Getting Evidence into Clinical Practice:
Musculoskeletal Research Facilitation Group (CAT Group)
Date: Dec 2022

Specific Question:
In adults in hospital following primary knee replacement are functional exercises more effective in improving mobility, range of knee motion and length of stay compared to bed exercises?

Clinical bottom line

There is very limited evidence to suggest functional exercises are more effective than bed exercises at reducing length of stay in patients post primary total knee replacement (TKR) in the acute hospital setting. A pilot study by Abbas and Daher (2017) favoured functional exercises; however, caution must be taken when drawing conclusions as the evidence was not high quality.
No evidence was found regarding outcomes for mobility or range of movement. Therefore our practice at University Hospitals of North Midlands (UHNM) will remain unchanged.

Why is this important?

In the United Kingdom (UK), approximately 90, 000 Total Knee Replacement (TKR) surgeries occur each year. This reduced to 30, 000 during the COVID-19 pandemic (Statista, 2022). This has led to a back log of patients waiting for knee surgery across the UK. Many patients are facing long waits for orthopaedic surgery, exceeding the 18 week wait target for planned elective care.

To aid in the restoration and recovery of elective surgery, there is an increasing push to maximise theatre capacity at for elective orthopaedics. There is a daily challenge to find the bed capacity on the County elective orthopaedic unit (EOU) as ten beds are occupied by Trauma patients; approximately a third of the bed capacity on the unit. This is to accommodate patient flow at our sister hospital Royal Stoke. A lack of bed capacity on day of surgery leads to late cancellations which pose additional stress to the patient and ward staff. It increases waiting list times and overall impacts the efficiency of the service. An efficient service is imperative to facilitate minimal time in hospital, reduce infection risk, limit waste and promote lean working; ultimately enhancing patient recovery.

Physiotherapy rehabilitation plays a key role in patient recovery; yet there is no gold standard protocol across the UK. NICE guidelines (2020; NG157) state inpatient rehabilitation should include mobilisation within 24hours and an exercise programme, but does not specify what exercises should be included. This has led to differences in type, frequency and progression of exercises between hospitals and physiotherapists (Wainwright, 2018). To understand what exercises are currently prescribed in hospitals across the UK, a question was posted in the interactive Chartered Society of Physiotherapy (CSP) forum. This identified variation in practice with some

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physiotherapists giving bed exercises only and others including closed chain functional exercises.

The protocol at University Hospital North Midlands (UHNM) currently includes mobilisation within 24 hours, as well as bed and seated knee exercises which include: static quadriceps contraction (SQ) inner range quadriceps (IRQ) straight leg raise (SLR) and active knee flexion and extension in sitting or lying. Patients are discharged once they are able to independently mobilise with a walking aid, demonstrate independent transfers and stairs where applicable and be able to complete their post-operative exercises. The patient is also educated on the importance of mobilisation and completing the prescribed exercises.

Clinically at UHNM we emphasise the importance of patients adhering to their exercises to aid recovery. As there is little evidence or national guidance regarding exercise prescription, it is difficult to determine if the exercises prescribed are optimal to achieve this. A review of current physiotherapy inpatient rehabilitation is warranted and has the potential to reduce patient's length of stay, minimise hospital costs (Wainwright and Burgess, 2020), and decrease UHNM's waiting list times. This is of particular interest in consideration of the on-going high demand for TKR surgery and ever growing surgical waiting lists at the Trust.

Therefore, the aim of this CAT is to identify any evidence that can help determine if functional exercises are better at improving early inpatient hospital outcomes of mobility, range of movement and hospital length of stay compared to usual care, bed exercises in adults post primary knee replacement.

Search timeframe- 2010- 2022

Inclusion Criteria

	Description	Search terms
Population and Setting	Adult patients receiving unilateral TKR Early post-op (0-7days) Any age/gender	Total knee replacements/ arthroplasty Early post-operative Inpatients
Intervention or Exposure	Usual care	Early post-op TKR exercises Bed/static exercise Static quadriceps/ inner range quadriceps/ straight leg raise
Comparison, if any	Functional closed chain knee exercises	Functional closed chain exercises (squat, step, marching, walking) strengthening Standing exercises

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Outcomes of interest	Length of stay in hospital ROM Strength Pain level	Length of stay in hospital (LoS) ROM/ range of movement Strength/ muscle contraction Pain level/ VAS score
Types of studies	RCT Experimental design	Randomised control trial Clinical trial Pilot study

Routine Databases Searched
Medline, Embase, Cinahl, Amed, Web of Science

Date of search- 13/09/2022

Results of the search

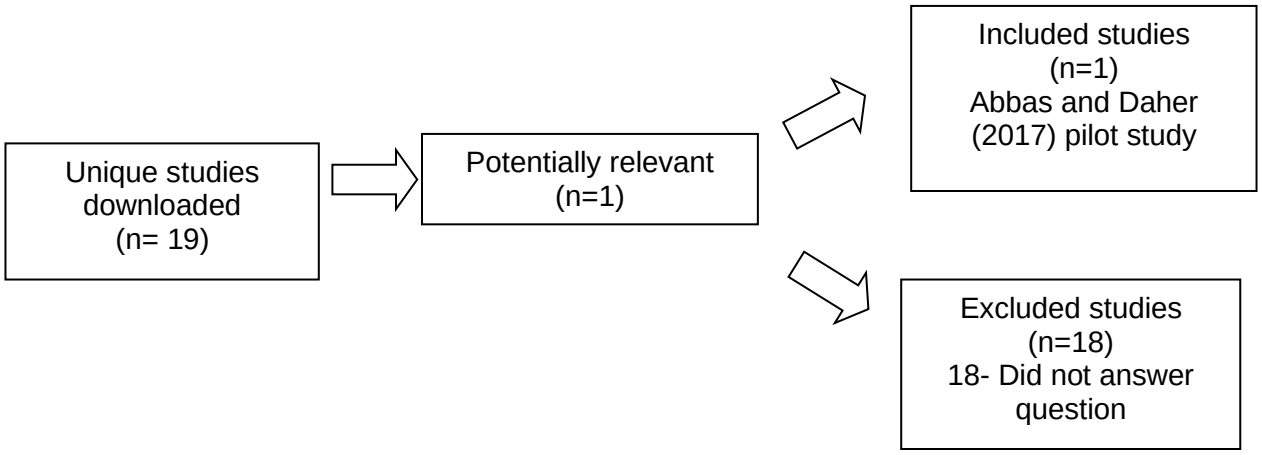

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Table 1- Detail of included studies

First Author, year and type of study	Population and setting	Intervention or exposure tested	Study results	Assessment of quality and comments
Abbas and Daher (2017) Pilot study	The study looked at changing the protocol for both Total Knee Replacement (TKR) and Total Hip Replacement (THR)patients between the years 2011-2013. A sample size was created from each year using an exclusion criterion. TKR sample numbers: 2011= 277 2012= 350 2013= 381 From these numbers, a mean sample (n=314) was created from 2011 and 2012 to compare against the 2013 sample. This study took place within the Ontario Acute Care Hospital, Canada. The study collected date for 12 months.	TKR inpatients 2013 (n= 381) were given a new post-op rehabilitation pathway (NPORP) which included: standing end range knee extension, marching, calf raises, mini squats, step up. The orthopaedic consultants requested that the patients still completed knee ROM exercises too as per the old protocol. Compared to a mean sample of TKR inpatients 2011-2012 (n=314) who received normal post-op protocol. This included knee ROM exercises, static quad, inner range quad, straight leg raise, ankle pumps etc. Outcome measure: length of stay/ post op days in hospital	The number of TKR patients discharged in less than 4 days significantly increased in 2013 (n=323), when compared to the mean number of patients discharged in less than 4 days in 2011/2012 (n=93).	Not an RCT Low quality evidence Used specific target population to answer question- increases validity. Small sample size- may not be representative of whole target population. Study took place in Canada- may have different post-op care than UK. Unable to blind participants or physiotherapists- potentially creating bias. Participants from 2011-2012 were taken from an average sample- no mention of how this was calculated or which participants were excluded. Both groups received same post-op care apart from the intervention. Calculated p value but no confidence intervals- so cannot accurately determine the treatment effect. Completed in a hospital environment by the physiotherapists- no equipment costs and easy to implement.

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Summary

From our search, only one pilot study addressed the question. The study found standing exercises such as squats, heel raises and marching significantly reduced the length of stay in hospital for knee replacement patients, compared to the standard protocol exercises; static quad, static glute and straight leg raise. Although the study was not based in the UK, it had a good sample size for a pilot study and demonstrated some feasibility of implementing a new exercise programme in a hospital setting that is low cost and easily replicable between staff. However, the study had some methodological flaws due to the lack of blinding and randomisation, as well as no information on the selection process of sample sizes. Therefore the quality of the results is not strong enough to endorse a change of practice.

Implications for Practice/research

We were unable to find high quality evidence to determine if functional exercises are superior to bed exercises at improving post-operative outcomes following a total knee replacement. Therefore, further robust high quality research in the form of randomised controlled trials is needed to improve the power of the data to inform a substantial change in physiotherapy practice.

NICE guidance advocates post-operative exercises but does not recommend specific exercises prescription. The guidance groups total hip, knee and shoulder replacement advice together. This may be due to the lack of individual representation of this patient group in the research. Research by Jesudason *et al.,* (2002) suggested bed exercises are of no additional benefit to early mobilisation alone; however, this study focused upon patients undergoing total hip replacements therefore could not be included in the appraisal and does not necessarily indicate the same result for patient following a total knee replacement. Further research that is specific to total knee replacement inpatient rehabilitation is warranted. Nice guidelines do acknowledge the variation in the provision of rehabilitation and this was reflected in our CSP interactive forum.

The exercises at UHNM are historical and not evidence based. Comments from the interactive CSP forum suggest similar exercises are used in other Trusts across the UK. Yet, some of the comments showed more progressive functional exercises are prescribed. Nevertheless, the post-operative exercises at UHNM have contributed to successful outcomes. They do focus on keeping the patient static in bed or the chair and perhaps our shift needs to be more of an active approach on mobilisation and exercising to reduce post-operative complications and optimise patient function ready for home. The pilot study did demonstrate the feasibility of prescribing functional exercises in a hospital setting with no additional resources required.

A service evaluation of implementing functional exercises will be worth considering alongside contact with national experts given the current pressures at UHNM for waiting lists and bed capacity to optimise local rehabilitation provision and patient recovery.

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What would you tweet? (140 characters)

Are post-operative TKR bed exercises out dated? Limited low quality evidence suggests functional exercises are more effective than bed exercises at improving acute post-operative outcomes in TKR patients. More research is warranted to implement a change of practice.

References

Abbas, C. and Daher, J., 2017. Pilot study: post-operative rehabilitation pathway changes and implementation of functional closed kinetic chain exercise in total hip and total knee replacement patient. *Journal of Bodywork and Movement Therapies*, *21*(4), pp.823-829.

Jesudason, C. and Stiller, K., 2002. Are bed exercises necessary following hip arthroplasty?. *Australian Journal of Physiotherapy*, *48*(2), pp.73-81.

NICE Guideline NG157 (2020) *Joint replacement (primary): hip, knee and shoulder*, *NICE National Institute for Health and Care*. Available at: https://www.nice.org.uk/guidance/ng157 Excellence .

Statista (2022) *Number of knee replacement procedures in England 2009/10-2020/21*. Available at: https://www.statista.com/statistics/1099116/knee-replacement-procedures-in-england/.

Wainwright, T.W. and Burgess, L., 2020. Early ambulation and physiotherapy after surgery. In *Enhanced recovery after surgery* (pp. 211-218). Springer, Cham.

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