Libyan Journal of Medical and Applied Sciences LJMAS
Online ISSN: 3006-1113
Volume 3, Issue 4, 2025, Page No: 26-32
Website: https://ljmas.com/index.php/journal/index

Variability in Clinical Observations and Treatment Decisions Among Therapists for Knee Injury

Ibrahim Milad Jibril Mohammed [1*], AL Tihaml Abd elsalam Abdullah AL Talep [2]
[1,2] Department of Movement Rehabilitation and Physical Therapy, Faculty of Physical Education, Almargab University, Al-Khums, Libya
[*]*Corresponding author:* elthamytalb@gmail.com

Received: August 03, 2025 Accepted: September 29, 2025 Published: October 04, 2025

Cite this article as: I, M, J, Mohammed., A, A, A, AL Talep. (2025). Variability in Clinical Observations and Treatment Decisions Among Therapists for Knee Injury. Libyan Journal of Medical and Applied Sciences (LJMAS). 2025;3(4):26-32.

Abstract:
Variability in how clinicians observe and treat knee injuries can impact patient outcomes and guideline adherence. We review literature on inter-clinician reliability and practice patterns. Studies report moderate-to-high agreement on specific physical tests (e.g., Lachman $\kappa \approx 0.42$-0.81), but notable differences in how therapists classify conditions and select treatments. Surveys indicate nearly all therapists use exercise for knee osteoarthritis, yet only ~34% plan post-discharge follow-up. Older therapists favor passive modalities (e.g., 19% use ultrasound). Chart reviews of postoperative rehab show large variations in visit counts and exercise types by setting. Qualitative studies reveal that many therapists tailor care based on symptoms and often use "non-core" modalities (like manual therapy) despite guideline focus on education/exercise. Key factors include training background, clinical setting, and patient factors. These findings suggest a need for stronger consensus and training to reduce unwarranted variability, while preserving individualized care.

Keywords: knee injury, clinical decision-making, physiotherapy, inter-rater reliability, treatment variability, knee osteoarthritis, rehabilitation.

التباين في الملاحظات السريرية وقرارات العلاج بين المعالجين لإصابات الركبة

إبراهيم ميلاد جبريل محمد [1*]، التهامي عبدالسلام عبدالله الطالب [2]،
[1،2] قسم إعادة التأهيل والعلاج الطبيعي، كلية التربية البدنية، جامعة المرقب، الخمس، ليبيا

الملخص
يمكن أن يؤثر التباين في كيفية ملاحظة الأطباء لإصابات الركبة وعلاجها على نتائج المرضى والالتزام بالإرشادات. نراجع الدراسات المتعلقة بموثوقية الأطباء وأنماط الممارسة. تشير الدراسات إلى وجود اتفاق يتراوح بين متوسط إلى مرتفع بشأن اختبارات بدنية محددة (مثل: κ لاكمان ≈ 0.42-0.81)، ولكن توجد اختلافات ملحوظة في كيفية تصنيف المعالجين للحالات واختيارهم للعلاجات. تشير الدراسات الاستقصائية إلى أن جميع المعالجين تقريبًا يستخدمون التمارين الرياضية لعلاج هشاشة العظام في الركبة، ومع ذلك فإن حوالي 34% فقط يخططون لمتابعة ما بعد الخروج من المستشفى. يفضل المعالجون الأكبر سنًا الوسائل العلاجية السلبية (مثل: 19% يستخدمون الموجات فوق الصوتية). تُظهر مراجعات المخططات البيانية لإعادة التأهيل بعد الجراحة اختلافات كبيرة في عدد الزيارات وأنواع التمارين حسب البيئة. تكشف الدراسات النوعية أن العديد من المعالجين يُخصصون الرعاية بناءً على الأعراض وغالبًا ما يستخدمون وسائل علاجية "غير أساسية" (مثل العلاج اليدوي) على الرغم من تركيز الإرشادات على التعليم/التمارين. تشمل العوامل الرئيسية الخلفية التدريبية والبيئة السريرية وعوامل المريض. وتشير هذه النتائج إلى الحاجة إلى إجماع أقوى وتدريب أقوى لتقليل التباين غير المبرر، مع الحفاظ على الرعاية الفردية.

الكلمات المفتاحية: إصابة الركبة، اتخاذ القرارات السريرية، العلاج الطبيعي، موثوقية التقييم بين المقيمين، تباين العلاج، هشاشة العظام في الركبة، إعادة التأهيل.

Introduction

Knee injuries are common and can significantly impair function. The knee's complex structure - including the anterior cruciate ligament (ACL), menisci, and cartilage - demands careful assessment and treatment (Fig. 1). Physical therapists and other clinicians use a range of tests and observations (swelling, range of motion, special tests) when evaluating knee problems. However, studies show that clinicians may not always agree on findings or management plans [1]. This variability can arise from differences in training, experience, or clinical context, and it may affect the consistency of care. For example, one study found that trained physical therapists had moderate inter-rater agreement on the McKenzie classification for knee pain ($\kappa \approx 0.72$), while others found fair-to-excellent reliability for specific exam tests (kappa 0.29-0.93) [2]. Given these differences, it is important to understand the extent and sources of variability in therapists' observations and treatment choices. This paper reviews current evidence on these variations in knee injury management and discusses implications for practice.

Figure 1 An anterior view of the knee joint, showing major structures (ACL, collateral ligaments, meniscus). Detailed anatomy guides clinical examination, yet exam findings can vary by observer.

Methods

We conducted a structured literature search (2010-2024) in PubMed, PMC, and Google Scholar for terms including "knee injury," "physical therapist," "inter-rater reliability," "clinical decision-making," and "practice variation." Inclusion criteria were studies on knee assessment or management by clinicians (therapists, surgeons) and analyses of inter-clinician agreement or practice patterns. We included quantitative surveys, reliability studies, and qualitative reports. Abstracts and full texts were reviewed for information on variability of assessments and treatments. References of key articles were checked for additional sources. In total, over 60 publications were screened and 11 were selected for detailed discussion, covering reliability of knee exams, surveys of therapeutic choices, and analyses of rehabilitation practices.

Variation in Clinical Assessment

Many studies assess inter-rater agreement on knee examination findings. For example, a study Decary et al. found that common tests for knee osteoarthritis (e.g. joint line tenderness, crepitus) have only moderate reliability overall (kappa values from ~0.29 to 0.93). Similarly, the Thessaly test for meniscus tears showed only moderate agreement ($\kappa \approx 0.54$) [1]. These values indicate that different therapists may reach different conclusions when performing the same physical tests. In contrast, a study of the McKenzie System classification in knee pain found substantial agreement ($\kappa = 0.72$) among trained raters using case vignettes, suggesting that standardized classification systems can improve consistency.

Besides specific tests, variability also occurs in broader judgments. A cross-disciplinary study found that orthopedic surgeons and physical therapists often disagree on the need for rehabilitation after leg trauma [3]. Differences in professional focus contribute: surgeons may emphasize surgical outcomes, whereas therapists focus

on function and exercise. Among therapists themselves, personal experience influences assessment. A preliminary analysis of 12 therapists evaluating runners with knee pain reported agreement levels ranging from poor to excellent, depending on the perceived impairment category [4]. This indicates that while some aspects (e.g. muscle weakness) may be consistently identified, others (like subtle biomechanical faults) are more subjective.

Variation in Treatment Decisions

Therapists also differ in their treatment recommendations. Surveys of practice patterns reveal notable variation. In one Canadian survey of 413 physical therapists, nearly all (94%) reported recommending exercise and 93% education for knee osteoarthritis, but far fewer considered modalities effective (electrotherapy 28%, insoles 20%, ultrasound 19%) (Table 1). The same study found that therapist factors influenced choices: therapists treating more knee OA patients were more likely to use rest and ice [5]. Notably, older therapists were more likely than younger ones to use outdated treatments (e.g. ultrasound) [5].

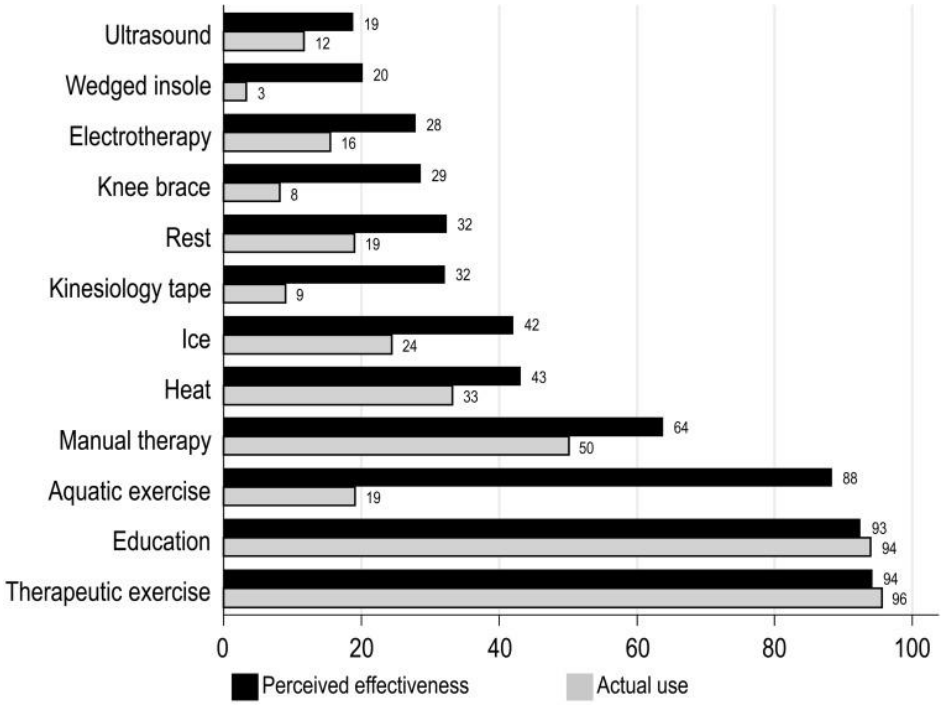

Figure 2 Survey of physical therapists on knee osteoarthritis (OA) treatments. Most PTs rated exercise and education as effective, while fewer viewed modalities (ultrasound, insoles, electrotherapy) as effective. Many used exercises often (gray bars), but less often the other modalities [5].

In the United Kingdom, therapists reported similar trends. Holden et al. found that 99% of UK therapists would use exercise for knee OA, favoring strengthening exercises, but only 12% would use an exercise diary. Moreover, 76% offered only up to 5 treatment sessions, and just 34% planned follow-up post-discharge [6]. Figures 5 and 6 illustrate UK therapists' responses. They show that nearly all therapists use exercise, manual therapy, and analgesic advice, but fewer use modalities like acupuncture or TENS. Choice of exercises also varied: therapists commonly prescribed knee strengthening and functional tasks, but the variety of exercises used differed (Fig. 4).

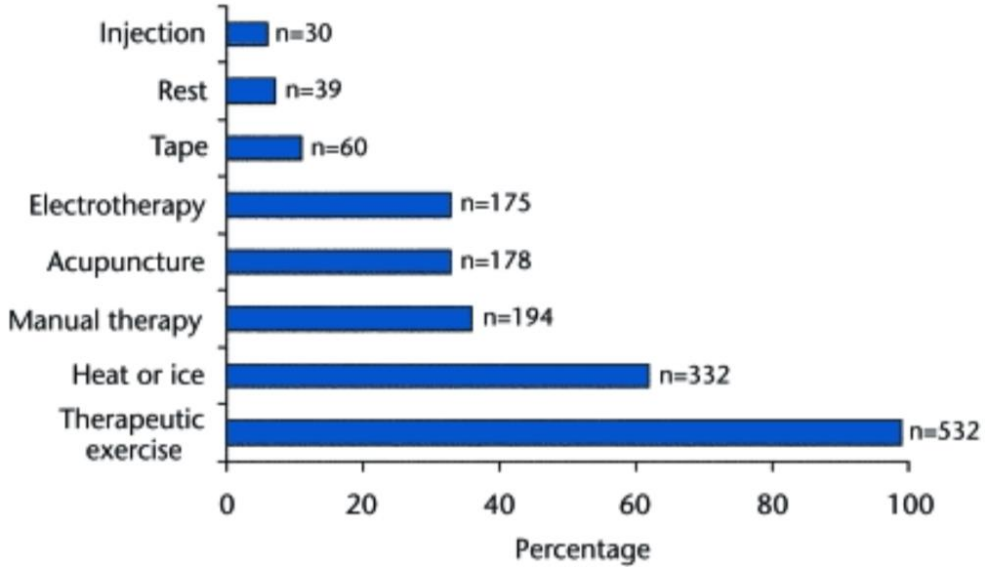

Figure 3 UK therapists' self-reported treatments for knee osteoarthritis. Nearly all (left bars) endorse exercise therapy, education, and manual therapy. Fewer (middle) endorse adjuncts like ultrasound or acupuncture. Reported patient education and exercise use align with guidelines, though less common treatments remain variable [7].

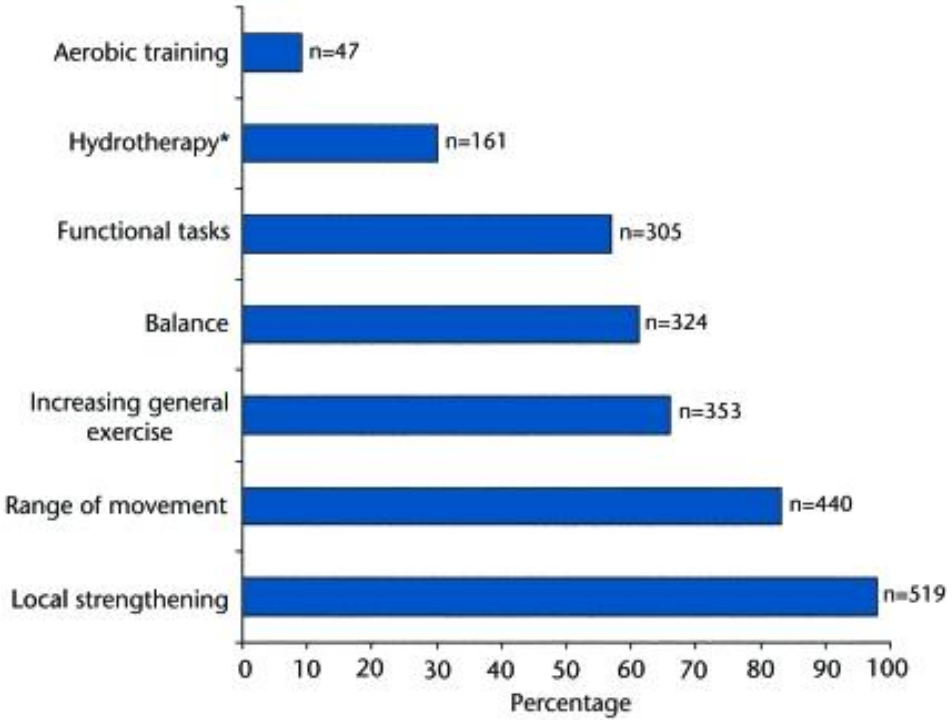

Figure 4 Types of exercises prescribed by UK therapists for knee OA [4]. Functional tasks (e.g. sit-to-stand) and strengthening exercises are most common. Range-of-motion and flexibility exercises are also used, but with greater variability among therapists.

These survey findings demonstrate broad agreement on core treatments (exercise, education) yet reveal differences in secondary therapies. Qualitative research echoes this. In interviews with Australian physiotherapists, most delivered core guideline-recommended care (education and land-based exercise), but many still used non-core modalities like hydrotherapy or manual therapy and placed varying emphasis on education. They tailored strategies to patient symptoms and history, often under-emphasizing OA pathophysiology education [8]. Therapists cited system-level barriers (insurance, time) that could lead to variation in care intensity.

Chart reviews of actual practice also highlight variability. Oatis et al. examined rehabilitation after total knee replacement in 180 patients. They found *"considerable variability"* in timing, number of visits, and exercise content. Outpatient PT patients had more visits and longer care duration than homecare patients [9]. Outpatients

were more likely to receive exercises well-supported by literature, but overall documentation of progression was limited for both settings [9]. Figures 5 and 6 show some of these data. While many therapists use multiple exercise types, 35% used five or fewer distinct exercises, and 2% used more than 30. This suggests inconsistency in therapeutic dose and diversity.

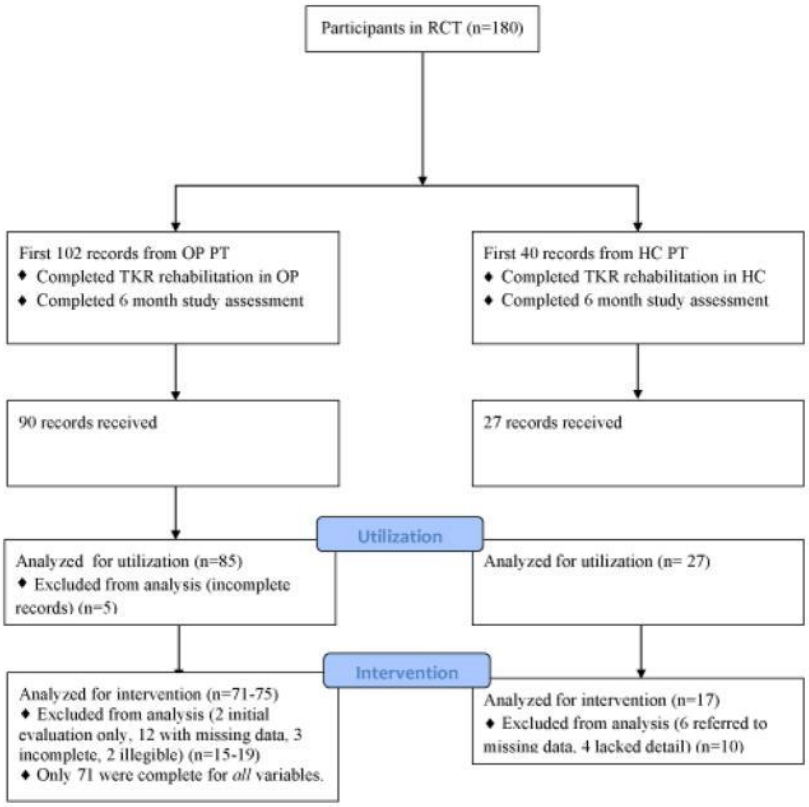

Figure 5 Homecare vs. outpatient rehabilitation content after knee replacement. Outpatient therapists (black) documented exercises for more muscle groups than homecare therapists (gray). For example, lower-extremity strengthening was noted more often in outpatient charts (**p<.001). This indicates variation in exercise selection by setting [9].

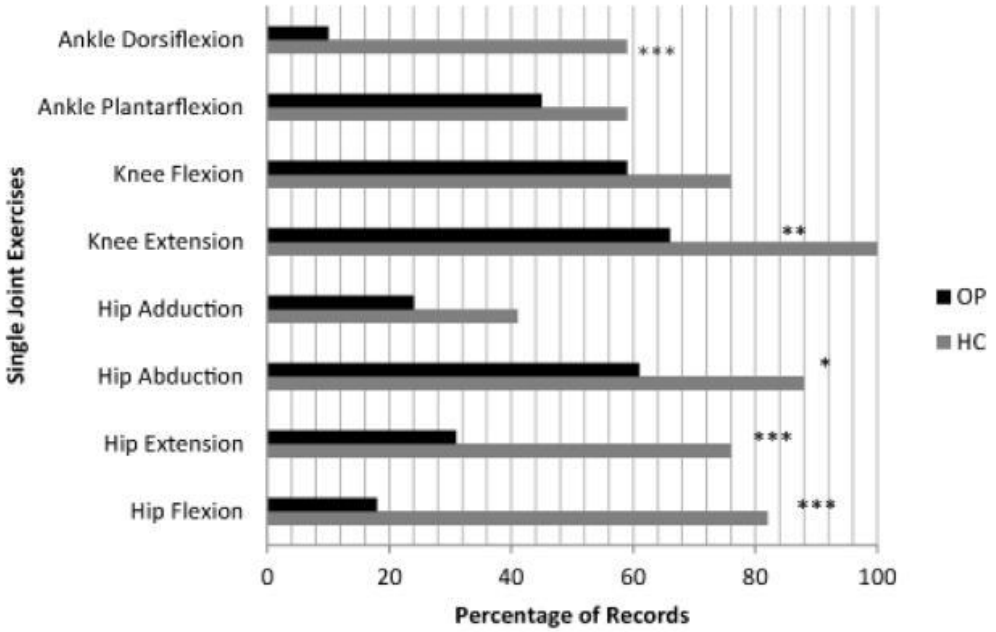

Figure 6 Number of different exercises used per patient after knee replacement [9]. Histogram of outpatient (black) vs homecare (gray) PT. Many therapists used a moderate number of exercises, but some used very few or many. This spread shows diversity in rehabilitation programming.

Finally, variability can be influenced by patient attributes. A study reported that patients with worse surgical severity were more likely to be recommended therapy by one profession than another [3]. This highlights that not only therapist factors but also differing interpretations of patient condition drive decision variance.

Discussion

Our review identifies multiple sources of variability among therapists managing knee injuries.

Assessment: Despite many objective tests, inter-rater reliability is often only moderate. Even experienced clinicians differ on exam findings and dysfunction diagnoses [1]. Standardized classification systems (e.g. McKenzie MDT) improve agreement somewhat, but more high-quality studies are needed to define reliable assessment protocols for the knee [2].

Treatment decisions: There is broad consensus to use education and therapeutic exercise for knee conditions, reflecting guidelines [5]. However, therapists vary in supplementing these core interventions with other modalities. Surveys show lower and inconsistent use of modalities (electrotherapy, ultrasound) and differences in exercise dose (number of sessions, variety of exercises) [9]. These variations stem from therapist beliefs, training, and practical constraints. For example, older therapists more often use passive modalities, and resource or reimbursement issues limit some therapists' ability to provide more visits [8].

The practical impact of this variability is twofold. On one hand, some individualization is beneficial: tailoring rehab to patient needs is vital. On the other hand, unnecessary discrepancies (unwarranted variation) can lead to suboptimal care. For knee OA, guidelines emphasize core care (exercise, weight management) but our sources found limited emphasis on weight advice and insufficient long-term follow-up [8]. In postoperative rehab, lack of standardized progression hindered outcome optimization [9]. Efforts to reduce unwarranted variation might include: enhancing training on evidence-based protocols, improving documentation standards, and developing clear guidelines that address practical barriers. Shared decision-making with patients can also align treatments to preferences while ensuring key interventions are not overlooked.

Conclusion

Therapists' clinical observations and treatment choices for knee injuries show significant variability, despite common agreement on core treatments. Reliability of physical findings is only moderate, and practitioners differ in exercise prescription, modality use, and follow-up plans. Factors such as clinician experience, setting, and health system constraints contribute to these differences. Our review suggests the need for improved standardization and education. Promoting adherence to evidence-based guidelines, ensuring robust training in assessment, and identifying system barriers are key steps. Future research should test interventions to harmonize care, such as consensus-based assessment tools or decision aids, while preserving the clinician's ability to personalize treatment.

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