Rehabilitation in Patients with Total Hip Arthroplasty During the Covid-19 Pandemic. Functional Outcomes

Macarena Otero, Raúl A. Posse, Gabriel O. Pérez Lloveras, Franco Casserá, Tomás M. Rognoni, Agustina Laboranti, Mateo Lazzari, Franco G. Casen Infante, David Arjona Angarita, Juan R. Tanus
Orthopedics and Traumatology Service, Hospital Universitario Austral, Buenos Aires, Argentina

ABSTRACT

Introduction: The COVID-19 pandemic had a significant impact on many parts of people's lives, including those who needed rehabilitation after primary hip arthroplasty. **Objective:** To determine if there is a difference in functional outcomes between supervised and self-administered rehabilitation after THA. **Materials and Methods:** Data were collected from two groups of patients: those who were operated on for unilateral THA and received supervised rehabilitation, and those who were operated on during the pandemic and experienced unsupervised, self-directed rehabilitation. The functional outcomes of both groups were compared three months and one year following surgery using the modified Harris Hip Score (mHHS) and the Forgotten Joint Score (FJS). **Results:** No significant differences were found in HHS between the two groups at 3 and 12 months (p 0.18). On the contrary, a statistically significant difference (p <0.001) was observed in the FJS, which was superior for unsupervised THA, both at 3 months and at 1 year. After 12 months, both scores showed significant improvement in the two groups (p < 0.001). **Conclusion:** After a THA, both supervised and unsupervised rehabilitation options should be considered. Our findings indicate that supervision does not result in faster or more successful rehabilitation, therefore enabling unsupervised rehabilitation for patients who require it.
Keywords: Total hip replacement; rehabilitation; functional outcomes; Forgotten Joint Score; Harris Hip Score; Covid-19.
Level of Evidence: IV

Rehabilitación en pacientes con artroplastia total de cadera durante la pandemia del COVID-19. Resultados funcionales

RESUMEN

Introducción: La pandemia del COVID-19 revolucionó muchos aspectos de la vida de las personas y aquellos pacientes que necesitaban una rehabilitación luego de una artroplastia total de cadera (ATC) no fueron la excepción. **Objetivo:** Determinar si existe alguna diferencia en los resultados funcionales entre la rehabilitación supervisada y la autoadministrada después de una ATC. **Materiales y Métodos:** Se recolectaron datos de 2 grupos de pacientes: los operados de ATC unilateral que realizaron rehabilitación supervisada y aquellos operados durante la pandemia, que recibieron rehabilitación sin supervisión, autoadministrada. Se compararon los resultados funcionales de ambos grupos a los 3 meses y al año de la cirugía mediante el Harris Hip Score modificado (HHSm) y el Forgotten Joint Score (FJS). **Resultados:** No se encontraron diferencias significativas en el HHS entre ambos grupos a los 3 ni a los 12 meses (p 0,18). Por el contrario, se observó una diferencia estadísticamente significativa (p <0,001) en el FJS, fue superior para la fisiokinesioterapia no supervisada, tanto a los 3 meses como al año. Ambos puntajes mejoraron a los 12 meses, en los dos grupos (p <0,001). **Conclusiones:** Tanto la rehabilitación supervisada como la no supervisada deben ser consideradas después de una ATC. Nuestros resultados han demostrado que la supervisión no implica una rehabilitación más pronta ni eficaz, esto otorga la posibilidad de una rehabilitación no supervisada para aquellos pacientes que así lo requieran.
Palabras clave: Artroplastia total de cadera; rehabilitación; resultados funcionales; Forgotten Joint Score; Harris Hip Score; COVID-19.
Nivel de Evidencia: IV

Received on December 11th, 2023. Accepted after evaluation on March 25th, 2024 • Dr. MACARENA OTERO • Oteromaca@gmail.com https://orcid.org/0009-0006-2297-5257
How to cite this article: Otero M, Posse RA, Pérez Lloveras GO, Casserá F, Rognoni TM, Laboranti A, Lazzari M, Casen Infante FG, Colombato F. Rehabilitation in Patients with Total Hip Arthroplasty During the Covid-19 Pandemic. Functional Outcomes. *Rev Asoc Argent Ortop Traumatol* 2024;89(3):314-321. https://doi.org/10.15417/issn.1852-7434.2024.89.3.1867

INTRODUCTION

Total hip arthroplasty (THA) is a widely used surgical procedure to treat degenerative diseases of the hip joint. The number of THAs in the world has increased significantly in recent years as the population ages and musculoskeletal diseases become more prevalent.[1]

Today, postoperative physical therapy is considered indispensable to achieve favorable functional outcomes in the context of THA. The COVID-19 pandemic and the "Preventive and Compulsory Social Isolation" (ASPO) in force from March 20 to March 31, 2020, and finally until January 31, 2021,[2] transformed numerous aspects of people's lives, including those in need of rehabilitation after THA.

Some studies advocate for professionally supervised physical therapy, claiming that individualized treatment can lead to a successful recovery and better functional outcomes.[3-5] Other studies have found that self-administered exercise programs can be equally effective, and that patient autonomy in postoperative rehabilitation can be advantageous since it encourages self-responsibility and active involvement in the recovery process.[6,7]

However, the medical community continues to debate and disagree on the best approach to rehabilitation. Current scientific evidence provides conflicting results and has failed to clearly establish which of the two approaches, supervised or self-administered, is superior in terms of functional outcomes and long-term quality of life.

The aim of this study was to retrospectively compare functional outcomes at 3 months and 1 year in patients undergoing primary THA between two groups: those operated on during the pandemic period, who performed unsupervised self-administered rehabilitation, and those operated on before the pandemic, who received formal, professionally supervised rehabilitation.

Our hypothesis was that there would be no significant differences between the two groups after one year, but that the group receiving supervised physical therapy would have more favorable outcomes after three months.

MATERIALS AND METHODS

A retrospective analysis of functional outcomes was conducted in two groups of patients who had undergone THA: those who were operated on before the pandemic (2019) and had undergone the usual rehabilitation protocol implemented by the hip reconstructive surgery team for 12 weeks, supervised by a professional from the Rehabilitation Service, and those who were operated on during the pandemic (March 2020 to December 2021) and completed their rehabilitation at home, self-administered and unsupervised. Both groups followed the same exercise routine designed by the hospital's comprehensive rehabilitation team (Appendix).

The patients had been operated on by two expert surgeons from the same team, using a posterolateral approach.

Demographic data were evaluated, such as age, sex, side operated on, body mass index, comorbidities (chronic obstructive pulmonary disease, diabetes, coronary artery disease, smoking), type of implant and need for red blood cell transfusion after surgery (Table 1).

Functional outcomes were measured in both groups at 3 and 12 months after surgery using the modified Harris Hip Score (mHHS) and Forgotten Joint Score (FJS) (Table 2).

The inclusion criteria were: 1) age >18 years, 2) unilateral THA for hip osteoarthritis, Crowe types I and II hip dysplasia or femoral neck fracture, and 3) minimum follow-up of one year.

Appendix

HUA Rehabilitation Protocol

- **Hospitalization period:**
  Immediate postoperative period: Mobilization and exercise plan, isometric contraction of glutes and quadriceps, active mobilization exercises with flexion-extension of both hips, dragging the heel supported on the bed, and active and counter-resistance exercises for both feet.
  Post-operative day 1: Bedside sitting, standing and ambulation with a walker.

- **Post-discharge and first month:**
  Week 1: Mobilization plan and muscle and gait rehabilitation plan. Except in selected cases, canes and supports are not used.
  Weeks 2-4: Physical therapy twice a week. Exercise plan of 3 sets of 10 repetitions each. Passive and active mobilization plus progressive muscle strengthening.

- **From the 1st month onwards:**
  TENS or magnetotherapy are used for analgesic or anti-inflammatory physical therapy as needed by the patient. 10 min of stationary bike (high seat). A 1 kg load is added to the entire exercise plan. Assisted active exercises in lateral decubitus for abductors. Psoas elongation.

- **From the 2nd month onwards:**
  Lightweight quadriceps chair exercises. 10 min of treadmill walking.

- **From the 3rd month onwards:**
  Same protocol, additional load according to tolerance. Low impact aerobic activity.

Table 1. Demographic variables

Variable*	Unsupervised physical therapy	Supervised physical therapy	p
n	**60**	**47**	
Male sex, n (%)	36 (60.0)	25 (53.2)	0.611[1]
Age	62.02 (12.03)	62.55 (11.03)	0.813[1]
Left side, n (%)	27 (45.0)	29 (61.7)	0.128[2]
Type of implant, n (%)			0.447[2]
Cemented	7 (11.7)	6 (12.8)	
Hybrid	2 (3.3)	0 (0.0)	
Uncemented	51 (85.0)	41 (87.2)	
Body mass index	28.41 (5.03)	29.16 (5.27)	0.453[1]
Other lower limb arthroplasty, n (%)	6 (10.0)	6 (12.8)	0.888[2]
Chronic obstructive pulmonary disease, n (%)	3 (5.0)	0 (0.0)	0.335[2]
Coronary heart disease, n (%)	9 (15.0)	5 (10.6)	0.708[2]
Transfusions, n (%)	2 (3.3)	0 (0.0)	0.586[2]
Smoker, n (%)			0.738[2]
Ex-smoker	6 (10.0)	7 (14.9)	
No	44 (73.3)	33 (70.2)	
Yes	10 (16.7)	7 (14.9)	
Diabetes, n (%)	6 (10.0)	1 (2.1)	0.215[2]

*Continuous variables summarized as mean (standard deviation).
[1]Kruskal-Wallis test; 2Fisher's test.

Table 2. Functional outcomes.

	Unsupervised physical therapy	Supervised physical therapy
Modified Harris Hip Score		
3 months	79.6	82
1 year	84.9	87.3
Forgotten Joint Score		
3 months	86.9	70
1 year	91.1	75.7

The exclusion criteria were: 1) THA for Crowe types III and IV dysplasia, 2) absence of data on mHHS and FJS in the clinical records, 3) primary arthroplasties complicated by dislocation, periprosthetic infection or periprosthetic fracture that modified the usual postoperative period, 4) symptomatic COVID-19 patients who required rest or hospitalization.

The data were collected through a search in the computerized clinical record system of our institution, the "PECTRA System".

Statistical Analysis

The Kruskal-Wallis test for continuous variables and Fisher's test for categorical variables were used to compare mHHS and FJS values at 3 and 12 months postoperatively in the supervised and self-administered physical therapy groups. The demographic data of the sample were also analyzed. A p value <0.05 was considered significant.

RESULTS

The medical records of 272 patients undergoing THA were reviewed, with 119 receiving supervised physical therapy in 2019 and 147 receiving unsupervised physical therapy during the pandemic. 165 patients were excluded: 127 for incomplete clinical record data, 27 for symptomatic COVID-19 that interrupted rehabilitation, six for implant dislocation, four for periprosthetic infection, and one for periprosthetic fracture.

Finally, 107 patients undergoing THA were included: 47 patients received supervised physical therapy (operated in 2019, before the pandemic), while 60 patients received self-administered rehabilitation at home (operated between March 2020 and December 2021). The mean age in both groups was 62 years. No significant differences in demographic variables were observed between the groups (Table 1).

The mean mHHS at 3 months after surgery was 79.6 (95% confidence interval [95%CI] 77-82.2) for patients with unsupervised physical therapy, and 82 (95%CI 79.1-84.9) for those who did supervised physical therapy. At 12 months, the mean scores were 84.9 (95% CI 82.3-87.4) and 87.3 (95% CI 84.3-90.2), respectively. The difference in score at 3 and 12 months was 2.37 (standard error 1.76; p 0.18), in both groups (Figure 1).

The mean FJS at 3 months after surgery was 86.9 (95%CI 82.4-91.5) for patients with unsupervised physical therapy, and 70 (95%CI 65.2-74.8) for those in the other group. At 12 months, the means were 91.1 (95% CI 86.6-95.7) and 75.7 (95% CI 70.9-80.4), respectively. The difference in score at 3 months was 16.9 (standard error 2.09; p<0.0001), while at 12 months it was 15.5 (standard error 2.09; p<0.0001) (Figure 2).

The difference between the score at 3 and 12 months was 4.2 (p<0.0001) in patients with unsupervised physical therapy and 5.67 (p<0.0001) in those with supervised physical therapy.

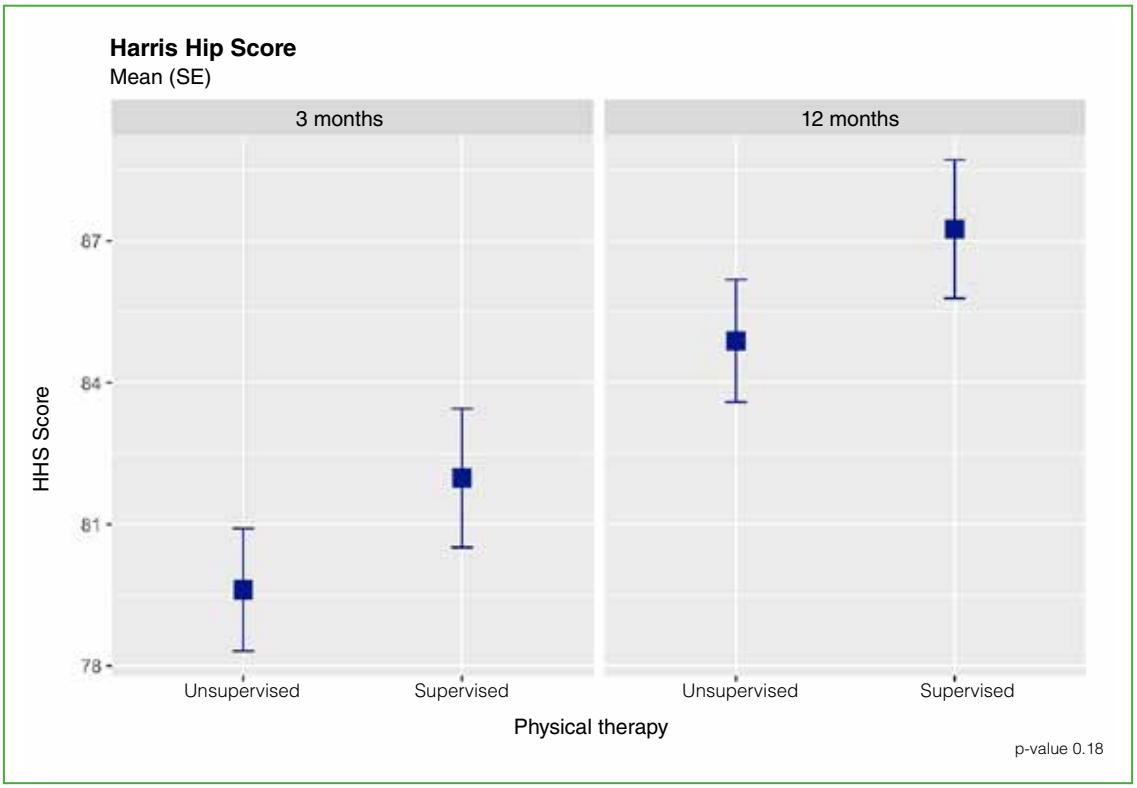

Figure 1. Harris Hip Score results at 3 and 12 months.

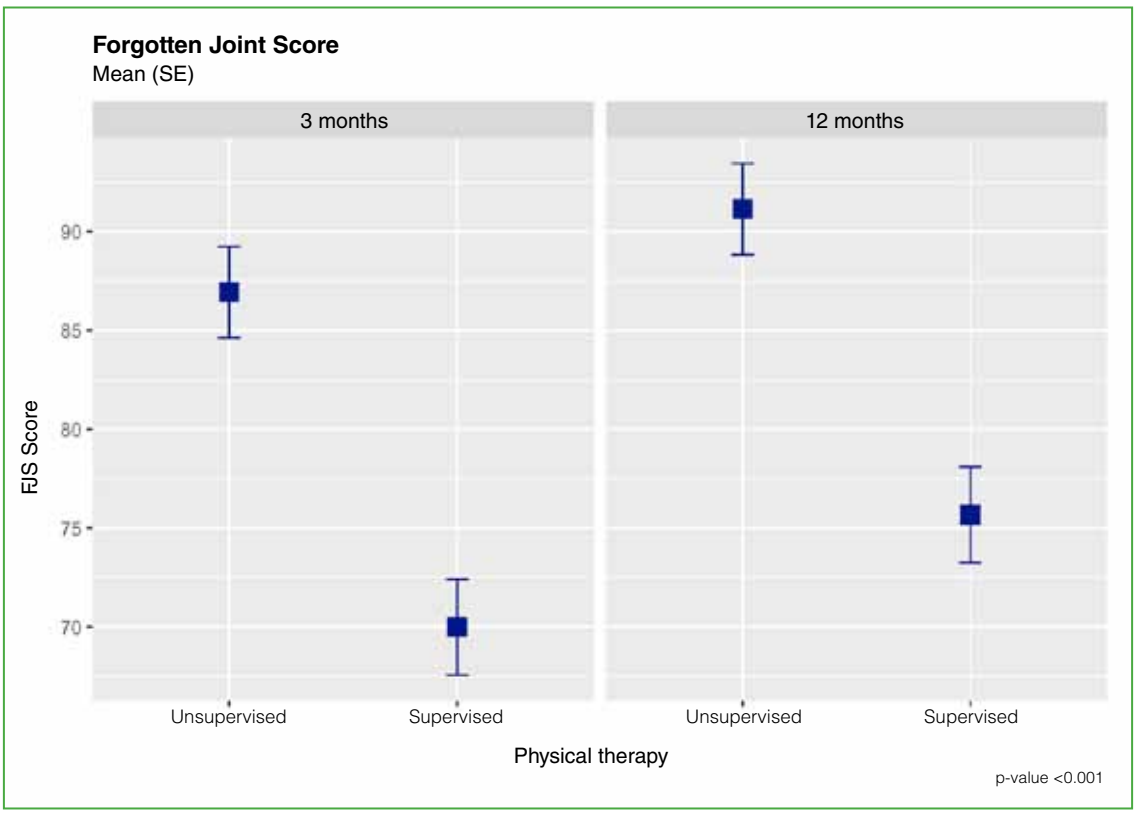

Figure 2. Forgotten Joint Score results at 3 and 12 months.

DISCUSSION

Supervised kinesiology rehabilitation has long been considered the gold standard in the postoperative management of patients undergoing THA. Several studies have highlighted its benefits in improving functional outcomes and reducing disability in patients. Furthermore, because kinesiologists provide each patient individualized care, the rehabilitation program may be tailored to meet the specific requirements of each patient, leading to a more effective and successful recovery.[8-10] However, self-administered exercises have also gained recognition as a viable option in the rehabilitation process following THA.[11]

Regarding the results of our study, mHHS scores were higher in the supervised rehabilitation group, both at 3 and 12 months, with no statistically significant differences (p 0.18). These findings are consistent with those of Coulter et al.,[12] who, in their randomized, controlled study, found no clinical or statistical differences in scores on the WOMAC *(Western Ontario McMaster Universities Osteoarthritis Index*) scale, the SF-36 questionnaire and the *Timed Up and Go* test at 6-month follow-up between a self-administered group and a supervised rehabilitation group. These authors concluded that an unsupervised early rehabilitation plan can be developed effectively for low-risk patients. On the other hand, Saueressig et al.[13]discovered no advantage of supervised physical therapy over standard postoperative care or any other type of care.

With respect to the FJS, our study found no statistically significant difference ($p<0.0001$) in favor of the self-administered rehabilitation group, both at 3 and 12 months. Likewise, statistically significant improvements in the FJS were observed within each group between 3 and 12 months postoperatively: a 4.2-point difference for the self-administered physical therapy group and a 5.67-point difference for the supervised physical therapy group. However, none of these values reached the minimum significance difference for the score in question, which is set at 10.8 points. These findings, although contradictory, reinforce the aforementioned statements about the favorable and reproducible results of self-administered home rehabilitation. In their 2008 randomized clinical study, Galea et al.[11] found no significant differences between patients who underwent rehabilitation in specialized centers and those who followed specific self-administered plans after THA. In their study, both rehabilitation groups showed significant improvements in quality of life, ability to walk up and down stairs, the *Timed Up and Go* test, and the 6-minute walk test eight weeks after surgery. These authors concluded that a strengthening plan is effective and generates significant improvements for patients, whether in a rehabilitation center or at home.

In terms of economics, Fatoye et al. studied the cost-effectiveness of physical therapy following total hip arthroscopy (THA) and found that, from the perspective of national health systems, physical therapy was only cost-effective when carried out in accelerated programs. However, they were unable to extrapolate these findings to the level of the patient or healthcare provider.[14]

Making an informed decision requires careful consideration of the benefits and limitations of each type of rehabilitation. Supervised kinesiology rehabilitation offers the advantage of direct supervision by trained professionals, ensuring proper technique correction, optimal exercise progression and individualized attention. On the other hand, self-administered exercises offer the advantage of autonomy and flexibility for the patient, which may improve compliance with the rehabilitation program and overall satisfaction.[9,15,16] In addition, self-administered exercise programs may be more accessible and cost-effective, especially for those patients who have geographic limitations or financial difficulties in accessing supervised rehabilitation services.

A strength of our study is that, to our knowledge, it is the first to compare functional and subjective outcomes in groups with different types of rehabilitation after THA in Argentina. The sample is acceptable. Limitations include its retrospective design and the fact that it was not possible to include many patients due to the lack of information in the clinical records. The FJS reflects the subjectivity of each patient, unlike the mHHS, which includes both a subjective and an objective component.

CONCLUSIONS

Our study yielded no statistically significant differences in the mHHS at 3 and 12 months post-surgery between a supervised and a self-administered rehabilitation plan. However, significant differences were found in the FJS: self-administered rehabilitation was superior at both 3 and 12 months, most likely due to the full subjective nature of the score and the epidemiological context in which this group's THA was performed. This supports the growing controversy in the rehabilitation field and underscores the importance of considering each patient's preferences and needs when deciding on the most appropriate rehabilitation approach. Future high-quality research with larger cohorts are required to corroborate our findings and provide more precise recommendations for clinical practice.

Conflict of interest: The authors declare no conflicts of interest.

R. A. Posse ORCID ID: https://orcid.org/0000-0003-2202-4268
G. O. Pérez Lloveras ORCID ID: https://orcid.org/0009-0005-4227-0484
F. Casserá ORCID ID: https://orcid.org/0009-0005-0566-7124
T. M. Rognoni ORCID ID: https://orcid.org/0009-0000-4720-1318
A. Laboranti ORCID ID: https://orcid.org/0000-0002-7136-937X
M. Lazzari ORCID ID: https://orcid.org/0009-0006-8609-5777
F. G. Casen Infante ORCID ID: https://orcid.org/0009-0008-9108-9755
D. Arjona Angarita ORCID ID: https://orcid.org/0009-0009-7278-2527
J. R. Tanus ORCID ID: https://orcid.org/0009-0009-4021-3696

REFERENCES

1. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *J Bone Joint Surg Am* 2007;89(4):780-5. https://doi.org/10.2106/JBJS.F.00222
2. Estado de situación de la cobertura de casos por covid-19 [Internet]. Argentina.gob.ar. 2022. Available at: https://www.argentina.gob.ar/noticias/estado-de-situacion-de-la-cobertura-de-casos-por-covid-19
3. Wainwright TW, Memtsoudis SG, Kehlet H. Fast-track hip and knee arthroplasty. how fast? *Br J Anaesth* 2021;126(2):348-9. https://doi.org/10.1016/j.bja.2020.09.038
4. Umpierres CS, Aguiar Ribeiro T, Marchisio AE, Galvão L, Krás Borges IN, de Souza Macedo CA, et al. Rehabilitation following total hip arthroplasty evaluation over short follow-up time: Randomized clinical trial. *J Rehabil Res Dev* 2014;51(10):1567-78. https://doi.org/10.1682/jrrd.2014.05.0132
5. Piva SR, Gil AB, Almeida GJM, DiGioia AM 3rd, Levison TJ, Fitzgerald GK. A balance exercise program appears to improve function for patients with total knee arthroplasty: a randomized clinical trial. *Phys Ther* 2010;90(6):880-94. https://doi.org/10.2522/ptj.20090150
6. Mizner RL, Petterson SC, Snyder-Mackler L. Quadriceps strength and the time course of functional recovery after total knee arthroplasty. *J Orthop Sports Phys Ther* 2005;35(7):424-36. https://doi.org/10.2519/jospt.2005.35.7.424
7. Rooks DS, Huang J, Bierbaum BE, Bolus SA, Rubano J, Connolly CE, et al. Effect of preoperative exercise on measures of functional status in men and women undergoing total hip and knee arthroplasty. *Arthritis Rheum* 2006;55(5):700-8. https://doi.org/10.1002/art.22223
8. Chaudhry YP, Hayes H, Wells Z, Papadelis E, Arevalo A, Horan T, et al. Unsupervised home exercises versus formal physical therapy after primary total HIP arthroplasty: A systematic review. *Cureus* 2022;14(9):e29322. https://doi.org/10.7759/cureus.29322
9. Beaupre LA, Masson EC, Luckhurst BJ, Arafah O, O'Connor GJ. A randomized pilot study of a comprehensive postoperative exercise program compared with usual care following primary total hip arthroplasty in subjects less than 65 years of age: Feasibility, selection of outcome measures and timing of assessment. *BMC Musculoskelet Disord* 2014;15(1):192. https://doi.org/10.1186/1471-2474-15-192
10. Monaghan B, Cunningham P, Harrington P, Hing W, Blake C, O' Dohertya D, et al. Randomised controlled trial to evaluate a physiotherapy-led functional exercise programme after total hip replacement. *Physiotherapy* 2017;103(3):283-8. https://doi.org/10.1016/j.physio.2016.01.003

11. Galea MP, Levinger P, Lythgo N, Cimoli C, Weller R, Tully E, et al. A targeted home- and center-based exercise program for people after total hip replacement: A randomized clinical trial. *Arch Phys Med Rehabil* 2008;89(8):1442-7. https://doi.org/10.1016/j.apmr.2007.11.058
12. Coulter C, Perriman DM, Neeman TM, Smith PN, Scarvell JM. Supervised or unsupervised rehabilitation after total hip replacement provides similar improvements for patients: a randomised controlled trial. *Arch Phys Med Rehabil* 2017;98(11):2253-64. https://doi.org/10.1016/j.apmr.2017.03.032
13. Saueressig T, Owen PJ, Zebisch J, Herbst M, Belavy DL, et al. Evaluation of exercise interventions and outcomes after hip arthroplasty. *JAMA Netw Open* 2021;4(2):e210254. https://doi.org/10.1001/jamanetworkopen.2021.0254
14. Fatoye F, Wright JM, Yeowell G, Gebrye T. Clinical and cost-effectiveness of physiotherapy interventions following total hip replacement: A systematic review and meta-analysis. *Rheumatol Int* 2020;40(9):1385-98. https://doi.org/10.1007/s00296-020-04597-2
15. Peter WF, Nelissen RG, Vliet Vlieland TP. Guideline recommendations for post-acute postoperative physiotherapy in total hip and knee arthroplasty: Are they used in daily clinical practice? *Musculoskeletal Care* 2014;12(3):125-31. https://doi.org/10.1002/msc.1067
16. Scott CEH, MacDonald DJ, Howie CR. 'Worse than death' and waiting for a joint arthroplasty. *Bone Joint J* 2019;101-B(8):941-50. https://doi.org/10.1302/0301-620X.101B8.BJJ-2019-0116.R1