The modern way to treat a total knee patient:
Slow and Steady

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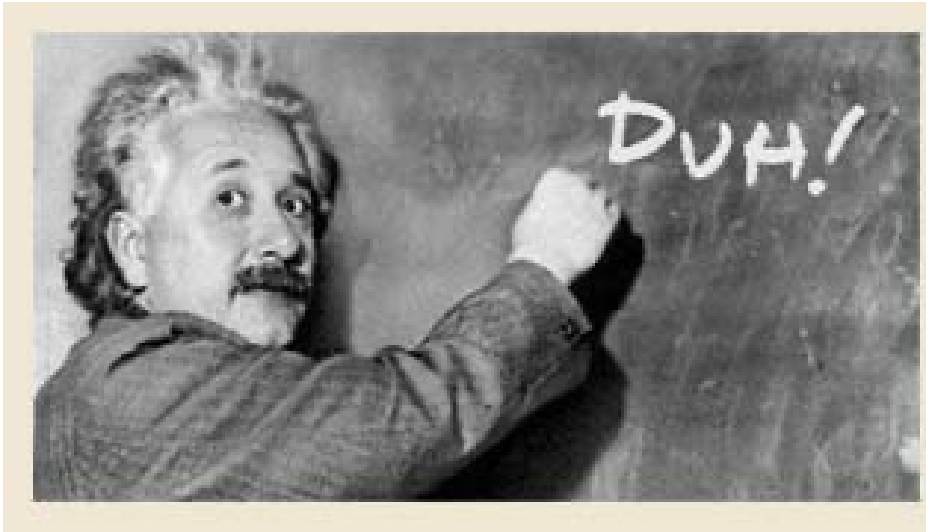
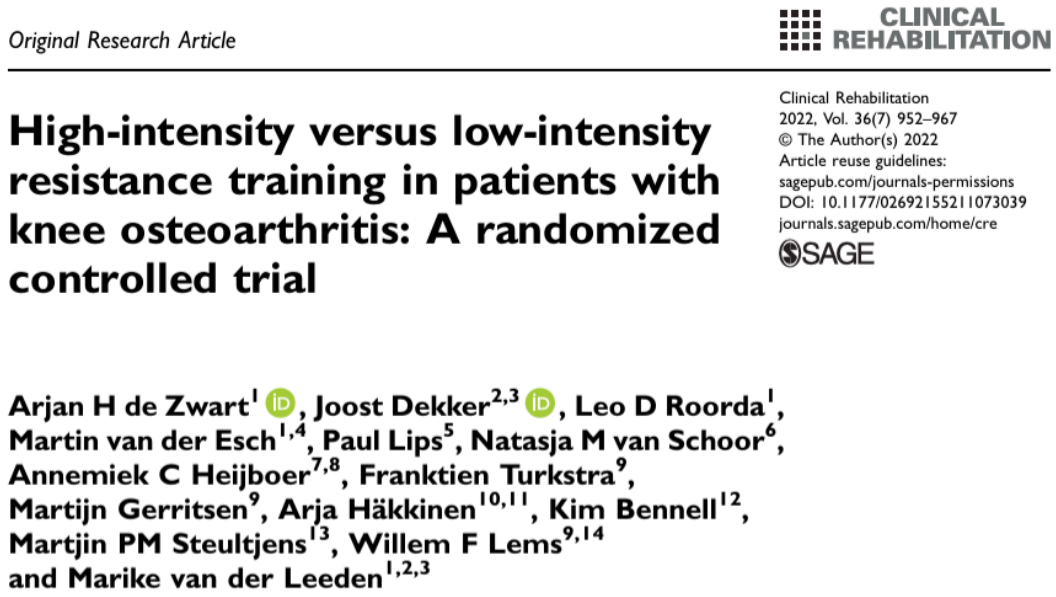
Slow and Steady: it's (un) Common Sense

- We splint all other body parts when they are injured.
- We know swelling is the enemy of early function
- Surgery is massively traumatic
- Our sutures are only as good as the tissue they bring together
- Why would you move it early?



High Intensity vs. Low Intensity in patients with Knee OA: A randomized control trial

- HI vs LI. Isokinetic muscle strength as outcome.
- 12 weeks of Resistance Training : HI vs LI
- 177 Participants, 67.6 +/- 5.8 years
- No difference between groups
  - Strength
  - Pain
  - Physical function



Original Research Article

CLINICAL REHABILITATION

High-intensity versus low-intensity resistance training in patients with knee osteoarthritis: A randomized controlled trial

Clinical Rehabilitation
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Arjan H de Zwart[1], Joost Dekker[2,3], Leo D Roorda[1], Martin van der Esch[1,4], Paul Lips[5], Natasja M van Schoor[6], Annemiek C Heijboer[7,8], Franktien Turkstra[9], Martijn Gerritsen[9], Arja Häkkinen[10,11], Kim Bennell[12], Martijn PM Steultjens[13], Willem F Lems[9,14] and Marike van der Leeden[1,2,3]

High Intensity vs. low intensity rehab post TKA

Arthritis Care & Research
AN OFFICIAL JOURNAL OF THE AMERICAN COLLEGE OF RHEUMATOLOGY

Osteoarthritis | Full Access

Early High-Intensity Versus Low-Intensity Rehabilitation After Total Knee Arthroplasty: A Randomized Controlled Trial

Michael J. Bade, Tamara Struessel, Michael Dayton, Jared Foran, Raymond H. Kim, Todd Miner, Pamela Wolfe, Wendy M. Kohrt, Douglas Dennis, Jennifer E. Stevens-Lapsley

First published: 03 November 2016 | https://doi.org/10.1002/acr.23139 | Citations: 83

- 162 participants
- 2-3 visits/wk, 11 weeks
- HI included progressive resistance and faster WB
- No difference
  - TUG
  - 6MW, 10MW
  - WOMAC
  - SF-12
  - ROM
  - Muscle Strength

Intensive vs. Conventional Therapy post TKA

Comparing Intensive and Conventional Therapy: A Meta-Analysis of Postoperative Physical Outcomes After Total Knee Replacement

Mohamed Zahed [1], Alzahraa Faris Alesawy [2], Ziad Samir Zahed [3], Rahafat Samir [4], Mahmoud Eleisawy [4]

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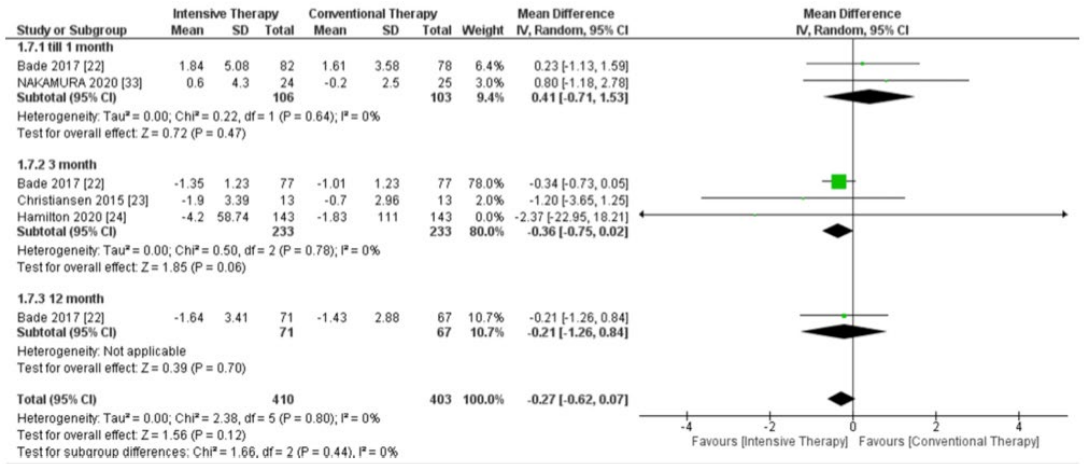

FIGURE 8: Forest plot of time up and go.

- 2025 Meta Analysis
- 15 RCTs, 1087 patients
- 2006 to 2024
- Intensive Therapy at one month no difference in:
  - Walking distance
  - Quads
  - ROM
  - Pain
- Conclusion: ITT not justified

Rehabilitation

- Exercise Programs
  - In person (higher adherence)
  - Remote (lower adherence)
- Education
- Nutrition and Supplements
- First reports year 2000

KSSTA Knee Surgery Sports Traumatology Arthroscopy
THE OFFICIAL CLINICAL JOURNAL OF ESSKA

Knee | Full Access

Telerehabilitation has similar clinical and patient-reported outcomes compared to traditional rehabilitation following total knee arthroplasty

Drake G. LeBrun, Brooks Martino, Elizabeth Biehl, Charles M. Fisher, Alejandro Gonzalez Della Valle, Michael P. Ast

First published: 26 March 2022 | https://doi.org/10.1007/s00167-022-06931-6 | Citations: 14

82 virtual vs. 244 conventional age matched controls
No differences in
90 day encounters
MUA rates
KOOS, Pain, VR-12
Conclusion Telerehab similar to in person rehab

Does how you do the knee matters: KA vs MA

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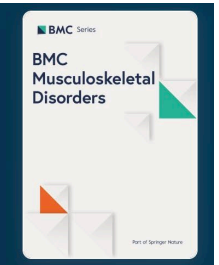
Postoperative clinical outcomes for kinematically, restricted kinematically, or mechanically aligned total knee arthroplasty: a systematic review and network meta-analysis of randomized controlled trials

Research | Open access | Published: 24 April 2023

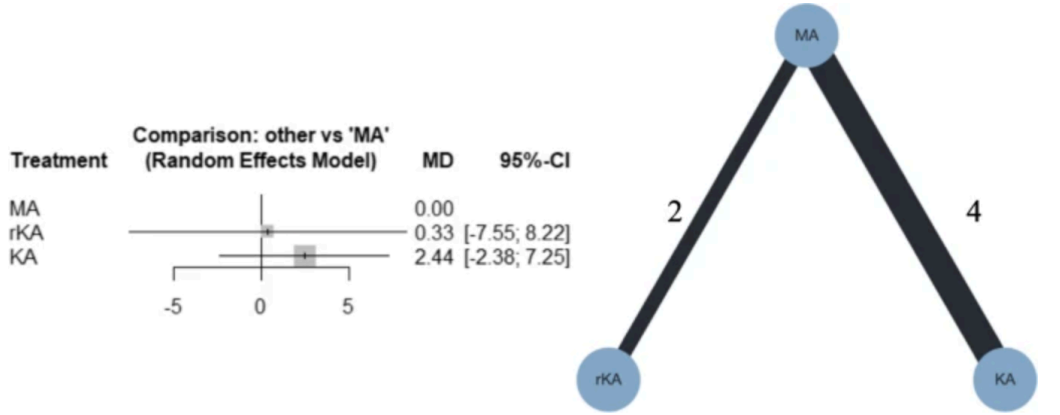
Volume 24, article number 322, (2023) Cite this article



Slight improvement in early period, no difference at one year

- **Waterson et al. 2016 Design** Prospective, blinded randomized trial (n = 71; KA n = 36, MA n = 35) with assessments at 6 weeks, 3 months, 6 months, and 1 year. **ROM result** No significant difference in range of movement at one year—mean difference 0.1° (95% CI −6.0 to 6.1, p = 0.99) [3].
- **Matsumoto et al. 2017 Design** Navigation-assisted series comparing 30 KA and 30 MA knees with one-year radiographic and clinical follow-up. **ROM result** Postoperative flexion angles and functional activity scores were reported significantly better in the KA group (p < 0.003 for flexion) at one year [4].
- **Elbuluk et al. 2022 (matched cohort) Design** 1:1 matched cohort (100 KA vs 100 MA) using the same implant and robotic guidance with outcomes at 6 weeks, 1 year, and 2 years. **ROM result** No difference in knee ROM at 6 weeks or 1 year (P > .43) [8].
- **Dossett randomized cohort (long-term follow-up) Design** Original randomized cohort (44 KA, 44 MA) with long-term follow-up (~13 years reported later); long-term PROMs and reoperation rates were comparable between methods (no consistent long-term ROM advantage reported in the follow-up summary) [7]. ----

Fig. 3



Forest plot and network plot for postoperative ROM. ROM, range of motion; MA, mechanically aligned; KA, kinematically aligned; rKA, restricted kinematically aligned; MD, mean difference; CI, confidence interval

Variation in recovery

- 327 patients, University of Colorado
- Rapid increase in first 40 days
- Improvements to 80 days.
- This variability illustrates the limitations of a one-size-fits-all approach to postoperative rehabilitation, as both the content of therapy and resource requirements are likely to differ between individuals with fast versus slow recovery of flexion.

Fig. 1

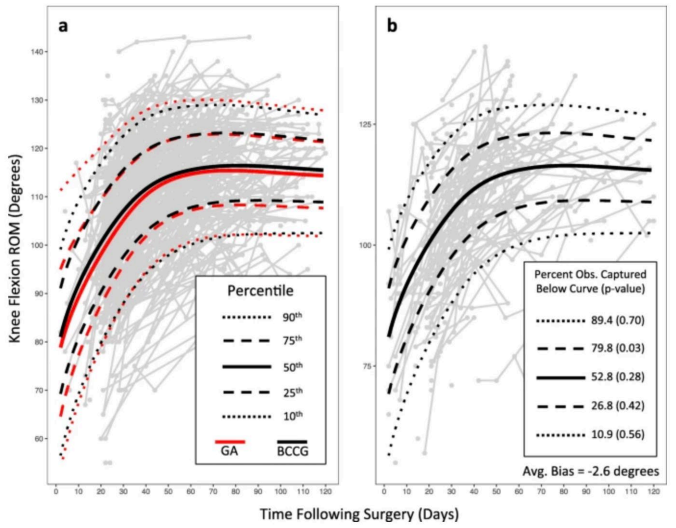
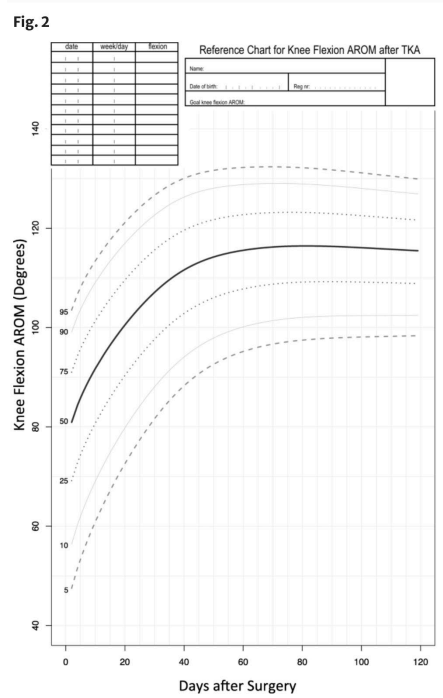


Fig. 2



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Reference chart for knee flexion following total knee arthroplasty: a novel tool for monitoring postoperative recovery

Research article | Open access | Published: 22 July 2020

Volume 21, article number 482, (2020) Cite this article

BMC Musculoskeletal Disorders

Aims and scope →

- Individual monitoring and goal setting
- Adaptive digital programs tailored to each patient’s recovery profile
- App Based, human backed virtual programs
- Wearables to enable objective real time assessment and intervention

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- M. Karimijashni, S. Yoo, K. Barnes et al., "Postoperative Rehabilitation Interventions in Patients at Risk of Poorer Outcomes Following Total Knee Arthroplasty: A Systematic Review," Musculoskeletal Care, 2025
- A. Gordon, A. M. Hussain, and M. A. Mont, "Utilization of smartphone technology and wearable technology following TKA," Journal of Knee Surgery, 2025
- A. J. Kittelson and K. Colborn, "Reference chart for knee flexion following total knee arthroplasty: a novel tool for monitoring postoperative recovery," BMC Musculoskeletal Disorders, 2020

Conclusion

- Baseline rehabilitation following total knee replacement should emphasize soft tissue healing in the first four weeks, followed by steady, pain-guided increase in activity
- Personalization of care may require ramping up or down the timeline based on patient history, physiology
- Real time, sensor based, patient monitoring can be integrated into care pathways to customize post op PT.

Thank you

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