

Factors Influencing the Functional Outcome after

Total Hip Replacement (THR) in Elderly Patients: A Literature Review

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The prevalence of hip fractures among the elderly continues to present significant health challenges, impacting mobility, independence, and healthcare resources. Total hip replacement (THR) is a critical surgical intervention to alleviate pain and enhance functional mobility in elderly patients. This literature review aimed to identify factors influencing post-THR recovery, focusing on success determinants, limitations, and commonly used assessment tools. The findings highlight that early mobilization, structured rehabilitation, patient self-efficacy, and family involvement are essential to successful outcomes. Dual mobility prostheses were noted to reduce dislocation rates, enhancing recovery in high-risk patients. However, challenges such as comorbidities, psychological constraints, and limited access to comprehensive rehabilitation persist. Measurement tools such as the Oxford Hip Score (OHS) and the Timed Up and Go (TUG) test were commonly employed to assess patient progress. Addressing these challenges through multidisciplinary care, patient-specific strategies, and further research is essential for improving long-term recovery and functional outcomes. These insights provide healthcare professionals with practical guidance for supporting recovery and enhancing the quality of life in elderly patients post-THR.

Key Words: hip fracture/ elderly/ total hip replacement/ functional recovery/ rehabilitation/ multidisciplinary care/ patient outcomes

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Background and Significance of the Review Problem

The number of older persons in Thailand has been steadily increasing, and by 2023, the elderly population accounted for nearly 20% of the total population, reflecting the significant shift towards an aging society¹. Hip fractures are among the most pressing health issues affecting elderly Thai individuals, leading to severe outcomes such as increased mortality rates, prolonged disability, decreased quality of life, and high healthcare costs². Studies have indicated that the mortality rate for Thai individuals following hip fractures is substantial, with an 18% mortality rate reported within the first year post-injury, an average survival period of 72 months (approximately six years), and a 68% mortality rate within ten years³.

Hip fractures are most commonly associated with underlying comorbidities and age-related physical deterioration, with falls being the primary cause of such injuries⁴. Global estimates indicate that the incidence of hip fractures is expected to increase from 1.66 million in 1990 to 2.6 million by 2025 and reach 4.5 million by 2050⁵. The anatomical prevalence of intertrochanteric fractures is notably higher than femoral neck fractures in individuals aged 65 and older⁶. Approximately 79% of hip fractures result from falls, with other contributing factors

including falls from significant heights and vehicular accidents⁷. Post-hip fracture complications often include joint deformities, reduced range of motion, and impaired mobility⁸.

Surgical intervention, such as total hip replacement (THR), is often necessary to restore hip joint function. Between 2010 and 2015, primary hip replacement procedures increased by approximately 26%⁹. THR aims to alleviate pain and restore the ability to perform activities of daily living (ADLs). ADLs encompass a range of essential tasks, including mobility transfers, personal hygiene, and general household activities¹⁰. THR involves replacing the femoral head and acetabulum with prosthetic components to restore joint function and improve patient outcomes¹¹.

While surgical interventions offer significant benefits, they also carry risks of complications, including severe pain, dislocation, and infection, which can potentially result in functional disability⁸. Previous research has noted that physical activity alone may not be sufficient to restore function post-THR fully¹². Therefore, this review seeks to identify the factors influencing functional outcomes following THR in elderly patients, presenting key challenges and considerations for healthcare providers to enhance rehabilitation and promote functional capacity¹³.

Review Objectives: This literature review aims to:

1. Identify the factors influencing functional outcomes following total hip replacement (THR).
2. Examine key success factors and limitations related to improving functional ability post-THR.
3. Identify commonly used measurement tools for assessing patient outcomes after THR.
4. Highlight key determinants, challenges, and implications for enhancing postoperative recovery in elderly patients.

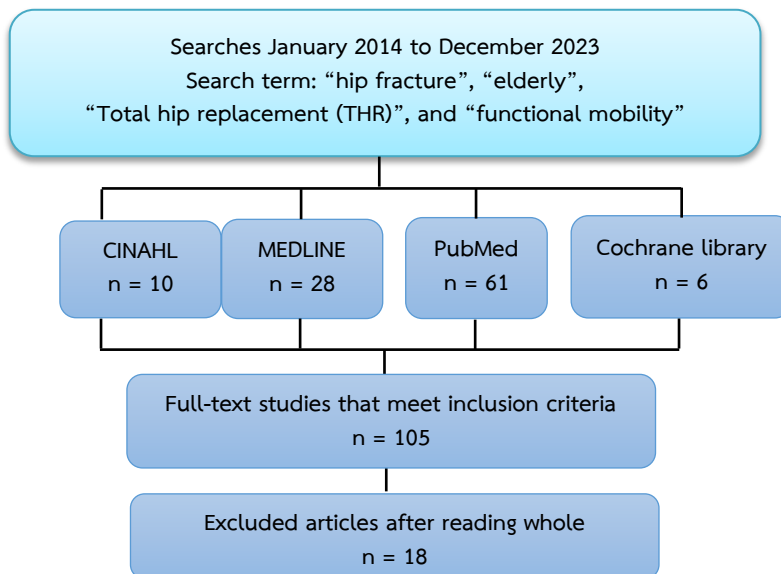
Review Methodology

Systematic literature searches were conducted using electronic databases, including CINAHL Complete, MEDLINE, PubMed, and the Cochrane Library, to identify relevant peer-reviewed journal articles. The search spanned from January 2014 to December 2023 and used key terms such as "hip fracture," "elderly," "total hip replacement (THR)," and "functional mobility." The search strategy incorporated Boolean

operators and filters to refine the results and target pertinent studies.

The inclusion criteria specified that articles must be primary source studies with full text available, focus on factors influencing the functional outcome after total hip replacement in elderly patients, be published in English, and be within the 2014-2023 timeframe. Articles were excluded if they did not meet these criteria or discussed unrelated outcomes. The screening process began with an initial review of article titles and abstracts for relevance, followed by a detailed full-text evaluation of those that met the inclusion criteria. Studies that did not align with the research objective were excluded at this stage.

Key data extracted from the selected studies included study design, sample characteristics, intervention descriptions, and main findings related to functional outcomes. This information was synthesized narratively to emphasize the factors influencing recovery and functional mobility post-THR in elderly patients.



Review results

A total of eighteen studies related to the functional recovery of elderly patients after Total Hip Replacement (THR) were included in

the review. Table 1 presents a summary of these studies, highlighting the study design, timing and duration of interventions, post-intervention follow-up, and key outcome measures.

Table 1 Summary of systematic reviews or meta-analyses related to functional recovery in elderly patients after THR (n=18)

Author/ Year	Purpose	Study Design	Intervention Details (Timing/Dura- tion)	Post- Interven- tion Follow-Up	Outcome Measures	Key Findings/ Recommendations
1. Achudan et al. (2023) ²	Compare THA-DMC with conventional implants for femoral neck fractures in elderly.	Retrospective cohort	Standardized post-op treatment for THA-DMC vs. conventional implants	Follow-up: 6 months and 1-year follow-up	SF-36, Oxford Hip Score	Lower dislocation rates in THA-DMC group; similar functional outcomes between groups.
2. Kou- douna et al. (2023) ¹¹	Investigate post-op recovery pathways and physical therapy's	Literature review	Varied post-op rehab programs analyzed	Not specified	TUG, HHS, SF-36, EQ-5	Early mobilization improved recovery; highlighted need for objective guidelines.

Author/ Year	Purpose	Study Design	Intervention Details (Timing/Dura- tion)	Post- Interven- tion Follow-Up	Outcome Measures	Key Findings/ Recommendations
	effects on returning to pre-fracture status.					
3. Bertault- Le Gourri- erec et al. (2022) ¹²	Compare THA with dual mobility cups and hemiar- throplasty in elderly FNF patients.	Retrospective cohort	Compared dislocation rates of THA- DM vs. HA	Follow-up: 5 years	WOMAC, mor- tality rates	THA-DM showed lower dislocation rates and better WOMAC scores; HA had higher mortality.
4. Sharkey et al. (2022) ⁴	Examine arthroplasty's role in hip fracture management and implant options.	Review article	Discussed implant selection (DM, hemiarthro- plasty)	Not specified	Function and complication comparisons	THA recommended for selected patients; noted complications included increased dislocation rates.
5. Gausden et al. (2021) ³	Investigate failure reasons in THA for femoral neck fractures (FNF).	Retrospective review	Analyzed multiple approaches and implant types	Follow-up: 6-year	Revision and complication rates	Higher revision rates due to periprosthetic fractures and infection; stability issues noted but not predominant.
6. Stephens et al. (2021) ¹	Evaluate the stability and functional benefits of dual mobility THA for hip fracture.	Retrospective case-controlled study	Compared dual mobility (DM) THA and standard THA	Follow-up: minimum 12-month follow-up	Oxford Hip Score (OHS), dislocation rates	Functional equivalence with reduced dislocation rates in DM group; recommended further RCTs.
7. Hoskins et al. (2021) ¹³	Assess revision and disloca- tion rates among various THA prosthesis types.	Registry study (AOANJRR)	Standard-head, large-head, DM, constrained liner THA	Follow-up: 10 years	Cumulative revision rate, Kaplan-Meier survival	Large-head and DM prostheses had lower early dislocation rates; suggested large- head for lower dislocation risk.
8. Saxer et al. (2018) ⁸	Compare AMIS vs. lateral ap- proach in	Prospective RCT	Assessed early mobility and independence	Follow-up: 1-year	TUG test, FIM scores	AMIS approach improved early mobility; results

Author/ Year	Purpose	Study Design	Intervention Details (Timing/Dura- tion)	Post- Interven- tion Follow-Up	Outcome Measures	Key Findings/ Recommendations
	hemiarthro- plasty for FNFs.					affected by multiple patient factors.
9. Verbeek et al. (2018) ⁶	Evaluate long-term outcomes after acetabular fracture surgery.	Long-term follow-up study	Focused on operative fixation and its outcomes	Follow-up: mean 11.3 years	SMFA, SF-12	Native hips had superior outcomes; emphasized the importance of adequate reduction.
10. Bliemel et al. (2017) ⁹	Assess the impact of pre-existing conditions on outcomes in geriatric hip fracture patients.	Prospective single-center	Analyzed outcomes by pre-existing conditions	Follow-up: 1-year	Barthel Index, mortality	Neurological and renal conditions impacted outcomes most significantly.
11. Joestl et al. (2016) ¹⁰	Compare LCP fixation vs. revision prosthesis for periprosthetic femoral fractures.	Retrospective review	Compared surgical techniques	Not specified	Parker mobility score	LCP fixation effective for Vancouver B2 fractures; shorter surgical time noted.
12. Nich et al. (2016) ⁵	Assess whether DMCs reduce dislo- cation risk in THA for patients >75 years with femoral neck fractures.	Prospective study	Dual-mobility cups used in THA	Follow-up: 12-42 months	Dislocation rates, autonomy scores	Reduced dislocation rates with DMCs; beneficial for elderly with high instability risk.
13. Okoro et al. (2016) ¹⁴	To review rehabilitation programs improving post-THR function.	Systematic Review	PRT initiated < 1 month post- THR (center- based) or > 1 month (home-based); varied from 7	Not speci- fied	WOMAC	Early PRT programs recommended for better outcomes. High center-based costs noted.

Author/ Year	Purpose	Study Design	Intervention Details (Timing/Dura- tion)	Post- Interven- tion Follow-Up	Outcome Measures	Key Findings/ Recommendations
			days to 24 months			
14. Tar- antino et al. (2016) ⁷	Investigate sarcopenia's role in recovery post- hip fracture.	Observational study	Compared osteoporosis and osteoarthritis patients	Not specified	PASE test, muscle biopsy	Sarcopenia linked to decreased recovery; recommended increased physical activity.
15. Minns Lowe et al. (2015) ¹⁵	To evaluate the effectiveness of physiotherapy after discharge on function, ROM, QOL, and muscle strength post- THR.	Systematic Review (2007-2013)	Varied timing: soon after sur- gery, 2, 5, 8 weeks, and up to 12 months post-surgery; Duration: 3-4 months	Follow-up: 6, 12, 24 months	OHS, MAC- TAR, HHS, and other measures	Physiotherapy post- discharge showed benefits in strength and function; suggested need for long-term follow-up.
16. Magklara et al. (2014) ¹⁶	To investigate the role of self-efficacy in functional recovery and well-being in OA patients undergoing THR/TKR.	Systematic Review (up to 2013)	Self-efficacy impact assessed across 8 studies	Follow-up: up to 6 months	Walking speed, physical func- tion scores	Strong correlation between post-op self-efficacy and recovery; further research recommended.
17. Vissers et al. (2011) ¹⁷	To review the recovery of physical functioning post-THR with focus on perceived function, ability to complete tasks, and daily activities.	Systematic Review & Meta-Analysis (up to 2009)	31 studies analyzed, different timings of intervention	Not specified	SF-36-PF, WOMAC-PF, OHS	Improvement in perceived and functional capacity noted, suggesting follow-up for comprehensive assessment.

Author/ Year	Purpose	Study Design	Intervention Details (Timing/Dura- tion)	Post- Interven- tion Follow-Up	Outcome Measures	Key Findings/ Recommendations
18. Chudyk et al. (2009) ¹⁸	To synthesize the effectiveness of hip fracture rehabilitation in elderly patients.	Systematic Review (1980- 2007)	Rehabilitation categorized into 6 types: early rehab, OT/PT, care pathways, etc.	Follow-up: multiple follow-ups post- discharge	Ambulatory ability, reduced falls	Comprehensive programs improve outcomes but need theoretical frameworks for clarity.

Based on the findings in Table 1, which align with the study objectives, the following summary provides a comprehensive overview of factors, key success elements, limitations, commonly used measurement tools, and determinants crucial for improving THR outcomes in elderly patients.

1. Identify the factors influencing functional outcomes following total hip replacement (THR).

The studies highlighted several factors influencing functional outcomes post-THR:

1.1 Timing and Type of Intervention: As shown by Okoro et al. (2016)¹⁴ and Minns Lowe et al. (2015)¹⁵, early mobilization and physiotherapy were effective in improving muscle strength and functional outcomes.

1.2 Comorbidities and Pre-existing Conditions: Bliemel et al. (2017)⁹ found that conditions like neurological and renal impairments significantly impacted recovery.

1.3 Surgical Approach and Prosthesis

Type: Studies like Achudan et al. (2023)² and Saxer et al. (2018)⁸ compared different surgical techniques (AMIS vs. lateral approach) and types of prostheses (e.g., dual mobility cups) to identify their effects on mobility, dislocation rates, and autonomy.

2. Examine key success factors and limitations related to improving functional ability post-THR. Key success factors and limitations identified include:

2.1 Success Factors:

1) Self-efficacy and Motivation: Studies such as Magklara et al. (2014)¹⁶ and Tarantino et al. (2016)⁷ highlighted the significant impact of self-efficacy on recovery, showing that patients who possess higher levels of motivation and a positive mindset demonstrate faster and better recovery outcomes. Additional research³⁸ emphasized that self-motivation and patient insight play a crucial role in rehabilitation, with patients actively engaging in their recovery experiencing more favorable results, 2) Family

and Social Support: The importance of family involvement was underscored by studies such as Bliemel et al. (2017)⁹, which found that family support positively influences patient recovery. Enhanced family involvement, particularly when caregivers are informed and trained on post-surgical care and rehabilitation protocols, significantly improves functional outcomes in elderly patients^{9,12}, and 3) Optimal Rehabilitation Environment: An effectively adapted home environment, featuring appropriate furniture, accessibility modifications (e.g., bathroom aids), and a safe layout, is essential for preventing accidents and promoting functional improvements. Studies^{6,8} reinforced that a supportive home setting facilitates smoother rehabilitation and better overall recovery.

2.2 Limitations: 1) High Costs and Accessibility Issues: Okoro et al. (2016) highlighted that the significant expense associated with center-based rehabilitation programs poses a major barrier, restricting patient access to effective treatment. Economic and logistical challenges, particularly the high costs of these center-based programs, underscore the need for more accessible and cost-effective home-based rehabilitation solutions to support long-term patient care^{5,13}, 2) Physical Barriers: Physical pain and other physical limitations were identified in various studies as significant obstacles to achieving full recovery, impacting to pa-

tients' ability to engage fully in their rehabilitation programs, and 3) Psychological Constraints: Depression, anxiety, and the fear of falling are critical psychological barriers that contribute to self-imposed restrictions on activities. It leads to reduced participation in rehabilitation and negatively affects overall recovery, as emphasized in studies including Sharkey et al. (2022)⁴ and findings from other reviews⁷.

3. Identify commonly used measurement tools for assessing patient outcomes after THR. Commonly used measurement tools for assessing outcomes following total hip replacement (THR) included:

3.1 Functional Outcome Measures: The Oxford Hip Score (OHS), Harris Hip Score (HHS), and Hip Disability and Osteoarthritis Outcome Score (HOOS) were commonly employed to evaluate functional recovery. Additionally, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was frequently used to assess joint pain and function, aiding in patient mobility and pain relief^{3,12,20}.

3.2 Physical Performance Tests: Mobility and functional independence were often measured using tests such as the Timed Up and Go (TUG) test, the 6-Minute Walk Test (6-MWT), and the Functional Independence Measure (FIM). These tools provided objective data on a patient's mobility and post-surgical recovery.

3.3 Psychological Assessment Tools:

The Mini-Mental State Exam (MMSE) was commonly cited for evaluating a cognitive function, while the Mental Component Summary (MCS) of the SF-36 was used to assess mental health^{7,20}.

3.4 Quality of Life Measures: Instruments like the SF-36 and EQ-5D were utilized to evaluate the overall quality of life and patient-reported outcomes, capturing the broader impact of THR on daily living and well-being^{8,11,20}.

4. Highlight key determinants, challenges, and implications for enhancing postoperative recovery in elderly patients.

The key determinants and challenges for enhancing recovery include:

4.1 Determinants: 1) Type of Implant and Surgical Technique: Dual mobility cups were found to reduce dislocation rates, as evidenced by studies from Stephens et al. (2021)¹ and Bertault-Le Gourriec et al. (2022)¹², highlighting their advantage for elderly patients, and 2) Rehabilitation Program Type: The comparison of home-based and center-based rehabilitation programs, as explored by Okoro et al. (2016)¹⁴, showed that flexible, patient-specific rehabilitation plans can improve recovery outcomes.

4.2 Challenges: 1) Patient-Specific Challenges: Age, comorbidities, and psychological resilience (as discussed by Nich et al., 2016⁵)

were significant barriers to recovery, emphasizing the need for personalized treatment approaches. Pre-existing health conditions, age, gender, and body mass index (BMI) were found to limit optimal recovery. Older patients with multiple comorbidities, particularly those involving neurological or cardiovascular issues, faced higher risks of complications and prolonged recovery²⁹, and 2) Economic and Social Barriers: Access to effective rehabilitation services was restricted by high costs and limited resource availability, as highlighted by Hoskins et al. (2021)¹³.

Discussion

This literature review provides significant insights into the factors influencing functional outcomes following total hip replacement (THR) in elderly patients. The results align with existing literature and reveal critical determinants of success and the challenges that must be addressed to improve patient recovery.

Factors Influencing Functional Outcomes: The review highlights that early mobilization and structured physiotherapy are pivotal in enhancing post-THR outcomes. Lowe et al. (2015)¹⁵ and Okoro et al. (2016)¹⁴ demonstrated that early, tailored interventions significantly improve muscle strength and functionality. Additionally, pre-existing conditions, such as neurological and renal impairments, as identified by Bliemel et al. (2017)⁹, were found to

Impact recovery negatively, reinforcing the necessity for comprehensive pre-operative assessments and personalized care plans. The comparison of surgical techniques and implant types, such as the AMIS approach and dual mobility cups, as seen in studies by Achudan et al. (2023)² and Saxer et al. (2018)⁸, further suggests that careful surgical planning can enhance post-operative autonomy and reduce dislocation rates.

Key Success Factors and Limitations: The importance of self-efficacy and patient motivation, highlighted by Magklara et al. (2014)¹⁶ and Tarantino et al. (2016)⁷, underscores the role of psychological preparedness in recovery. Patients with high levels of self-motivation showed better engagement and faster rehabilitation progress. Family and social support were also emphasized by Bliemel et al. (2017)⁹ as critical contributors to recovery, particularly when caregivers were educated on post-surgical care. However, significant barriers were identified, including economic limitations noted by Hoskins et al. (2021)¹³ and Okoro et al. (2016)¹⁴, which restrict access to adequate, center-based rehabilitation programs. Physical barriers, such as pain and mobility limitations, and psychological constraints, like anxiety and fear of falling, further complicate the recovery process^{4,7}.

Measurement Tools for Assessing

Outcomes: Consistent use of validated measurement tools is crucial for tracking patient progress post-THR. Common functional outcome measures included the Oxford Hip Score (OHS), Harris Hip Score (HHS), and the Hip Disability and Osteoarthritis Outcome Score (HOOS). The WOMAC index was frequently used to evaluate joint pain and function^{3,17,19}. Physical performance was assessed using the Timed Up and Go (TUG) and the 6-Minute Walk Test (6-MWT), which provide objective data on mobility and functional independence. The Mini-Mental State Exam (MMSE) and the Mental Component Summary (MCS) of the SF-36 were regularly employed^{7,19} for cognitive and psychological evaluations. Quality of life was also assessed through instruments like the SF-36 and EQ-5D, highlighting the broader impacts of THR on daily living^{8,11,20}.

Determinants and Challenges: The review identified key determinants such as the type of implant and surgical technique used. Using dual mobility cups, supported by Stephens et al. (2021)¹ and Bertault-Le Gouriérec et al. (2022)¹², demonstrated reduced dislocation rates, marking an advantage for elderly patients. The type of rehabilitation program, whether home-based or center-based, was another determinant, with flexible, patient-specific programs shown to enhance recovery¹⁴. However, patient-specific challenges, including age,

comorbidities, and psychological resilience, were significant barriers to recovery. Older patients with multiple comorbidities, particularly neurological or cardiovascular conditions, face higher risks and prolonged recovery periods²⁹. Economic and social barriers, as noted by Hoskins et al. (2021)¹³, further limit access to rehabilitation services, stressing the importance of developing cost-effective, home-based rehabilitation alternatives.

Implications for Practice and Future

Research: The findings emphasize the need for a multidisciplinary approach in post-THR care, integrating physical, psychological, and social support systems. Healthcare professionals should prioritize early intervention, motivate patient engagement, and educate caregivers to optimize recovery outcomes. Future research should focus on large-scale, randomized controlled trials to further explore the long-term efficacy of various surgical techniques and rehabilitation programs. Addressing economic and social barriers is essential to make rehabilitation accessible to all elderly patients.

Conclusion

Total hip replacement (THR) is a crucial surgical procedure for reducing pain and improving functional ability in elderly patients. This review identified key factors influencing recovery outcomes post-THR, emphasizing the importance of early mobilization, structured rehabilitation, and personalized care. Patient self-efficacy, family support, and a well-

adapted living environment were critical for optimal recovery. Using dual mobility prostheses reduced dislocation rates, particularly in high-risk patients, enhancing long-term functional outcomes. However, challenges such as comorbidities, psychological barriers, and limited access to comprehensive rehabilitation persist. Overcoming these challenges requires a multidisciplinary approach involving healthcare providers, family members, and community resources to support patient recovery effectively.

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