

1 **How do physical therapists treat people with knee osteoarthritis and**
2 **what drives their clinical decisions? A population-based cross-**
3 **sectional survey.**

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5 Bruno R da Costa, MScPT PhD^{1,2}, Edgar Ramos Vieira, MScPT PhD¹, Inae Caroline Gadotti,
6 MScPT PhD¹, Conner Colosi, DPT¹, James Rylak, DPT¹, Travis Wylie, DPT¹, Susan Armijo-
7 Olivo, MScPT PhD³

8
9 ¹Department of Physical Therapy, Florida International University, Miami, FL, USA

10 ²Institute of Primary Health Care (BIHAM), University of Bern, Bern, Switzerland

11 ³Faculty of Rehabilitation Medicine, Department of Physical Therapy, University of Alberta, Edmonton,
12 AB, Canada

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14
15
16
17 Correspondence to:

18 Bruno R da Costa, BScPT MScPT PhD
19 Head of Clinical Research
20 Institute of Primary Health Care (BIHAM)
21 University of Bern
22 Gessellschaftstrasse 49
23 3012 Bern
24 Switzerland
25 e-mail: bruno.dacosta@biham.unibe.ch

26 **Word count: 2555**

27 **Key words: Health care surveys, Osteoarthritis, Physical therapy, Physiotherapy**

28 **ABSTRACT**

29

30 **Background:** It is unclear how physical therapists (PTs) in Florida (USA) currently treat people
31 with knee osteoarthritis, and whether current best evidence is used for clinical decision making.

32 **Methods:** We included PTs from Florida. We assessed perceived effectiveness and actual use of
33 physical therapy interventions and quantified the association between the actual use of
34 interventions with different characteristics of PTs.

35 **Results:** 413 PTs completed the survey. Most respondents perceive therapeutic exercise (94%)
36 and education (93%) as “effective” or “very effective”. Interventions least perceived as
37 “effective” or “very effective” were electrotherapy (28%), wedged-insole (20%), and ultrasound
38 (19%). PTs that follow principles of evidence-based practice are more likely to use therapeutic
39 exercise (OR3.89;95%CI1.21-12.54) and education (OR3.63;95%CI1.40-9.43), and less likely to
40 use ultrasound (OR0.32; 95%CI0.16-0.63) and electrotherapy (OR0.32;95%CI0.17-0.58). They
41 also indicate that older PTs are more likely to use ultrasound (OR3.57;95%CI1.60-7.96),
42 electrotherapy (OR2.53;95%CI1.17-5.47), Kinesio tape (OR3.82;95%CI1.59-9.18), and ice
43 (OR1.95,95%CI1.02-3.73).

44 **Conclusions:** In line with clinical guidelines, most PTs use therapeutic exercise and education in
45 the treatment of people with knee osteoarthritis. However, interventions that lack scientific
46 support, such as electrotherapy and ultrasound, are still used. A modifiable therapist
47 characteristic, adherence to evidence based practice, is positively associated with the use of
48 interventions supported by scientific evidence.

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50

51 **INTRODUCTION**

52 Osteoarthritis is the most common joint disease and the main cause of pain in the elderly.¹ The
53 knee is the most commonly affected joint in the lower extremities, and knee osteoarthritis is
54 strongly associated with physical disability.¹⁻³ As life expectancy increases, the prevalence of
55 knee osteoarthritis is also expected to increase.⁴ Management of knee osteoarthritis is mainly
56 symptom-oriented because there is still no effective disease-modifying treatment.⁵

57 Physical therapy plays an important role in the treatment of knee osteoarthritis symptoms.⁶

58 Current evidence from randomized controlled trials suggests that the most effective individual
59 physical therapy treatment modalities for knee osteoarthritis are cardiovascular or strengthening
60 exercise and education (i.e. instructions on physical exercises and weight loss).⁷⁻¹⁰ However, in
61 clinical practice physical therapists most often use a combination of two or more interventions
62 when treating people with knee osteoarthritis.¹¹ For example, the use of exercises may be
63 preceded by the use of physical agents such as ultrasound, diathermy or electro analgesia (i.e.
64 Interferential current or transcutaneous electrical stimulation –TENS).

65 The low representativeness in randomized controlled trials of treatment strategies commonly used
66 in the clinical setting may pose a challenge to evidence based practice.¹¹ Therefore, we need to
67 know how physical therapists actually treat people with knee osteoarthritis to design
68 representative trials and to identify gaps between evidence and practice to understand where
69 changes in physical therapy education are needed. Although previous studies were conducted in
70 the United Kingdom^{12,13}, it is unclear how physical therapists in Florida (USA) currently treat
71 people with knee osteoarthritis, and whether current best evidence is used in their clinical
72 decision making.

73

74 The purpose of this study was to conduct a survey to understand how physical therapists treat
75 people with knee osteoarthritis, and what drives their clinical decision making.

76 **METHODS**

77 **Study design**

78 This population-based cross-sectional electronic survey study was approved by the Florida
79 International University Institutional Review Board (IRB-14-0381).

80 **Target population**

81 The survey was conducted in February 2015 with licensed physical therapists in Florida. No
82 further restrictions in eligibility were applied. A contact list of physical therapists was obtained
83 from the Florida Department of Health. Physical therapists were contacted by email including an
84 invitation to participate and a link to the online survey.

85 **Data collection**

86 We developed a survey based on information from a literature review, concerning related surveys
87 previously published and guidelines of conservative non-pharmacological knee osteoarthritis
88 treatment, and discussions with experts in the field, including researchers who had previously
89 conducted surveys of physical therapy interventions among physical therapists. We pilot-tested
90 our survey with a convenience sample of 20 Doctor of Physical Therapy students from the
91 Florida International University, who gave feedback on content, form, and time needed to
92 complete the survey. We included suggestions from the participants at this stage in the final
93 version of the survey. After the first pilot group was completed, we made minor modifications to
94 improve flow and clarity. Further pilot testing was thus deemed unnecessary and the survey
95 questions were considered relevant for the objectives of the study. The survey was designed so

96 that it took a maximum of 10 minutes to complete. A copy of the final survey is provided in
97 Appendix 1.

98 The survey had 12 items distributed across four sections. The first section gathered information
99 on general demographic characteristics and general clinical experience as well as clinical
100 expertise specific to osteoarthritis management: gender, age, years of practice, currently
101 practicing, number of people with knee osteoarthritis seen per month, post-graduate training
102 related to osteoarthritis treatment, and familiarity with guidelines of clinical practice for knee
103 osteoarthritis treatment. The second section assessed perceived effectiveness of the following
104 interventions for the treatment of knee osteoarthritis: manual therapy, therapeutic exercise,
105 aquatic exercise, electrotherapy, ultrasound, ice, heat, wedge insoles, knee brace, Kinesio tape,
106 education, and rest. Perceived effectiveness was assessed in a Likert-type scale with the
107 following options: ineffective, somewhat effective, effective, very effective. Because different
108 physical therapists may have different perspectives on what constitutes an effective treatment, we
109 presented in our survey a case vignette of a patient with painful osteoarthritis and consequent
110 functional limitations (Appendix 1), which are considered major outcomes when assessing the
111 effectiveness of knee osteoarthritis treatments.¹⁴ We asked physical therapists to assess the
112 expected effectiveness of different physical therapy interventions taking this case vignette into
113 consideration. The third section concerned the frequency of actual use by physical therapists of
114 each of the interventions listed above to treat people with knee osteoarthritis. Frequency of actual
115 use of interventions was assessed in a Likert-type scale with the following options: never, rarely,
116 sometimes, often. The fourth section assessed whether physical therapists use principles of
117 evidence-based practice to define treatment strategies. Evidence-based practice was defined as
118 the combined use of clinical experience, patient preference, and evidence from peer-reviewed
119 articles as the main sources of information used to define treatment strategies.

120 We distributed the survey electronically using Qualtrics (<http://www.qualtrics.com>). The survey
121 website outlined the research project, identified the research team, discussed the privacy of the
122 data, offered a contact email/phone number should potential participants have questions, and
123 other information recommended by the ethics committee. Submission of a completed survey was
124 considered consent to participate.

125 **Data analysis**

126 We tabulated data on demographics and clinical expertise to describe our study population, using
127 percentages, means, and standard deviations as appropriate and plotted results to compare
128 perceived effectiveness with actual use of physical therapy interventions. We conducted
129 multivariable logistic regression models to derive odds ratios with 95% confidence intervals to
130 quantify the association between the actual use of physical therapy interventions, our dependent
131 variable, with different characteristics of physical therapists, our independent variables. Odds
132 ratios above 1 imply that physical therapists with the characteristic of interest are more likely to
133 use a specific intervention. We conducted multiple imputation to account for missing answers by
134 using gender, age, years of clinical practice, number of patients treated with knee osteoarthritis
135 per month, post-graduate training related to osteoarthritis treatment, and evidence-based practice
136 as variables in the imputation model, to create 20 imputed datasets.^{3,15} The alpha level was set at
137 0.05. We performed all analyses using Stata 14 (StataCorp LP, College Station, TX) statistical
138 software.

139 **RESULTS**

140 **General Population Demographics**

141 Of the 13296 invitations sent by e-mail, a total of 413 physical therapists completed the survey
142 and were included in our analysis (3.1% of response). Table 1 displays the characteristics of the
143 physical therapists that answered the survey. Respondents were on average 44 years old, mainly
144 females (64%), with over 10 years of clinical practice (66%), and who defined treatment
145 strategies following principles of evidence-based practice (69%). Less than 30% saw more than
146 10 people with knee osteoarthritis per month or had postgraduate training related to osteoarthritis
147 treatment.

148 **Perceived effectiveness and use of PT interventions**

149 Figure 1 displays the percentage of respondents that perceived the effectiveness of interventions
150 as “effective” or “very effective” and percentage of respondents that classified the actual use of
151 the interventions as “often”, when treating people with knee osteoarthritis. Most respondents
152 perceive therapeutic exercise (94%) and education (93%) as “effective” or “very effective”.
153 Interventions least perceived as “effective” or “very effective” were electrotherapy (28%),
154 wedged insole (20%), and ultrasound (19%). Actual use is in agreement with perceived
155 effectiveness for most interventions, with therapeutic exercise (96%) and education (94%) being
156 used by most respondents, and Kinesio tape (9%), knee brace (8%), and wedged insole (3%) by
157 the least number of respondents. Although aquatic exercise is considered by 88% of respondents
158 as “effective” or “very effective”, only 19% reported to actually use this intervention with
159 patients.

160

161 **Association between physical therapist characteristics and use of knee osteoarthritis** 162 **treatments**

163 Figure 2 shows the association between physical therapists' characteristics and often use of knee
164 osteoarthritis treatments. Male therapists are more likely to recommend rest (OR 1.84; 95%CI
165 1.08 to 3.14) and less likely to use Kinesio tape (OR 0.34; 95%CI 0.14 to 0.86). Older physical
166 therapists (>60 years old) are more likely to use ultrasound (OR 3.57; 95%CI 1.60 to 7.96),
167 electrotherapy (OR 2.53; 95%CI 1.17 to 5.47), Kinesio tape (OR 3.82; 95%CI 1.59 to 9.18), and
168 ice (OR: 1.95, 95%CI 1.02 to 3.73). Physical therapists that treat over 10 people with knee
169 osteoarthritis per month are more likely to recommend rest (OR 2.27; 95%CI 1.31 to 3.95) and
170 use ice (OR 2.10; 95%CI 1.32 to 3.34). Physical therapists with postgraduate training related to
171 osteoarthritis treatment are more likely to use manual therapy (OR 1.99; 95%CI 1.25 to 3.18).
172 Physical therapists that follow principles of evidence-based practice are more likely to use
173 therapeutic exercise (OR 3.89; 95%CI 1.21 to 12.54) and education (OR 3.63; 95%CI 1.40 to
174 9.43), and less likely to use ultrasound (OR 0.32; 95%CI 0.16 to 0.63) and electrotherapy (OR
175 0.32; 95%CI 0.17 to 0.58). Physical therapists familiar with guidelines of clinical practice for the
176 treatment of people with knee osteoarthritis are more likely to use manual therapy (OR 1.74;
177 95%CI 1.07 to 2.85).

178 **Combined use of different PT interventions for the treatment of people with knee**
179 **osteoarthritis**

180 Table 2 shows the frequency of combined use of different interventions for the treatment of
181 people with knee osteoarthritis. The combination of treatments most commonly used is
182 therapeutic exercise, education, and manual therapy (9.75%) followed by the combination of
183 these three therapies plus the addition of ice (6.82%). Given the high heterogeneity of
184 interventions used across different types of combinations, most combinations are used by less

185 than 1% of physical therapists (61.10%). Only 2.52% of physical therapists reported not using
186 treatment strategies with combined interventions.

187 **DISCUSSION**

188 The results of this survey including 413 physical therapists indicate that the most commonly used
189 physical therapy interventions to treat people with knee osteoarthritis are therapeutic exercise and
190 education, while ultrasound and electrotherapy were among the least used. Our results also
191 indicate that evidence based practice and therapists' age have an important influence on the
192 frequency of how some interventions are prescribed to people with knee osteoarthritis.

193 Unsurprisingly, how physical therapists perceive the effectiveness of interventions was in
194 agreement with the frequency they are used. Aquatic exercise was the main exception, however.

195 While 88% of the physical therapists believe that aquatic exercise is effective or very effective,
196 only 19% reported to often use it with patients, which may be explained by limited access to
197 clinics with appropriate facilities and similar effectiveness to land-based therapeutic exercise.^{16,17}

198 Finally, over 99% of the physical therapists reported the combined use of 2 or more
199 interventions, with the combination of therapeutic exercise, education, and manual therapy being
200 the most frequently used.

201 Two similar surveys were previously conducted with physical therapists from the United
202 Kingdom. In 2006, Holdem et al.¹² conducted a cross-sectional survey with 538 physical
203 therapists randomly sampled from the general population. Similar to our findings, it was reported
204 that physical therapists in the United Kingdom commonly use therapeutic exercises and
205 education to treat people with knee osteoarthritis, and less frequently use Kinesio tape or
206 recommend that patients rest, avoiding physical activities. This is in line with current guidelines
207 of clinical practice.^{9,10} However, physical therapists in the United Kingdom made frequent use of

208 ice, heat, and electrotherapy, which appears to be less frequently used by American physical
209 therapists. There is little evidence supporting the effectiveness of these interventions,¹⁸⁻²⁰ which
210 consequently leads to weaker recommendations regarding their use.⁹ The differences may be due
211 to the time that the study was conducted (almost ten years ago) because practice is always
212 evolving and new evidence is incorporated into practice overtime. Walsh et al.¹³ published in
213 2008 another cross-sectional survey with 83 managers of physical therapy clinics also from the
214 United Kingdom. They reported that therapeutic exercise is the most commonly used treatment in
215 people with knee osteoarthritis, and in agreement with Holdem et al., they also reported that
216 United Kingdom physical therapists commonly use electrotherapy.

217 Our survey is the first to investigate the association between characteristics of physical therapists
218 and their clinical decision making in knee osteoarthritis treatment. Adherence to principles of
219 evidence based practice and therapists' age seem to be the strongest drivers of clinical decision
220 making. Physical therapists that adhere to principles of evidence based practice are more likely
221 to use therapeutic exercise and education, and less likely to use ultrasound and electrotherapy.
222 Indeed, evidence indicates that the former interventions are effective when treating these patients,
223 and that there is not enough evidence supporting the use of the latter interventions.^{7,8,18,19} This is
224 reflected by recommendations presented in recently published guidelines of clinical practice to
225 treat knee osteoarthritis.^{9,10,21,22}

226 Our results also indicate that older physical therapists are more likely to use ultrasound,
227 electrotherapy, Kinesio tape, and ice, which are therapies that are not supported by the evidence,
228 as previously mentioned. This finding may be explained by a number of factors. Perhaps there is
229 a lower interest or lack of skills of older therapists to incorporate new evidence in their practice

230 or because older physical therapists are less exposed to new and up-to-date knowledge than
231 younger therapists.^{23,24}

232 This is the first study to describe how a sample of American physical therapists treat people with
233 knee osteoarthritis. This is also the first study to investigate the influence of physical therapist
234 characteristics on knee osteoarthritis treatment clinical decision making. It is a population-based
235 survey with a relatively large sample size, including 413 participants sampled from the general
236 population of physical therapists in Florida. Because of the economy of the method used to
237 recruit participants, it was possible to contact all potential participants rather than a sample. One
238 of the main limitations of our survey is that it included only physical therapists from Florida.
239 While we are not aware of evidence that physical therapist skills vary across the US, our results
240 may arguably be limited to Florida physical therapists. Another main limitation is the method
241 used for sampling physical therapists. It is unclear whether the contact information available
242 through the Florida Department of Health is current, which may justify the extremely low
243 response rate of 3%. It is likely that physical therapists interested in osteoarthritis and on
244 evidence based practice participated disproportionately. However, a comparison between PTs
245 who participated in our survey and PTs who are members of the Florida Physical Therapy
246 Association (FPTA) indicate that our sample may be representative of PTs in Florida. FPTA PTs
247 are on average 45 years old, 36% are males, and 59% has over 10 years of clinical practice
248 (personal communication, 16th February 2016). PTs included in our survey are on average 44
249 years old, 36% are males, and 66% has over 10 years of clinical practice. Moreover, we asked
250 PTs about electrotherapy use, which may lack specificity, as several interventions could be
251 categorized as electrotherapy. Finally, the parametrization of frequency of use may have led to a
252 random error between ‘sometimes’ and ‘rarely’ frequencies of use. However, we believe that if a
253 random error took place, it would have little influence in the results presented in Figure 1.

254 Our results suggest that incorporation of principles of evidence based practice by physical
255 therapists may lead to clinical decision making supported by the best evidence available when
256 treating people with knee osteoarthritis. It is currently unclear what evidence based practice
257 training method would be most effective for physical therapists to engage in the use of best
258 evidence. Some preliminary work has found that small group work with interactive and personal
259 education tend to be most effective.²⁵⁻²⁷ Future studies, ideally using a randomized controlled
260 design, should be conducted to identify which training methods are likely to result in improved
261 clinical decisions based on best available evidence by physical therapists of different ages and
262 professional stages, and eventually its influence on patients' outcomes. Our results also stress that
263 current research of physical therapy treatment for knee osteoarthritis does not reflect clinical
264 practice. While most trials investigate the effectiveness of single interventions, our results
265 indicate that less than 1% of therapists use single interventions when treating people with
266 osteoarthritis. This substantiates the need for randomized controlled trials with factorial designs
267 to investigate the combined effect of complex physical therapy interventions, which are
268 postulated to be larger than the effect of single interventions.²⁸

269 Physical therapists in Florida mainly use therapeutic exercise and education in the treatment of
270 people with knee osteoarthritis, which is in line with best evidence available and current
271 guidelines of clinical practice. Although less frequently used, interventions that lack scientific
272 support, such as electrotherapy and ultrasound, are still used. Use of such interventions may lead
273 to unnecessarily long treatment sessions, wasting financial resources and possibly compromising
274 compliance of patients.²⁹ A modifiable therapist characteristic, adherence to evidence based
275 practice, is positively associated with the use of interventions supported by scientific evidence.
276 Finally, because over 99% of physical therapists reported the use of complex treatment

277 interventions, future trials should address the heterogeneous nature of physical therapy treatment
278 of people with knee osteoarthritis.

REFERENCES

1. Altman R, Brandt K, Hochberg M, et al. Design and conduct of clinical trials in patients with osteoarthritis: recommendations from a task force of the Osteoarthritis Research Society. Results from a workshop. *Osteoarthritis Cartilage* 1996; **4**(4): 217-43.
2. Rosemann T, Wensing M, Joest K, Backenstrass M, Mahler C, Szecsenyi J. Problems and needs for improving primary care of osteoarthritis patients: the views of patients, general practitioners and practice nurses. *BMC Musculoskelet Disord* 2006; **7**: 48.
3. Nuesch E, Dieppe P, Reichenbach S, Williams S, Iff S, Juni P. All cause and disease specific mortality in patients with knee or hip osteoarthritis: population based cohort study. *BMJ* 2011; **342**: d1165.
4. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. *Bull World Health Organ* 2003; **81**(9): 646-56.
5. Pavelka K. Symptomatic treatment of osteoarthritis: paracetamol or NSAIDs? *Int J Clin Pract Suppl* 2004; (144): 5-12.
6. Brakke R, Singh J, Sullivan W. Physical therapy in persons with osteoarthritis. *PM R* 2012; **4**(5 Suppl): S53-8.
7. Fransen M, McConnell S, Harmer AR, Van der Esch M, Simic M, Bennell KL. Exercise for osteoarthritis of the knee. *Cochrane Database Syst Rev* 2015; **1**: CD004376.
8. Fibel KH, Hillstrom HJ, Halpern BC. State-of-the-Art management of knee osteoarthritis. *World J Clin Cases* 2015; **3**(2): 89-101.
9. Hochberg MC, Altman RD, April KT, et al. American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. *Arthritis Care Res (Hoboken)* 2012; **64**(4): 465-74.
10. Hauk L. Treatment of knee osteoarthritis: a clinical practice guideline from the AAOS. *Am Fam Physician* 2014; **89**(11): 918-20.
11. Bennell KL, Egerton T, Pua YH, Abbott JH, Sims K, Buchbinder R. Building the rationale and structure for a complex physical therapy intervention within the context of a clinical trial: a multimodal individualized treatment for patients with hip osteoarthritis. *Phys Ther* 2011; **91**(10): 1525-41.
12. Holden MA, Nicholls EE, Hay EM, Foster NE. Physical therapists' use of therapeutic exercise for patients with clinical knee osteoarthritis in the United kingdom: in line with current recommendations? *Phys Ther* 2008; **88**(10): 1109-21.
13. Walsh NE, Hurley MV. Evidence based guidelines and current practice for physiotherapy management of knee osteoarthritis. *Musculoskeletal Care* 2009; **7**(1): 45-56.
14. Pham T, van der Heijde D, Altman RD, et al. OMERACT-OARSI initiative: Osteoarthritis Research Society International set of responder criteria for osteoarthritis clinical trials revisited. *Osteoarthritis Cartilage* 2004; **12**(5): 389-99.
15. Sterne JA, White IR, Carlin JB, et al. Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. *BMJ* 2009; **338**: b2393.
16. Mortimer R, Privopoulos M, Kumar S. The effectiveness of hydrotherapy in the treatment of social and behavioral aspects of children with autism spectrum disorders: a systematic review. *J Multidiscip Healthc* 2014; **7**: 93-104.
17. Batterham SI, Heywood S, Keating JL. Systematic review and meta-analysis comparing land and aquatic exercise for people with hip or knee arthritis on function, mobility and other health outcomes. *BMC Musculoskelet Disord* 2011; **12**: 123.
18. Rutjes AW, Nuesch E, Sterchi R, Juni P. Therapeutic ultrasound for osteoarthritis of the knee or hip. *Cochrane Database Syst Rev* 2010; (1): CD003132.

19. Rutjes AW, Nuesch E, Sterchi R, et al. Transcutaneous electrostimulation for osteoarthritis of the knee. *Cochrane Database Syst Rev* 2009; (4): CD002823.
20. Brosseau L, Yonge KA, Robinson V, et al. Thermotherapy for treatment of osteoarthritis. *Cochrane Database Syst Rev* 2003; (4): CD004522.
21. Jevsevar DS. Treatment of osteoarthritis of the knee: Evidence-based guideline, 2nd edition. *J Am Acad Orthop Surg* 2013; **21**(9): 571-6.
22. McAlindon TE, Bannuru RR, Sullivan MC, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthritis Cartilage* 2014; **22**(3): 363-88.
23. Jette DU, Bacon K, Batty C, et al. Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. *Phys Ther* 2003; **83**(9): 786-805.
24. Bernhardsson S, Johansson K, Nilsson P, Oberg B, Larsson ME. Determinants of guideline use in primary care physical therapy: a cross-sectional survey of attitudes, knowledge, and behavior. *Phys Ther* 2014; **94**(3): 343-54.
25. Nilsson P, Bernhardsson S. Towards evidence-based physiotherapy - research challenges and needs. *J Physiother* 2013; **59**(3): 143-4.
26. Tilson JK, Mickan S. Promoting physical therapists' use of research evidence to inform clinical practice: part 1--theoretical foundation, evidence, and description of the PEAK program. *BMC Med Educ* 2014; **14**: 125.
27. Tilson JK, Mickan S, Sum JC, Zibell M, Dylla JM, Howard R. Promoting physical therapists' use of research evidence to inform clinical practice: part 2--a mixed methods evaluation of the PEAK program. *BMC Med Educ* 2014; **14**: 126.
28. Craig P, Dieppe P, Macintyre S, et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* 2008; **337**: a1655.
29. Alexandre NM, Nordin M, Hiebert R, Campello M. Predictors of compliance with short-term treatment among patients with back pain. *Rev Panam Salud Publica* 2002; **12**(2): 86-94.

TABLES

Table 1. Characteristics of Physical Therapists included in the survey

Characteristics of physical therapists	n=(413)
Age, mean (SD)	43.8 (11.8)
Male, n (%)	150.0 (36.3)
>10 years of practice, n (%)	271.0 (65.6)
>10 patients per month, n (%)	121.0 (29.3)
Postgraduate training, n (%)	118.0 (28.6)
Evidence based practice, n (%)	286.0 (69.2)
Familiar with GCP, n (%)	317.0 (76.8)

SD: standard deviation; GCP: Guidelines of clinical practice

Table 2. Frequency of combined use of different interventions for the treatment of people with knee osteoarthritis.

Therapeutic exercise	Education	Manual therapy	Ice	Heat	Electrotherapy	Aquatic exercise	Kinesio tape	Rest	Ultrasound	Knee brace	Wedged insole	Frequency (%)
•	•	•										9.75
•	•	•	•									6.82
•	•	•	•	•								2.69
•	•	•		•								2.20
•		•										2.00
•	•											1.96
•	•	•		•	•							1.95
•	•	•				•						1.95
•	•	•		•	•							1.69
•	•	•					•					1.48
•	•	•	•		•							1.47
•	•					•						1.21
•	•	•	•				•					1.21

61.10% of all combinations of interventions were used by less than 1% of physical therapists; 2.52% of physical therapists use a single intervention for osteoarthritis treatment.

FIGURES

Figure 1. Percentage of respondents that perceived effectiveness of knee osteoarthritis treatments as “effective” or “very effective” and percentage of respondents that classified actual use of treatments as “often”.

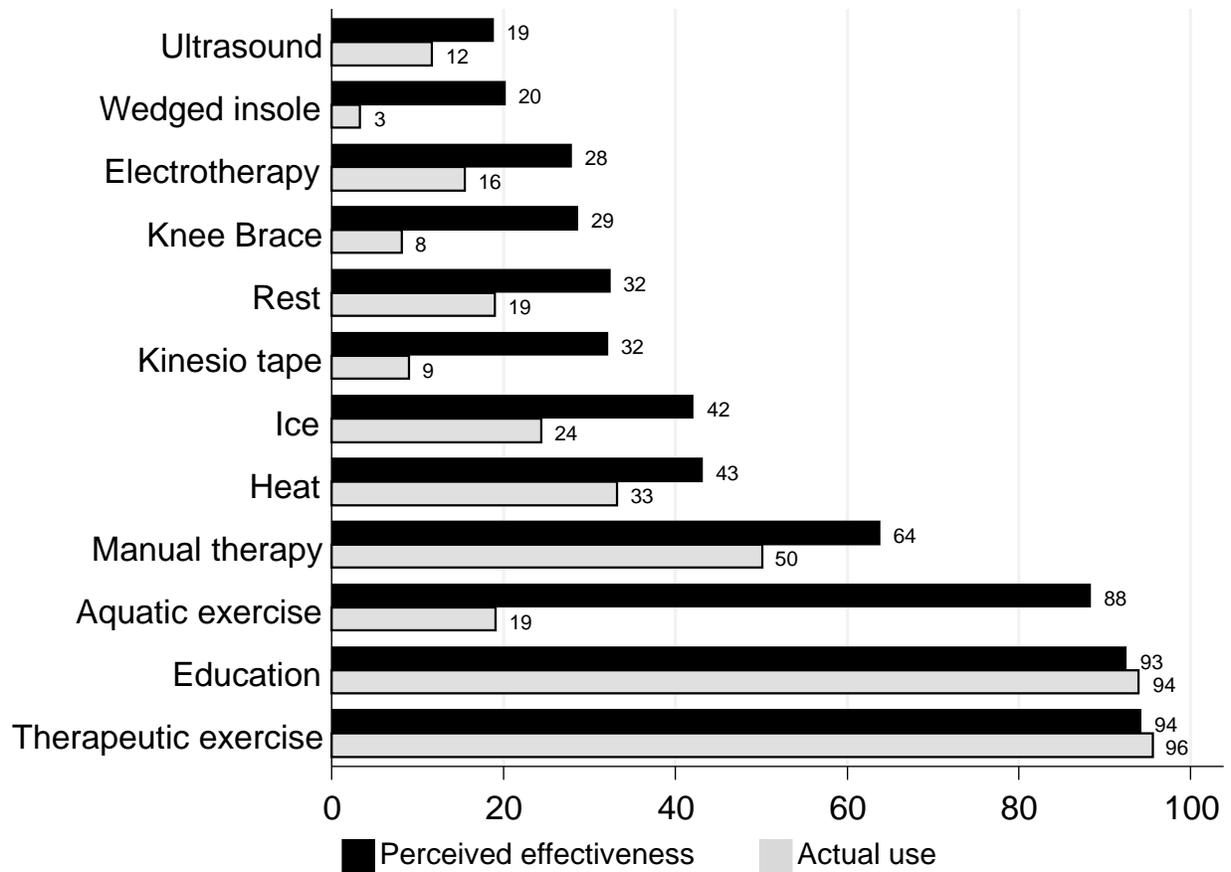
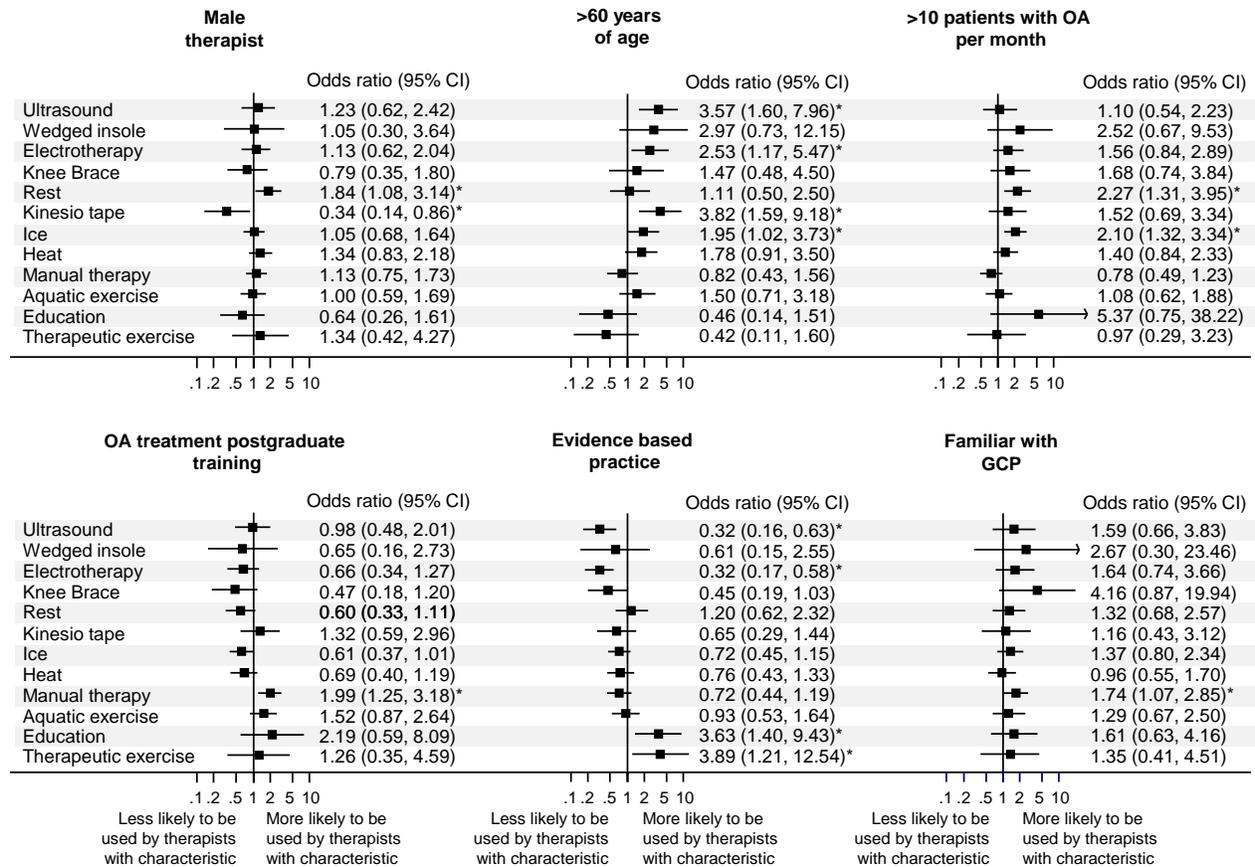


Figure 2. Association between physical therapist characteristics and frequent use of knee osteoarthritis treatments.



OA: osteoarthritis; GCP: guidelines of clinical practice; CI: confidence interval. *statistically significant at $p < 0.05$. Estimates are derived from multivariable models with frequency of use of knee osteoarthritis treatments as a dependent variable and physical therapist characteristics as independent variables.

APPENDIX

Appendix 1. Survey conducted in Qualtrics (<http://www.qualtrics.com>)

Intro Thank you for taking this short survey. Please try to answer all questions, regardless of how frequent you treat patients with knee osteoarthritis. The survey has a total of 12 questions and should take approximately 5 minutes to be completed.

Q1 What is your gender?

- Female
- Male

Q2 How old are you?

Q3 What year did you become licensed to practice physical therapy?

Q4 How many years have you practiced as a physical therapist?

- 0
- 1-5
- 6-10
- 11-15
- 16-20
- >20

Q5 Do you currently practice as a physical therapist?

- Yes
- No

Q6 Approximately, how many patients with knee osteoarthritis do you treat per month?

- 0
- 1-5
- 6-10
- >10

Q7 Do you have any specific post-graduate training related to osteoarthritis treatment?

- Yes
- No

Q8 Please use the following case scenario to answer question 8. A 65 year old patient with knee osteoarthritis has moderate pain (4/10 on visual analog scale) causing moderate limitations of ADLs. The patient has no contraindications for physical therapy interventions and has good cognitive function. In your opinion how effective would the following interventions be to treat this patient?

	Ineffective	Somewhat Effective	Effective	Very Effective
Manual Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Therapeutic Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquatic Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electrotherapy/E-Stim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ultrasound	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wedge Insoles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knee Brace/Wrap	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kinesio Tape	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q9 How often do you use the interventions below to treat patients with knee osteoarthritis?

	Never	Rarely	Sometimes	Often
Manual Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Therapeutic Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquatic Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electrotherapy/E-Stim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ultrasound	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wedge Insoles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knee Brace/Wrap	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kinesio Tape	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q10 What combination of interventions do you commonly use to treat patients with knee osteoarthritis?

- Manual Therapy
- Therapeutic Exercise
- Aquatic Exercise
- Electrotherapy/E-Stim
- Ultrasound
- Ice
- Heat
- Wedge Insoles
- Knee Brace Wrap
- Kinesio Tape
- Education
- Rest
- I do not combine interventions

Q11 Rank the sources of information used to guide your clinical decision making on knee OA treatment. (Top = Main Source / Bottom = Last Source). Click and drag items to reorganize in order of importance.

- _____ Courses I attended
- _____ Text books
- _____ Peer-reviewed articles
- _____ Peer advise
- _____ Patient preference
- _____ Clinical experience

Q12 Are you aware of clinical practice guidelines that you could use to help your clinical decision making?

- Yes
- No