Pessoa

Não concluí o meu ciclo de estudos em Portugal

23. Tendo em conta as suas horas semanais, qual o seu principal sector de trabalho?

- Público
- Privado
- Académico

24. Tendo em conta as suas horas semanais, trabalha mais:

- Por conta própria
- Por conta de outrem

Esta secção do questionário é sobre as atitudes individuais relativamente à PBE, ao seu uso, benefícios e limitações.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

25. A aplicação da PBE é necessária na prática da fisioterapia.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

26. A literatura e os resultados de investigação são úteis na minha prática clínica diária.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

27. Preciso de aumentar o uso da evidência na minha prática clínica diária.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

28. A adoção da PBE coloca uma exigência excessiva nos fisioterapeutas.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

29. Estou interessado em aprender ou melhorar as competências necessárias para incorporar a PBE na minha prática clínica.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

30. A PBE melhora a qualidade dos cuidados aos doentes.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

31. A PBE não tem em consideração as limitações do meu contexto da prática clínica.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

32. O meu rendimento financeiro poderá aumentar se eu incorporar a PBE na minha prática clínica.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

33. Falta evidência forte para sustentar a maior parte das intervenções que eu uso com os doentes.

- Discordo totalmente
- Discordo
- Concordo
- Concordo totalmente

34. A PBE ajuda-me a tomar decisões acerca dos cuidados prestados aos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
35. A PBE não tem em consideração as preferências dos doentes.
 Discordo totalmente Discordo Concordo Concordo totalmente
- Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta para um mês típico.*
36. Leitura/revisão de investigação/literatura relacionada com a minha prática clínica.
 ≤1 artigo 2-5 artigos 6-10 artigos 11-15 artigos ≥16 artigos
37. Utilização de literatura especializada e resultados de investigação no processo de tomada de decisão clínica.
 ≤1 vez 2-5 vezes 6-10 vezes 11-15 vezes ≥16 vezes
38. Utilização da MEDLINE ou outras bases de dados para pesquisar literatura/investigação relevantes para a prática clínica.
 ≤1 vez 2-5 vezes 6-10 vezes 11-15 vezes ≥16 vezes
- A secção seguinte é sobre o uso individual e a compreensão de normas de orientação clínica para a prática (*clinical practice guidelines*). As normas de orientação clínica para a prática oferecem uma descrição das especificações padrão para os cuidados prestados a doentes com doenças específicas e desenvolvem-se mediante um processo formal de construção de consenso, que incorpora a melhor evidência científica de efetividade e opinião especializada disponível.**
- Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.*
39. Estão disponíveis normas de orientação clínica para tópicos relacionados com a minha prática.
 Sim Não Não sei
40. Procuo ativamente normas de orientação clínica relacionadas com áreas da minha prática.
 Discordo totalmente Discordo Concordo Concordo totalmente
41. Uso normas de orientação clínica na minha prática.
 Discordo totalmente Discordo Concordo Concordo totalmente
42. Tenho conhecimento de que as normas de orientação clínica para a prática estão disponíveis *online*.
 Sim Não
43. Sou capaz de aceder *online* às normas de orientação clínica para a prática.
 Sim Não
44. Sou capaz de conciliar as preferências dos doentes com as normas de orientação clínica para a prática.
 Discordo totalmente Discordo Concordo Concordo totalmente
- A secção seguinte é sobre recursos disponíveis para aceder a informação e competências individuais na utilização desses recursos.**
- Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta. Nos itens que referem o seu "local de trabalho", baseie-se na unidade onde presta a maioria dos cuidados aos doentes.*
45. Tenho acesso a investigação atualizada através de revistas profissionais em formato de papel.
 Sim Não
46. Sou capaz de aceder a bases de dados eletrónicas no meu local de trabalho.
 Sim Não Não sei
47. Sou capaz de aceder a bases de dados eletrónicas em casa ou noutros locais sem ser no meu local de trabalho.
 Sim Não Não sei
48. No meu local de trabalho fomenta-se o uso de investigação atualizada na prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
49. Aprendi os fundamentos para a PBE, como parte da minha formação académica.
 Discordo totalmente Discordo Concordo Concordo totalmente
50. Recebi formação formal em estratégias de pesquisa para encontrar a investigação relevante para a minha prática clínica.
 Discordo totalmente Discordo Concordo Concordo totalmente
51. Estou familiarizado/a com os motores de pesquisa clínica (*por exemplo, MEDLINE, CINAHL, PEDro*).
 Discordo totalmente Discordo Concordo Concordo totalmente
52. Recebi formação formal para analisar criticamente a literatura científica como parte da minha preparação académica.
 Discordo totalmente Discordo Concordo Concordo totalmente
53. Tenho confiança na minha capacidade para ler criticamente literatura especializada.
 Discordo totalmente Discordo Concordo Concordo totalmente
54. Tenho confiança na minha capacidade para encontrar investigação relevante que responda às minhas questões clínicas.
 Discordo totalmente Discordo Concordo Concordo totalmente

Para o item seguinte, assinale a opção mais adequada para indicar a sua resposta para cada termo.

55. A minha compreensão dos seguintes termos:

Termo	Compreendo Perfeitamente	Compreendo Parcialmente	Não Compreendo
a) Risco relativo (<i>Relative risk</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Risco absoluto (<i>Absolute risk</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Revisão sistemática (<i>Systematic review</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Razão de chances (<i>Odds ratio</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Meta-análise (<i>Meta-analysis</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Intervalo de confiança (<i>Confidence interval</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Heterogeneidade (<i>Heterogeneity</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Viés de publicação (<i>Publication bias</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Para os itens seguintes, ordene os 3 mais importantes (1 = mais importante).

56. Ordene as suas 3 principais barreiras ao uso de PBE na sua prática clínica.

- ___ Tempo insuficiente
- ___ Falta de recursos de informação
- ___ Falta de competências de investigação
- ___ Pouca capacidade para analisar criticamente a literatura
- ___ Impossibilidade de generalizar os resultados da literatura à minha população alvo
- ___ Incapacidade para aplicar os resultados da investigação a doentes com características específicas
- ___ Falta de compreensão de análise estatística
- ___ Falta de apoio coletivo por parte dos meus colegas de trabalho
- ___ Falta de interesse

57. Muito obrigado pela sua participação. Sem a sua ajuda este trabalho não se podia concretizar. Nós iremos continuar a desenvolver mais trabalhos relacionados com esta temática e gostaríamos de, mais uma vez, contar com o seu apoio nesta tarefa.

Se tiver interesse em participar em estudos futuros, por favor indique a resposta sim e o seu e-mail. Se não quiser participar em mais estudos relacionados com este tema escolha a resposta não.

- Sim. Declaro que gostaria de continuar a ser estudado e que é de minha espontânea vontade fazê-lo. _____
- Não. A minha participação no estudo acaba neste momento. _____ (e-mail)

Annex XI – Evidence-based practice classification grid

Annex XII – Knee Osteoarthritis Clinical Vignette

A 65-year-old woman was referred by her general practitioner with a 3-year history of left knee pain, which was of insidious onset and has gradually worsened over time. She is a retired shop manager and usually enjoys gardening, but this has become difficult due to her knee problem. Her general health is good, despite being overweight and having mild hypertension. She also has pain in both hands. Today, she rates the intensity of her knee pain as 6 out of 10. Descending stairs, bending, and rising from sitting all aggravate her knee pain. She has some difficulty when walking and has started to use a cane outdoors. Her knee is stiff first thing in the morning and after staying in one position for too long. She finds some relief from an anti-inflammatory gel and takes up to three 200-mg ibuprofen tablets per day. Despite not having a radiograph, she feels her problem is due to arthritis, as her father had this. It is her first referral for physical therapy, and she is optimistic about its outcome. On examination, the left knee has a mild effusion and a valgus alignment. Flexion is limited, and the quadriceps femoris muscles are weak. The joint line is tender on palpation. No other examination findings are remarkable.

Retrieved from: Holden, M. A., Nicholls, E. E., Hay, E. M., & Foster, N. E. (2008). Physical therapists' use of therapeutic exercise for patients with clinical knee osteoarthritis in the United Kingdom: in line with current recommendations?. *Physical Therapy, 88*(10), 1109-1121.

**Annex XIII – Permission to use and adapt the Holden et al. 2008
Clinical Vignette**



Melanie Holden <m.holden@keele.ac.uk>

Hoje, 13:51

Ricardo Luís de Almeida Maia Ferreira ↵

  Responder a todos | ▼

Dear Ricardo,

That is absolutely fine, we just request that you appropriately acknowledge our original paper.
Good luck with your research.

Kind Regards

Mel

...

Annex XIV – Knee Osteoarthritis Questionnaire

A secção seguinte é sobre informação demográfica individual.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

2. Quais são as suas competências na língua Portuguesa?
- Sei ler, escrever e falar Português
 - Não sei ler nem escrever, mas sei falar Português
 - Sei ler e escrever, mas não sei falar Português
 - Não sei ler, escrever ou falar Português
3. Exerce atualmente ou exerceu recentemente (há pelo menos 6 meses) funções como fisioterapeuta em Portugal?
- Sim
 - Não
4. Qual é o seu sexo?
- Masculino
 - Feminino
5. Qual é a sua faixa etária?
- 20–29 anos
 - 30–39 anos
 - 40–49 anos
 - ≥50 anos
6. Tem atualmente uma cédula profissional de fisioterapeuta válida?
- Sim
 - Não
7. Há quantos anos obteve a cédula profissional?
- <5 anos
 - 5–10 anos
 - 11–15 anos
 - >15 anos
8. Qual o seu grau académico mais elevado?
- Bacharelato
 - Licenciatura
 - Mestrado
 - Doutoramento
 - Pós-doutoramento
 - Outro. Qual? _____
9. Tendo em conta o seu grau académico atual, gostaria de prosseguir os estudos no futuro?
- Sim
 - Não
 - Não sei
10. Participa com regularidade (≥ 1 vez por ano) em cursos de formação contínua?
- Sim
 - Não
11. Está inscrito nalguma organização profissional (*por exemplo, Associação Portuguesa de Fisioterapeutas (APFISIO)*)?
- Sim
 - Não
12. É educador clínico/monitor de estudantes/estagiários de fisioterapia?
- Sim
 - Não
13. Em média, quantas horas trabalha por semana?
- <20 horas
 - 20–30 horas
 - 31–40 horas
 - >40 horas
14. Em média, quantos doentes atende por dia?
- 0
 - 1–5
 - 6–10
 - 11–15
 - >15
15. Quantos fisioterapeutas a tempo inteiro trabalham consigo no local de trabalho onde maioritariamente presta cuidados?
- 0
 - 1–5
 - 6–10
 - 11–15
 - >15
16. Por favor, indique a percentagem do seu tempo total de trabalho que leva em cada tipo de atividade durante um mês típico como:
- a) Prestador de cuidados a doentes
 - 0%
 - 5–25%
 - 30–50%
 - 55–75%
 - 80–100%
 - b) Investigador
 - 0%
 - 5–25%
 - 30–50%
 - 55–75%
 - 80–100%
 - c) Professor
 - 0%
 - 5–25%
 - 30–50%
 - 55–75%
 - 80–100%
17. Qual das seguintes opções melhor descreve o contexto demográfico do local de trabalho em que presta a maioria dos cuidados aos doentes?
- Aldeia
 - Vila
 - Cidade

 - Não trato doentes

18. Por favor, indique o distrito do local de trabalho em que presta a maioria dos cuidados aos doentes.

- | | |
|---|---|
| <input type="checkbox"/> Açores | <input type="checkbox"/> Leiria |
| <input type="checkbox"/> Aveiro | <input type="checkbox"/> Lisboa |
| <input type="checkbox"/> Beja | <input type="checkbox"/> Madeira |
| <input type="checkbox"/> Braga | <input type="checkbox"/> Portalegre |
| <input type="checkbox"/> Bragança | <input type="checkbox"/> Porto |
| <input type="checkbox"/> Castelo Branco | <input type="checkbox"/> Santarém |
| <input type="checkbox"/> Coimbra | <input type="checkbox"/> Setúbal |
| <input type="checkbox"/> Évora | <input type="checkbox"/> Viana do Castelo |
| <input type="checkbox"/> Faro | <input type="checkbox"/> Vila Real |
| <input type="checkbox"/> Guarda | <input type="checkbox"/> Viseu |

Não trato doentes

19. Qual das seguintes opções melhor descreve o local de trabalho em que presta a maioria dos cuidados aos doentes?

- Autarquia/Câmara Municipal
- Centro de Medicina Física e Reabilitação
- Centro de Saúde
- Centro Geriátrico/Estrutura Residencial para Idosos
- Clínica Privada
- Clube ou Associação Desportiva
- Cuidados ao Domicílio
- Empresa Comercial, Industrial ou outra
- Empresa de Prestação de Serviços de Saúde
- Gabinete de Estética
- Gabinete de Fisioterapia
- Ginásio/Fitness Center
- Hospital Privado
- Hospital Público ou Parceria Público-privada
- Instituição de Ensino Básico ou Secundário
- Instituição de Ensino Pré-escolar
- Instituição de Ensino Superior ou Centro de Investigação
- Piscina
- Spa
- Termas
- Unidade de Cuidados Continuados
- Outro. Qual? _____

Não trato doentes

20. Qual das seguintes opções melhor descreve o tipo de problemas com que se depara?

- Cardiorrespiratória
- Cuidados Continuados e Paliativos
- Cuidados de Saúde Hospitalar
- Cuidados de Saúde Primários
- Dermato-funcional
- Desporto
- Envelhecimento
- Fisioterapia Aquática
- Fisioterapia na Saúde dos Animais
- Músculo-esquelético
- Neurologia
- Pediatria
- Pessoas com Amputação
- Saúde da Mulher
- Saúde Mental
- Outro. Qual? _____

Não trato doentes

21. Qual das seguintes opções melhor descreve a maioria dos doentes com que se depara?

- Pediátrico (≤ 18 anos)
- Adulto (19-64 anos)
- Geriátrico (≥ 65 anos)

Não trato doentes

22. Em que escola concluiu a sua licenciatura em Fisioterapia?

- Atlântica - Escola Universitária de Ciências Empresariais, Saúde, Tecnologias e Engenharia
- Escola Superior de Saúde da Cruz Vermelha Portuguesa
- Escola Superior de Saúde da Universidade de Aveiro
- Escola Superior de Saúde de Leiria
- Escola Superior de Saúde do Porto
- Escola Superior de Saúde de Santa Maria
- Escola Superior de Saúde de Setúbal
- Escola Superior de Saúde do Alcoitão
- Escola Superior de Saúde do Vale do Ave
- Escola Superior de Saúde do Vale do Sousa
- Escola Superior de Saúde Dr. Lopes Dias
- Escola Superior de Saúde Egas Moniz
- Escola Superior de Saúde Jean Piaget - Silves
- Escola Superior de Saúde Jean Piaget - Vila Nova de Gaia
- Escola Superior de Saúde Jean Piaget - Viseu
- Escola Superior de Tecnologia da Saúde de Coimbra
- Escola Superior de Tecnologia da Saúde de Lisboa
- Instituto Superior de Saúde do Alto do Ave
- Universidade Fernando Pessoa

Não concluí o meu ciclo de estudos em Portugal

23. Tendo em conta as suas horas semanais, qual o seu principal sector de trabalho?

- Público
- Privado
- Académico

24. Tendo em conta as suas horas semanais, trabalha mais:

- Por conta própria
- Por conta de outrem

A secção seguinte é sobre tratamento de doentes com osteoartrose do joelho.

Para os itens seguintes, assinale a opção mais adequada para indicar a sua resposta.

25. Tratou algum doente com osteoartrose do joelho nos últimos 6 meses?

- Sim
- Não

26. De acordo com o seguinte cenário clínico, ordene 5 intervenções que considera importante administrar (1= mais importante)

Cenário clínico:

Uma mulher com 65 anos foi referenciada pelo seu médico de família, com uma história clínica de 3 anos de dor no joelho esquerdo, de início insidioso que tem vindo a piorar gradualmente. Ela é uma gerente de loja aposentada que faz habitualmente jardinagem, atividade que se tem tornado difícil devido ao seu problema no joelho. A sua saúde geral é boa, apesar de ter excesso de peso e hipertensão moderada. Também tem dor em ambas as mãos. Hoje, ela percebe a sua dor no joelho com uma intensidade de 6 em 10. Atividades como descer escadas, dobrar-se e levantar-se a partir da posição de sentada, todas agravam a sua dor no joelho. Ela tem alguma dificuldade a caminhar e começou a usar uma bengala fora de casa. O joelho apresenta rigidez matinal e após estar muito tempo na mesma posição. Ela encontra algum alívio com a aplicação de um gel anti-inflamatório e toma até três comprimidos de 200mg de ibuprofeno por dia. Apesar de não ter uma radiografia, ela sente que o seu problema se deve à artrose, uma vez que o seu pai tinha essa doença. É a primeira vez que faz fisioterapia e está otimista quanto ao resultado. Ao examinar, o joelho esquerdo apresenta um leve edema e valgismo. A flexão está limitada e os músculos do quadríceps femoral estão fracos. A interlinha articular apresenta-se sensível à palpação. Nenhum outro resultado de exame é digno de anotação.

- | | | |
|---|--|--|
| <input type="checkbox"/> Acompanhamento nutricional | <input type="checkbox"/> Hidroginástica | <input type="checkbox"/> Tai Ji |
| <input type="checkbox"/> Acupuntura | <input type="checkbox"/> Kinesio Tape | <input type="checkbox"/> Tape |
| <input type="checkbox"/> Alongamentos | <input type="checkbox"/> Laserterapia de Alta Intensidade | <input type="checkbox"/> Terapia Manual |
| <input type="checkbox"/> Auxiliares de marcha | <input type="checkbox"/> Laserterapia de Baixa Intensidade | <input type="checkbox"/> Terapia por Ondas de Choque |
| <input type="checkbox"/> Corrente Interferencial | <input type="checkbox"/> Magnetoterapia | <input type="checkbox"/> Terapia por Sanguessugas |
| <input type="checkbox"/> Electroacupuntura | <input type="checkbox"/> Moxabustão | <input type="checkbox"/> Termoterapia |
| <input type="checkbox"/> Estimulação Eléctrica NMES | <input type="checkbox"/> Ortótese | <input type="checkbox"/> Ultra-som Terapêutico |
| <input type="checkbox"/> Estimulação Eléctrica TENS | <input type="checkbox"/> Palmilhas | <input type="checkbox"/> Ventosaterapia |
| <input type="checkbox"/> Exercícios Aeróbicos | <input type="checkbox"/> Plataforma Vibratória Oscilante | |
| <input type="checkbox"/> Exercícios de Equilíbrio | <input type="checkbox"/> Sessões de Educação/Auto-cuidado | |
| <input type="checkbox"/> Exercícios de Força | <input type="checkbox"/> Spa | <input type="checkbox"/> Outro (especifique) _____ |

27. Muito obrigado pela sua participação. Sem a sua ajuda este trabalho não se podia concretizar. Nós iremos continuar a desenvolver mais trabalhos relacionados com esta temática e gostaríamos de, mais uma vez, contar com o seu apoio nesta tarefa.

Se tiver interesse em participar em estudos futuros, por favor indique a resposta sim e o seu e-mail. Se não quiser participar em mais estudos relacionados com este tema escolha a resposta não.

- Sim. Declaro que gostaria de continuar a ser estudado e que é de minha espontânea vontade fazê-lo. _____
(e-mail)
- Não. A minha participação no estudo acaba neste momento.

Annex XV – Knee Osteoarthritis classification grid

Tema	Análise temática	Subcategorias	Unidades de significado
Knee Osteoarthritis	1. Intervention plan		<p>"Tento sempre que o plano de intervenção seja feito entre o fisioterapeuta e o cliente. Claro que a maioria do tratamento vem do fisioterapeuta, mas tento sempre, cada vez mais, que venha de um diálogo e dos objetivos que sejam importantes para o utente e a partir daí constrói-se a intervenção, de acordo com o que o cliente diz."</p> <p>"Normalmente é a fisioterapia que dá a maior parte da intervenção clínica, mas quando o cliente tem alguma limitação ou dificuldade, vou adaptando as técnicas, dou suporte com o que ele quer e o que nós podemos fazer."</p> <p>"Algo que eu normalmente faço é a partir de avaliação pondero sempre a questão de "free foot" ou seja, de outras coisas além das do osteoartrite nos pontos contralaterais ou necessitar de um cuidado ou de uma avaliação mais abrangente, e a partir desse momento tento perceber dentro daquilo que... é o dolo para o dolo clínico e para o dolo do paciente, e tento perceber em que medida que aquece "body" é formado. Ou seja, que formação que tem a falta da componente do tecido tecidual propriamente dito, que componente que tem a falta de outros fatores que habitualmente não são considerados (questões como o sono, modo do movimento, sedentarismo). Fazem esse avaliação mais global, para perceber em que medida é que em cada campo eu vou ter de atuar. A partir desse momento depois de analisar as estratégias, em função dessa avaliação que está feita."</p> <p>"Eu sou muito, eu tento ir muito ao encontro daquilo que o utente me diz. Por isso, se para ele o dolo não é tão importante, se é mais a funcionalidade, eu tento ir por aí. Quem tem que viver com a condição, é ele."</p> <p>"Tentamos que seja o mesmo fisioterapeuta a atender a pessoa, que já conhece a causa por a avaliação. Ter o plano de tratamento como considero melhor. As pessoas vêm diretamente a nós, e vamos nós que devíamos tudo."</p>
		1. Applied	<p>"Depende um pouco do estado e das capacidades, obviamente. Mas no global seria importante mobilizar, treinar de força e depois treino de atividades funcionais."</p> <p>"Vou a dor... dependo... até 50-50... eu não sei se as pessoas ou usar muito ultrassom e electroterapia."</p> <p>"Nós geralmente o que costumamos fazer sempre, em primeiro, uma componente de relaxamento muscular (fazíamos muitos versos alguma espécie de calor que ajuda na rigidez, ajuda logo a diminuir o tecido muscular, tudo mais e facilita o trabalho que faremos depois), de seguida usamos terapia manual (massagear, mobilizações fisiológicas e acessórios), usamos após sempre exercício para as pessoas fazerem e com um ou outro agente fazemos também treino de equilíbrio e treino de marcha, se for o caso."</p> <p>"Tudo depende da sua função, treino de mobilidade, treino de amplitude, de força. Mas normalmente o treino de equilíbrio é mais importante, se é mais a funcionalidade, eu tento ir por aí. Quem tem que viver com a condição, é ele."</p> <p>"Além disso, eu tenho muito, eu tenho muito a questão de mobilidade e questão de flexibilidade e questão de força, estabilidade até seja já depois alguns meses terapêuticos eletroterapia para o controle da dor, normalmente em cores ou TENS, não vou muito mais para além daí mas aí só com o objetivo de ajudar a mobilizar."</p>
		2. Eventually applied	<p>"Em relação ao yoga e ao Tai Chi, e a modalidades que sejam um benefício mais físico e que dêem a pessoa de alguma forma poder fazer sentido para pessoas com dor e com fatores psicossociais importantes e conscientização geral, pode fazer sentido a se ajudar as pessoas a desligar em um benefício da dor em si, da condição em si. Acho que isso pode fazer sentido e se calhar até recomendar à pessoa como coadjuvante à fisioterapia."</p> <p>"Acho que algumas coisas que se dá do Tai Chi e do Yoga é melhor, e nos países onde eles, tem vindo a provar que algumas coisas que o senhor Kenso Kase disse que não correspondem à verdade. Mas em termos de eficácia não acho que seja muito interessante, não sei se é possível, mas de facto é muito interessante. Começo a haver também uma série de trabalhos publicados neste sentido. Mas esse, esse é o contrário. Lise volta a utilizar, volte a utilizar mais."</p>
	2. Interventions	2. Eventually applied	<p>"Vou lá ver... calar está ali um quarto de hora... já nem digo quando está mais... mesmo 15 minutos é muito tempo em termos de intervenção. O tempo que a pessoa está ali naquele quarto de hora, podemos estar a fazer muitas outras coisas. Eu acredito plenamente que a pessoa se sinta melhor com o calor, mas uma coisa é senti-se melhor, outra coisa é contribuir para a sua recuperação e para a sua sustentabilidade (força, dor, etc.). Pode naquele momento aliviar um benefício a curto prazo."</p> <p>"O conceito de massagem coreana. Esse tipo de estratégia de massagem é não faço. Acho que para os objetivos que nós hoje em dia temos de tratamento e massagem não responde a esses objetivos de tratamento. Se nós queremos a mobilidade e funcionalidade do doente, ele tem que ser ativo, tem que ser participativo, e portanto não é a massagem que vai resolver."</p> <p>"No osteoartrite, houve uma altura que usava o gelo ou calor... quer dizer mais o calor é que dá mais de usar."</p> <p>"Via ultrassom, as manipulações da área da coluna, não recomendo, electroterapia."</p> <p>"Até porque houve uma [risos] recomendação, do não recomendação de tudo ou recomendar a utilização contra o TENS. É recomendado agora."</p>
		3. Not applied	<p>"Vou lá ver... calar está ali um quarto de hora... já nem digo quando está mais... mesmo 15 minutos é muito tempo em termos de intervenção. O tempo que a pessoa está ali naquele quarto de hora, podemos estar a fazer muitas outras coisas. Eu acredito plenamente que a pessoa se sinta melhor com o calor, mas uma coisa é senti-se melhor, outra coisa é contribuir para a sua recuperação e para a sua sustentabilidade (força, dor, etc.). Pode naquele momento aliviar um benefício a curto prazo."</p> <p>"O conceito de massagem coreana. Esse tipo de estratégia de massagem é não faço. Acho que para os objetivos que nós hoje em dia temos de tratamento e massagem não responde a esses objetivos de tratamento. Se nós queremos a mobilidade e funcionalidade do doente, ele tem que ser ativo, tem que ser participativo, e portanto não é a massagem que vai resolver."</p> <p>"No osteoartrite, houve uma altura que usava o gelo ou calor... quer dizer mais o calor é que dá mais de usar."</p> <p>"Via ultrassom, as manipulações da área da coluna, não recomendo, electroterapia."</p> <p>"Até porque houve uma [risos] recomendação, do não recomendação de tudo ou recomendar a utilização contra o TENS. É recomendado agora."</p>
		3. Not applied	<p>"Vou lá ver... calar está ali um quarto de hora... já nem digo quando está mais... mesmo 15 minutos é muito tempo em termos de intervenção. O tempo que a pessoa está ali naquele quarto de hora, podemos estar a fazer muitas outras coisas. Eu acredito plenamente que a pessoa se sinta melhor com o calor, mas uma coisa é senti-se melhor, outra coisa é contribuir para a sua recuperação e para a sua sustentabilidade (força, dor, etc.). Pode naquele momento aliviar um benefício a curto prazo."</p> <p>"O conceito de massagem coreana. Esse tipo de estratégia de massagem é não faço. Acho que para os objetivos que nós hoje em dia temos de tratamento e massagem não responde a esses objetivos de tratamento. Se nós queremos a mobilidade e funcionalidade do doente, ele tem que ser ativo, tem que ser participativo, e portanto não é a massagem que vai resolver."</p> <p>"No osteoartrite, houve uma altura que usava o gelo ou calor... quer dizer mais o calor é que dá mais de usar."</p> <p>"Via ultrassom, as manipulações da área da coluna, não recomendo, electroterapia."</p> <p>"Até porque houve uma [risos] recomendação, do não recomendação de tudo ou recomendar a utilização contra o TENS. É recomendado agora."</p>
	3. Sessions frequency	1. Daily	<p>"Né pessoas que fazem diária."</p> <p>"É na verdade fazem-se todos os dias."</p>
		2. 2/3 times per week	<p>"2 ou 3 sessões."</p> <p>"Na realidade os utentes vão duas ou três vezes por semana."</p> <p>"Duas vezes por semana, normalmente."</p> <p>"Nestas coisas, em particular, em média fazem 2 vezes por semana porque no dia a seguir estava um benefício mais massagado e com os exercícios e tudo o mais, e estão andando ou espalhando 2 ou 3 dias cada intervenção, era o tempo que nós víamos que eles conseguiram ter estes benefícios."</p>
		3. Weekly/15-15 days	<p>"...tento utentes a fazer do tipo duas vezes em duas sessões, e depois passar a só semanal ou quinzenal."</p>
	4. Symptoms	1. Important to the patient	<p>"É no maioritariamente era por dor. As pessoas, acho que só se lembram dos tratamentos por dor, não tanto pela prevenção."</p> <p>"Obrigado ao cliente se queiram mais usamos se a rigidez ou a dor, a dor no joelho, a dor mecânica, principalmente. E essas duas seriam assim o principal dolo eu..."</p> <p>"E assim, eu tendia a responder assim, dolo, a dor."</p> <p>"É assim de tudo e para manterem a funcionalidade, acima de tudo. Eles vêm e não, eles recorrem a nós quando, por exemplo, têm dificuldade em de ir às compras, ou ir à escola, ou fazer as atividades da vida diária. Então, é principalmente para manutenção e melhoria da funcionalidade."</p>
		2. Not important to the patient	<p>"A incapacidade e dor, sendo que, a funcionalidade em primeiro e a dor em segundo lugar."</p> <p>"Depois a limitação na vida, pressões, alterações de sensibilidade, como por exemplo, diminuição de força e instabilidade articular."</p>
		3. Important to the therapist	<p>"É a limitação, a dor e a instabilidade articular."</p> <p>"O que nós vamos ver é a dor e depois da mobilidade e da capacidade de suportar carga naquele joelho."</p> <p>"Dor, limitação na vida, alterações de sensibilidade, diminuição de força e instabilidade articular."</p>
4. Not important to the therapist		<p>"Também há outros sintomas que são frequentes como os resacas (problemas no joelho, embora eu pessoalmente não valorizo tanto e não ganho no mesmo patamar de dor ou rigidez ou diminuição da força."</p> <p>"Às vezes há pessoas que pronto, devido ao outro (devido à dor, devido à instabilidade "não é?"), porque são pessoas que têm dor, mexem-se menos e depois é tudo um ciclo vicioso, então muitas vezes condicionados fisicamente e às vezes também apresentam alguma alteração de equilíbrio, alterações na marcha, pronto isso também acontece."</p>	