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MSc Public Health and Social Care in Practice

**Quality Improvement in Stroke Rehabilitation: Evaluating the Role of Physiotherapists
in Early Supported Discharge Teams**

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Dissertation submitted as part of the requirements for the award of MSc Public Health and
Social Care in Practice

January /2026

DECLARATION

I, Yashvi Rajesh Sharma declare that this dissertation has been composed by myself, that the work contained herein is entirely my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or qualification, in whole or in part, except as specified.

Signature: Yashvi Sharma

Date: 07/01/2026

ACKNOWLEDGEMENT

I want to sincerely thank Dr. Junaid Shaikh, my supervisor, for his knowledgeable advice, unwavering support, and insightful criticism during this dissertation. Their advice and support have been invaluable in helping to shape this work.

I also want to express my sincere gratitude to the University of Wales Trinity Saint David's academic and administrative personnel for their steadfast support and the librarians for helping me navigate the research databases.

I wish to express my deepest gratitude to my family for their unwavering support, patience, and belief in me during the challenges of this study process — especially my mother, Pratima Sharma, whose love, guidance, and reassurance have been a continual source of strength and motivation.

Finally, I would also like to express my heartfelt thanks to my friend, whose encouragement, reassurance, and constant support motivated me throughout this dissertation.

Abstract

Background:

Stroke is a major cause of disability, and increasing pressure on health services has driven the development of Early Supported Discharge (ESD) models that enable earlier transition home with specialist multidisciplinary rehabilitation. Physiotherapists are central members of ESD teams; however, their specific contribution to quality improvement (QI) outcomes remains under-explored. This review evaluated how physiotherapists influence recovery, service quality, and patient experience within ESD services for adult stroke rehabilitation.

Methods:

A systematic literature review was conducted using PubMed, PEDro and ProQuest databases (2010–2025). The Population–Exposure–Outcome (PEO) framework guided the search strategy. Studies were included if they involved adult stroke survivors receiving ESD, reported outcomes relevant to physiotherapy input and quality improvement, and were undertaken in the United Kingdom or comparable European systems. Eligible studies were screened using PRISMA guidance, and methodological quality was assessed using the Critical Appraisal Skills Programme (CASP) tools. Data were extracted and synthesised using Braun and Clarke’s thematic analysis approach.

Results:

Ten studies met inclusion criteria, including randomised controlled trials, cohort studies, and registry analyses. ESD was consistently associated with reduced hospital length of stay, comparable functional outcomes to usual care, and higher patient satisfaction. Physiotherapy delivered at home supported goal-directed rehabilitation, mobility, and independence. Evidence highlighted improvements in caregiver burden and service responsiveness, although long-term functional superiority was inconsistent. Variability in physiotherapy, intensity, and workforce capacity represented ongoing challenges. Psychosocial outcomes such as confidence and emotional support were often under-reported.

Conclusion:

ESD is a safe, efficient model of post-stroke care when supported by skilled physiotherapists. Physiotherapists contribute to quality improvement through patient-centred rehabilitation, functional recovery support, discharge coordination, and outcome monitoring. To maximise benefit, UK services require strengthened staffing, integration, and greater emphasis on emotional and psychosocial rehabilitation. Further research should evaluate physiotherapist-led quality improvement initiatives and long-term recovery outcomes.

Keywords:

Stroke rehabilitation, Early Supported Discharge, European countries, physiotherapy, quality improvement, community rehabilitation, functional outcomes, multidisciplinary care, United Kingdom.

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ABBREVIATION

ADL – Activities of Daily Living

BI – Barthel Index

CASP – Critical Appraisal Skills Programme

CVA – Cerebrovascular Accident (stroke)

EHSD – Early Home Supported Discharge

ESD – Early Supported Discharge

FIM – Functional Independence Measure

GP – General Practitioner

LOS – Length of Stay

mRS – Modified Rankin Scale

NHS – National Health Service

NICE – National Institute for Health and Care Excellence

PEO – Population–Exposure–Outcome

PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PROMs – Patient-Reported Outcome Measures

QI – Quality Improvement

RCT – Randomised Controlled Trial

RCP – Royal College of Physicians

SLR – Systematic Literature Review

SSNAP – Sentinel Stroke National Audit Programme

TIA – Transient Ischemic Attack

UK – United Kingdom

VESD – Very Early Supported Discharge

WHO – World Health Organization

CHAPTER 1: INTRODUCTION

1.1 Introduction

Stroke is a leading cause of death and long-term disability worldwide, and it remains a major public health concern in the United Kingdom and comparable European healthcare systems. It is defined by the World Health Organization (WHO) as a rapidly developing clinical sign of focal or global disturbance of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin (WHO, 2018). Beyond its immediate clinical seriousness, stroke imposes substantial personal, social, and economic burdens. Survivors frequently face reduced independence, diminished participation in daily activities, and challenges reintegrating into their communities. Health and social care systems across the UK and Europe are likewise confronted with increasing demands for long-term rehabilitation, community support, and ongoing clinical management. The consequences of stroke are therefore not only acute and potentially life-threatening, but also enduring, leaving many survivors with physical, cognitive, emotional, and social impairments that require prolonged rehabilitation and support (Royal College of Physicians [RCP], 2023).

Stroke rehabilitation aims to maximise functional recovery, promote independence, and improve quality of life across the continuum of care. Rehabilitation is most effective when it is timely, coordinated, and tailored to individual needs. Physiotherapists play a central role within multidisciplinary stroke teams by addressing impairments in movement, balance, strength, and mobility, while also supporting relearning of functional tasks necessary for daily living (Pollock et al., 2014). Their expertise extends beyond physical training to include patient education, prevention of complications such as contractures or deconditioning, and encouragement of self-management strategies. As expectations grow for care that is both evidence-based and person-centred, the contribution of physiotherapists has become increasingly important in shaping effective rehabilitation pathways across diverse health systems.

In recent years, Early Supported Discharge (ESD) has emerged as a key service innovation designed to improve outcomes and make more efficient use of healthcare resources. ESD enables selected stroke patients, who are medically stable and suitable for community rehabilitation, to leave hospital earlier and continue intensive rehabilitation at home with a specialist multidisciplinary team (Langhorne et al., 2017). This approach reflects a shift toward delivering care closer to home, emphasising continuity, patient empowerment, and functional relevance. Evidence from the UK and European programmes indicates that appropriately resourced ESD services can reduce hospital length of stay while maintaining comparable clinical outcomes, highlighting their growing relevance within contemporary stroke care pathways.

This systematic review focuses specifically on the role of physiotherapists within ESD teams and their contribution to quality improvement in stroke rehabilitation. Although ESD is widely promoted in UK policy and clinical guidelines—and increasingly reflected in European practice—variations in service delivery, physiotherapy input, and patient outcomes remain evident across regions and organisations. Questions persist regarding optimal caseloads, therapeutic intensity, professional collaboration, and how physiotherapists influence both functional recovery and patient experience. By critically evaluating physiotherapists' contribution to effective, high-quality ESD services, this review seeks to clarify what works, for whom, and under what conditions. The findings aim to inform service development, support

best-practice implementation, and identify areas where further training, resources, or research may be required. In doing so, the review contributes to strengthening the evidence base for physiotherapy-led quality improvement within contemporary stroke rehabilitation.

1.2 Background and Current Context

1.2.1 Stroke as a Public Health Problem

Stroke represents a substantial burden to individuals, families, health services, and the wider economy. In the UK, approximately 100,000 people experience a stroke each year, and around 1.3 million people live with its long-term consequences (Stroke Association, 2023). Stroke is one of the main causes of adult disability, with many survivors experiencing persistent problems such as hemiplegia, impaired balance, fatigue, speech difficulties, and cognitive deficits (RCP, 2023).

The economic cost of stroke in the UK is estimated to exceed £26 billion annually, including direct healthcare costs, social care, lost productivity and informal caregiving (Patel et al., 2020). Similar financial pressures are reported across European healthcare systems. Due to the ageing population and increasing survival rates following acute stroke, the demand for effective rehabilitation services continues to rise. Consequently, the optimisation of rehabilitation pathways has become a major priority within the National Health Service (NHS) and other European health services.

1.2.2 Stroke Rehabilitation and the Role of Physiotherapy

Stroke rehabilitation is a complex, multidisciplinary process that begins in the acute phase and continues into the community. Its primary aim is to help individuals regain maximum independence and participation in daily life (NICE, 2022). Physiotherapy is one of the core components of stroke rehabilitation, targeting impairments of movement, posture, balance, and functional mobility.

Physiotherapists use task-specific training, repetitive practice, strengthening exercises, gait rehabilitation, and balance training to promote neuroplasticity and functional recovery (Pollock et al., 2014). Evidence consistently demonstrates that early, intensive, and goal-directed physiotherapy improves motor outcomes and reduces long-term disability (Verbeek et al., 2014). Physiotherapists also play a critical role in patient education, fall prevention, discharge planning, and carer training.

Despite these benefits, traditional hospital-based rehabilitation can be limited by short lengths of stay, resource pressures, and reduced therapy intensity (Langhorne et al., 2011). These pressures have led to the development of alternative service models such as Early Supported Discharge.

1.2.3 Early Supported Discharge (ESD): Concept and Development

Early Supported Discharge is defined as a service model that enables people with mild to moderate stroke to return home earlier than usual and receive coordinated, specialist rehabilitation in their own homes (Langhorne et al., 2017). ESD teams are typically multidisciplinary and include physiotherapists, occupational therapists, speech and language therapists, nurses, rehabilitation assistants and medical oversight.

The concept of ESD originated in response to evidence that prolonged hospital stays may not always enhance functional recovery and may expose patients to secondary complications

such as deconditioning, infections and institutional dependency (Langhorne et al., 2005). Home-based rehabilitation allows patients to practise functional tasks in their real-life environment, which may enhance task relevance, motivation, and participation (Fens et al., 2013).

A Cochrane systematic review by Langhorne et al. (2017) demonstrated that ESD services reduce hospital length of stay by an average of five to seven days, improve functional outcomes and increase the likelihood of patients being independent at six months post-stroke. Importantly, ESD has also been shown to be cost-effective when delivered by well-resourced and coordinated teams (Patel et al., 2020).

1.2.4 Policy Context in the United Kingdom

In the UK, ESD has become a core recommendation within national stroke policy. The National Institute for Health and Care Excellence (NICE) recommends that ESD should be provided to all eligible stroke patients as part of an integrated stroke care pathway (NICE, 2022). Similarly, the Sentinel Stroke National Audit Programme (SSNAP) and the National Stroke Service Model emphasise the importance of ESD in improving outcomes and reducing pressure on acute stroke units (RCP, 2023). Comparable strategies are increasingly being implemented across Europe. However, despite strong policy support, the availability and quality of ESD services remain inconsistent. SSNAP data indicate that not all stroke units meet recommended standards for therapy intensity, staffing levels, or responsiveness of ESD teams (RCP, 2023). Variations are particularly evident in the amount and type of physiotherapy input provided after hospital discharge.

1.2.5 Quality Improvement in Stroke Rehabilitation

Quality improvement (QI) in healthcare refers to the systematic use of methods to improve patient outcomes, service efficiency, and care experiences (Batalden and Davidoff, 2007). In stroke rehabilitation, quality improvement focuses on delivering evidence-based interventions, improving access to timely therapy, enhancing multidisciplinary teamwork, and ensuring patient-centred care.

Physiotherapists contribute directly to quality improvement through audit, outcome measurement, service redesign, and implementation of best practice guidelines. Measures such as improvements in mobility, gait speed, balance of confidence and functional independence are commonly used to evaluate rehabilitation quality (Pollock et al., 2014).

Within ESD services, quality improvement also relates to safe and timely discharge planning, continuity of care, patient engagement, and integration between hospital and community teams (Langhorne et al., 2017). Ineffective coordination or insufficient physiotherapy input may lead to poorer outcomes, hospital readmission, and increased caregiver burden.

1.2.6 The Role of Physiotherapists in ESD Teams

Physiotherapists are essential members of ESD teams and are responsible for delivering intensive, function-focused rehabilitation within the patient's home environment. Their role typically includes:

- Assessment of physical impairments and functional mobility
- Goal setting in collaboration with patients and carers
- Gait retraining, balance rehabilitation and strengthening

- Falls risk assessment and prevention strategies
- Family and caregiver education
- Progress monitoring and discharge planning

Research suggests that physiotherapy delivered in the home environment promotes contextualised learning and meaningful task practice (Fens et al., 2013). Patients often report greater satisfaction when rehabilitation is delivered in familiar surroundings and linked to real-life activities (Langhorne et al., 2017).

However, the intensity and quality of physiotherapy within ESD teams vary widely. Some studies report reduced therapy frequency due to staffing limitations, travel time, and service capacity issues (Tyson et al., 2020). These variations raise important concerns regarding equity, effectiveness, and quality of care.

1.2.7 Challenges and Gaps in Current Practice

Despite strong evidence supporting ESD, several challenges remain. These include:

- Workforce shortages, particularly in community physiotherapy services
- Variability in team structure and skill mix
- Inequalities in access to ESD across geographic areas
- Inconsistent therapy intensity and duration
- Limited long-term follow-up and outcome evaluation

Moreover, while ESD is generally effective for patients with mild to moderate stroke, its suitability for individuals with complex needs remains debated (Langhorne et al., 2017). Further research is required to identify how physiotherapy input can be optimised to ensure consistent quality across different service models.

There is also limited evidence specifically examining the contribution of physiotherapists to quality improvement within ESD teams, rather than evaluating ESD. This represents a significant gap in current literature.

1.3 Rationale for the Research

The growing prevalence of stroke and the increasing demand for effective rehabilitation services place significant pressure on the NHS. Early Supported Discharge is widely recognised as a cost-effective and patient-centred model of care; however, considerable variability exists in how ESD services are delivered, particularly in relation to physiotherapy provision.

Physiotherapists play a critical role in promoting recovery, functional independence and quality of life following stroke. Despite this, their specific contribution to service quality and rehabilitation outcomes within ESD teams has not been sufficiently examined through focused systematic evaluation. This research aims to address this gap by critically reviewing the existing evidence on the role of physiotherapists in ESD services and their contribution to quality improvement.

The boundaries of this study are limited to adult stroke rehabilitation within community-based ESD services and do not include inpatient rehabilitation, pediatrics or non-stroke neurological conditions.

1.4 Research Question

What is the role of physiotherapists in quality improvement outcomes within Early Supported Discharge teams for adult stroke rehabilitation in the United Kingdom?

1.5 Research Aim

To evaluate the contribution of physiotherapists to quality improvement initiatives in Early Supported Discharge services for stroke rehabilitation in UK and European countries.

1.6 Research Objectives

- To identify and evaluate the specific quality improvement (QI) initiatives led or supported by physiotherapists within ESD services.
- To assess the impact of physiotherapist contributions on patient-centred outcomes such as functional recovery, hospital readmission rates, and duration of hospital stay.
- To examine barriers and enablers affecting physiotherapists' engagement in quality improvement practices within stroke ESD teams.
- To inform NHS policy, clinical practice, and educational frameworks by highlighting evidence-based recommendations regarding physiotherapists' roles in enhancing the quality of stroke rehabilitation services.

1.7 Chapter Summary

This chapter has introduced stroke as a major public health problem and highlighted the importance of physiotherapy and Early Supported Discharge within contemporary stroke rehabilitation. The policy context, evidence base, and quality improvement challenges have been discussed, leading to the rationale for this research. The research question, aim, and objectives have been presented.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter critically examines the existing body of literature relating to stroke rehabilitation, Early Supported Discharge (ESD), and the role of physiotherapists in delivering high-quality, community-based stroke care. Drawing on a range of methodological sources—including systematic reviews, randomised controlled trials, observational studies, national audits, and professional guidelines—it synthesises current evidence to provide a comprehensive overview of how ESD is conceptualized, implemented, and experienced within modern stroke services.

The review begins by outlining the broader context of stroke rehabilitation, including the shift from hospital-centred models of care toward integrated, community-based approaches. It then explores the development and effectiveness of ESD as a service model designed to facilitate earlier transition home while maintaining therapeutic intensity. Emphasis is placed on the clinical rationale underpinning ESD, the organizational factors that shape service delivery, and the outcomes most reported in the literature.

A central focus of the chapter is the contribution of physiotherapists, whose role spans assessment, rehabilitation planning, delivery of task-specific therapy, and promotion of functional independence. The literature is examined to determine how physiotherapy input influences recovery trajectories, patient engagement, and long-term outcomes, and how this contribution is integrated within multidisciplinary ESD teams. Attention is also given to quality improvement initiatives, exploring how standards, guidelines, and performance indicators are used to evaluate and enhance service delivery.

In addition, the chapter addresses broader system-level issues such as workforce capacity, caseload pressures, training needs, and variations in service provision across regions. These factors are considered in relation to their potential impact on consistency of care, access to rehabilitation, and equity of outcomes. Patient experience and caregiver perspectives are also explored, recognising that perceptions of safety, support, and continuity are key markers of service quality alongside clinical outcomes.

By synthesising these strands of evidence, the chapter aims to identify areas of consensus, ongoing debate, and significant gaps in knowledge. Particular attention is paid to uncertainties surrounding optimal physiotherapy input within ESD, variation in implementation fidelity, and the challenges of sustaining high-quality rehabilitation in community contexts. The chapter concludes by highlighting how these gaps justify the need for the present systematic review and by outlining priorities for future research to strengthen the evidence base and inform practice (Langhorne et al., 2017; NICE, 2022).

2.2 Literature Review

2.2.1 Overview of Stroke Rehabilitation and the Central Role of Physiotherapy

Stroke rehabilitation is internationally recognised as a cornerstone of long-term stroke management and recovery. The overarching goal is to enable individuals to regain optimal physical, psychological, and social functioning through processes of restoration, compensation and adaptation (Langhorne, Bernhardt, and Kwakkel, 2011).

Physiotherapy is fundamental to this process, particularly in addressing movement dysfunction, balance impairment, muscle weakness, and reduced mobility. Interventions commonly include gait retraining, functional task practice, strength conditioning, and education aimed at promoting independence.

High-quality research demonstrates the effectiveness of physiotherapy after stroke. Pollock et al. (2014), in a major Cochrane review, reported that repetitive, task-specific physiotherapy significantly improves walking ability, balance and independence in activities of daily living (ADLs). Similarly, Veerbeek et al. (2014) found that early and intensive therapy enhances neuroplasticity and motor recovery, particularly within the first three months of post-stroke. These findings reinforce international guidelines recommending early mobilization and structured rehabilitation (WHO, 2017).

However, despite robust evidence, studies consistently describe a disconnect between recommended therapy intensity and what is delivered in practice — particularly after discharge from hospital (Tyson et al., 2020; RCP, 2023). This gap has stimulated interest in alternative models of care, most notably Early Supported Discharge.

2.2.2 Early Supported Discharge: Concept, Development and Rationale

Early Supported Discharge enables suitable stroke patients to leave hospital earlier while continuing specialist rehabilitation at home. The model aims to combine the intensity of inpatient therapy with the functional relevance of community-based care (Langhorne et al., 2017). ESD emerged in response to pressures on acute stroke services, reductions in hospital length of stay, and recognition that institutional environments may limit participation and independence.

One of the most influential pieces of evidence underpinning ESD is the individual patient data meta-analysis by Langhorne et al. (2005), which demonstrated that patients receiving ESD experienced shorter hospital stays, reduced dependency, and greater likelihood of living independently at six months. Later updates confirmed that ESD is clinically effective and cost-efficient when delivered by coordinated multidisciplinary teams (Langhorne et al., 2017; Patel et al., 2020).

From a quality improvement perspective, ESD aligns with modern healthcare priorities by promoting patient-centred care, reducing unnecessary inpatient bed days, and supporting integrated pathways across hospital and community services (NICE, 2022; WHO, 2017).

2.2.3 Effectiveness of ESD Services on Functional Outcomes

The effectiveness of ESD has been widely evaluated using outcome measures such as the Barthel Index, Modified Rankin Scale, and gait assessments. Langhorne et al. (2017) reported that ESD leads to improved functional independence without increasing mortality or readmission.

Economic evaluations also demonstrate benefits. Patel et al. (2020) showed that ESD reduces long-term social care costs, reinforcing its value for sustainable healthcare systems.

However, many studies evaluate ESD as a single, integrated intervention rather than examining how different professional groups contribute individually. These limits understanding of the specific mechanisms through which physiotherapists influence outcomes and quality improvement (Fisher et al., 2020).

2.2.4 The Role of Physiotherapists Within ESD Teams

Physiotherapists are consistently identified as core members of ESD teams. Their responsibilities include physical assessment, gait retraining, balance rehabilitation, task-oriented practice, fall prevention, education, and discharge planning (Pollock et al., 2014; NICE, 2022).

Delivering physiotherapy at home allows therapy to be embedded in real-life contexts, improving task relevance and skill transfer to everyday activities (Fens et al., 2013). Kwan et al. (2018) reported that stroke survivors receiving intensive community physiotherapy showed faster improvements in walking speed, balance, and confidence compared with standard outpatient care.

Despite these benefits, Tyson et al. (2020) identified wide variation in physiotherapy input across UK ESD services, ranging from daily visits to less than weekly provision. Such inconsistency raises concerns about equity and service quality. Moreover, few studies isolate physiotherapy as an independent factor within ESD effectiveness, limiting understanding of its precise contribution to quality improvement beyond multidisciplinary collaboration (Fisher et al., 2016).

2.2.5 Quality Improvement in Stroke Rehabilitation

Quality improvement (QI) refers to systematic efforts to enhance outcomes, safety and efficiency through continuous evaluation and service redesign (Batalden and Davidoff, 2007). Within stroke rehabilitation, this includes improving therapy access, increasing intensity, enhancing multidisciplinary coordination, and using outcome data to drive change.

National audit evidence shows that services engaging in regular monitoring and feedback — such as the Sentinel Stroke National Audit Programme (SSNAP) — achieve better performance indicators and therapy responsiveness (RCP, 2023; Rudd et al., 2016). Physiotherapists contribute through outcome measurement, pathway development, and innovation in service delivery.

Nevertheless, most QI studies focus on acute stroke management rather than community-based ESD services. Consequently, there remains limited understanding of how physiotherapists lead or influence QI initiatives within ESD contexts (Tyson et al., 2020).

2.2.6 Patient Experience and Quality of Life in ESD

Patient experience is recognised as a core indicator of service quality. Qualitative studies consistently report that stroke survivors value home-based rehabilitation due to increased comfort, autonomy, and involvement of family members (Fens et al., 2013).

Fisher et al. (2019) found that patients perceived ESD physiotherapy as more personalised and functionally meaningful, particularly when focused on everyday activities such as stair climbing, transfers, and outdoor mobility.

However, ESD is not universally appropriate. Individuals with severe stroke, cognitive impairment or limited social support may struggle to manage rehabilitation at home, potentially widening inequalities (Langhorne et al., 2017; Patel et al., 2020). Careful patient selection and tailored support remain essential.

2.2.7 Multidisciplinary Teamworking and Interprofessional Challenges

Effective ESD delivery relies on strong multidisciplinary teamwork. Physiotherapists must collaborate closely with occupational therapists, speech and language therapists, nurses, and rehabilitation assistants to coordinate holistic care (NICE, 2022).

Despite recognition of its importance, barriers persist. Tyson et al. (2020) identified challenges including role overlap, communication difficulties, and variable leadership. Such barriers may reduce therapy intensity, delay goal progression, and compromise continuity. From a QI perspective, strengthening team integration represents a modifiable system-level lever for improving outcomes (Batalden and Davidoff, 2007).

2.2.8 Workforce Capacity and Service Inequalities

Workforce capacity remains one of the most significant challenges. Community physiotherapy services often face staff shortages, high caseloads and extensive travel demands, all of which limit therapy frequency (RCP, 2023).

Geographical inequalities are also evident. Rural and socio-economically deprived areas frequently have reduced access to specialist ESD services, leading to variations in care quality (Patel et al., 2020). Furthermore, physiotherapists working in ESD often report feelings of professional isolation and fewer opportunities for specialist training compared with hospital-based colleagues (Tyson et al., 2020). These issues have implications for both staff wellbeing and service sustainability.

2.2.9 Emerging Innovations: Digital Physiotherapy and ESD

Digital health solutions are increasingly explored as tools to enhance ESD delivery. Laver et al. (2020) reported that telerehabilitation can improve therapy access, adherence, and functional outcomes. Virtual platforms may also reduce travel burden and support self-management.

However, digital approaches raise concerns regarding digital literacy, accessibility, data security, and safety for complex stroke populations. Evidence remains limited, and further high-quality research is required before widescale implementation in ESD settings can be recommended (WHO, 2017; NICE, 2022).

2.2.10 Critical Limitations of Evidence Base

Despite a substantial body of research, key limitations persist:

- Physiotherapy is rarely evaluated as an independent contributor to ESD effectiveness

- Long-term outcomes beyond 12 months are poorly reported
- Patients with severe stroke are underrepresented
- Workforce experience and leadership roles are under-researched
- Outcome measures vary considerably across studies

Together, these gaps limit the ability to determine how physiotherapists specifically drive quality improvement, beyond the broader impact of multidisciplinary care (Fisher et al., 2020; Langhorne et al., 2017).

2.2.11 Identified Research Gap

Although ESD is well supported as an effective rehabilitation model, there remains limited research specifically examining how physiotherapists drive quality improvement within ESD. The literature does not adequately explore how physiotherapists influence therapy intensity, functional outcomes, patient safety, innovation, or service sustainability.

Addressing this gap provides clear justification for the present systematic review, which seeks to explore physiotherapists' contribution to quality improvement in community-based stroke rehabilitation.

2.3 Chapter Summary

This chapter has critically reviewed literature on stroke rehabilitation, ESD, and the role of physiotherapists in supporting community-based recovery. While strong evidence supports ESD as a clinically effective and cost-efficient model, significant variation persists in physiotherapy provision, workforce capacity, and service quality. Importantly, the specific contribution of physiotherapists to quality improvement remains underexplored. These limitations provide a clear rationale for the systematic review presented in the following chapter.

CHAPTER 3: METHODOLOGY

3.1 Introduction to Chapter

This chapter explains the methodological process used to conduct the systematic review on the role of physiotherapists in Early Supported Discharge (ESD) teams for stroke rehabilitation in the United Kingdom and comparable European countries. It outlines the justification for adopting a systematic literature review (SLR) approach and describes the search strategy, Population–Exposure–Outcome (PEO) framework, keywords, databases, and eligibility criteria used to guide the review.

The chapter also details how studies were screened, critically appraised, and selected, with findings presented using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow approach. Finally, ethical considerations relating to secondary research are addressed.

This structured methodology was designed to enhance rigour, transparency, and reproducibility, ensuring that the resulting synthesis provides a credible evaluation of physiotherapists' contributions to quality improvement in ESD stroke rehabilitation (Moher et al., 2009; Boland et al., 2017).

3.2 Systematic Literature Review (SLR)

A systematic literature review (SLR) is a transparent, comprehensive, and reproducible method for identifying, selecting, and synthesising existing research on a focused question (Moher et al., 2009). Unlike narrative reviews, SLRs follow predefined processes aimed at minimising bias and improving reliability of findings. The purpose is to provide evidence-based conclusions that inform policy, clinical decision-making, and future research priorities (Boland et al., 2017).

Key stages include defining the research question, establishing inclusion and exclusion criteria, designing a search strategy, conducting database searches, screening titles and abstracts, critically appraising eligible studies, extracting relevant data, and synthesising the findings. PRISMA guidance was followed to ensure methodological consistency and clarity of reporting.

This approach was adopted to evaluate physiotherapists' roles in improving the quality of stroke rehabilitation through ESD services within the UK and European countries. Using an SLR framework ensured that every stage of evidence identification and synthesis was systematic, reproducible, and transparent (Aromataris and Munn, 2020). Studies conducted in the UK or comparable European healthcare systems were included to ensure similarities in service structure and ESD delivery models.

3.3 Search Strategy

A search strategy is a structured plan for locating relevant studies using predefined search terms, logical operators, and inclusion parameters (Aromataris and Munn, 2020). Comprehensive searches were conducted across PubMed and PEDro, focusing on English-language research published between 2010 and 2025 to ensure inclusion of contemporary ESD practice.

The PEO framework guided development of the strategy:

- **Population (P):** Adults ≥18 years with acute or sub-acute stroke.
- **Exposure (E):** Physiotherapist involvement within ESD teams.

- **Outcome (O):** Quality improvement and functional rehabilitation outcomes.

Boolean operators (AND/OR), truncation (e.g., *rehab*), and title/abstract filters were applied to refine results and reduce irrelevant retrievals. This structure allowed comprehensive, yet focused, identification of studies directly addressing physiotherapists' roles in enhancing quality outcomes within UK ESD services, or within comparable European healthcare systems.

3.4 Search Terms

Search terms comprised of keywords and controlled vocabulary (MeSH) relevant to the review. Appropriate selection of terms is essential to ensure accuracy and comprehensiveness of retrieved evidence (Boland et al., 2017). Synonyms were used to broaden coverage and capture variations in terminology, for example "stroke" OR "cerebrovascular accident".

Table 1. PEO Framework

Element	Description
Population	Adults ≥18 years with acute or sub-acute stroke receiving ESD
Exposure	Physiotherapists' role within multidisciplinary ESD teams
Outcome	Quality improvement, functional recovery, patient satisfaction, service efficiency

Research Question

How do physiotherapists contribute to quality improvement in stroke rehabilitation within Early Supported Discharge teams in the United Kingdom and European countries?

Search Strategy

PUBMED

(Stroke [MeSH] OR Hemiplegia [MeSH] OR Hemiparesis [MeSH]) AND (Patient Discharge [MeSH] OR Home Care Services [MeSH] OR Stroke Rehabilitation [MeSH]) AND (Quality of Life [MeSH] OR Activities of Daily Living [MeSH]) AND "United Kingdom and European countries"[MeSH].

PEDro

(stroke OR "post-stroke") AND (physiotherapist OR "physical therapist") AND "early supported discharge" AND "United Kingdom".

Use of synonyms, Boolean operators, and field limits ensured identification of both clinical trials and systematic reviews relevant to physiotherapy contributions to ESD outcomes.

3.5 Keywords

Core keywords included:

stroke, physiotherapist, early supported discharge, rehabilitation, quality improvement, community rehabilitation, United Kingdom, European countries.

These were mapped to the PEO framework and used consistently across databases to enhance search coherence.

3.6 Databases

Literature searches were conducted using PubMed, ProQuest, and PEDro due to their relevance to healthcare and rehabilitation. PubMed provides extensive biomedical coverage,

while PEDro specialises in physiotherapy trials, clinical guidelines, and systematic reviews (Maher et al., 2003).

Using multiple databases minimises publication bias and increases likelihood of capturing relevant evidence because no single source is comprehensive (Brunton et al., 2017). Filters for publication year, English language, and human studies were applied. Reference lists of included studies were hand-searched to identify additional eligible material.

This combined strategy provided both clinical and allied-health perspectives, supporting a holistic understanding of physiotherapists' contribution to quality improvement in ESD stroke services.

3.7 Inclusion and Exclusion Criteria

Clear eligibility criteria reduce bias and ensure consistency during study selection (Moher et al., 2009). Criteria were developed around the PEO framework and UK and European countries ESD context.

3.7.1 Inclusion Criteria

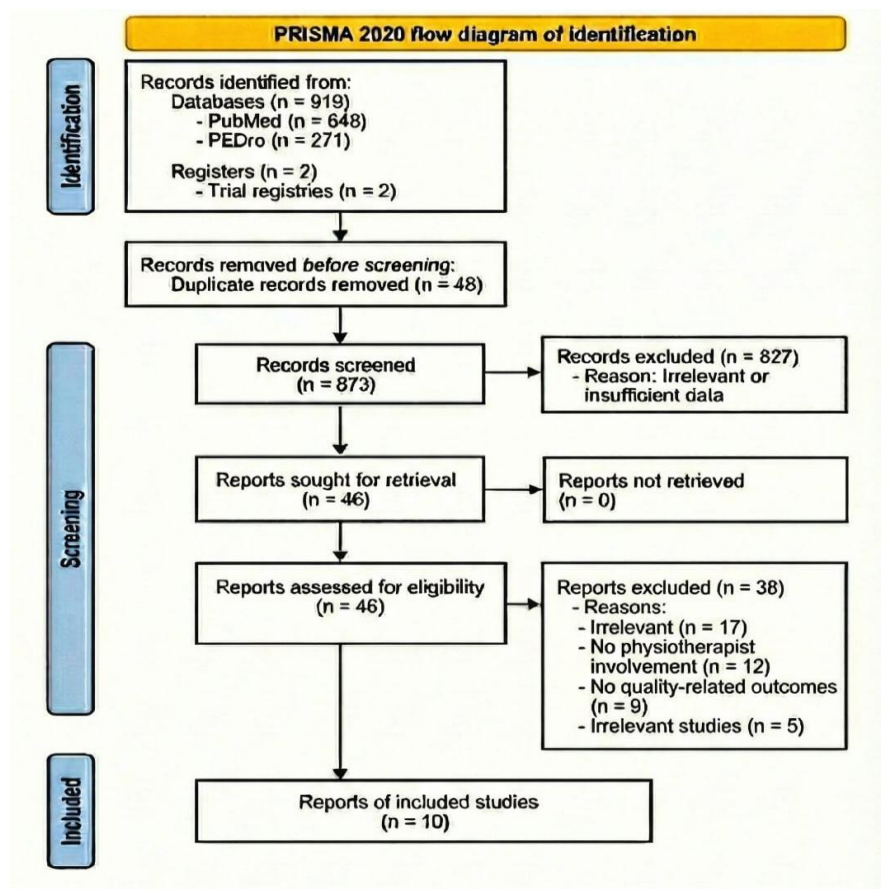
- Adults ≥ 18 years with acute or sub-acute stroke
- Patients receiving ESD services
- Studies involving physiotherapists as part of ESD multidisciplinary teams
- Conducted in the United Kingdom and European countries
- Peer-reviewed research in English (2010–2025)
- Quantitative, qualitative, or mixed methods studies relevant to quality outcomes

3.7.2 Exclusion Criteria

- Paediatric stroke populations
- Inpatient-only rehabilitation
- Studies without physiotherapist involvement
- Editorials, commentaries, conference abstracts, or grey literature

These restrictions ensured relevance to current UK and European countries ESD practice and maintained methodological transparency.

Figure 1: PRISMA Flow chart (Page et al., 2021)



3.8 Search Results

The literature search identified 921 records, of which 919 were retrieved from electronic databases (PubMed = 648; PEDro = 271) and two from trial registries. After removing duplicates, 873 records remained and were screened. Ethical research requires accuracy, transparency, and respect for intellectual ownership (Resnik, 2018). Only peer-reviewed studies reporting formal ethical approval were included.

Accurate citation prevented plagiarism, and no unpublished or confidential data were used. Because secondary analysis does not involve direct contact with participants, it poses minimal ethical risk; however, adherence to good academic practice strengthens credibility (NICE, 2022).

electronic databases (PubMed, n = 648; PEDro, n = 271), and 2 records were identified from trial registries.

No additional records were identified from other sources. After removal of 48 duplicate records, 873 unique records remained and were screened based on titles and abstracts.

During the screening stage, 827 records were excluded due to irrelevance, insufficient data, or other methodological reasons.

Consequently, 46 full-text articles were assessed for eligibility. Of these, 38 articles were excluded for the following reasons:

- Irrelevant studies (n=17)
- no physiotherapist involvement (n = 12), and
- absence of quality-related outcomes (n = 9).

Finally, 10 studies met the inclusion criteria and were included in the final synthesis. The study selection process followed PRISMA guidelines (Moher et al., 2009) to ensure transparency and methodology (rigor, 2009). Screening was undertaken independently by two reviewers, with disagreements resolved through discussion.

These studies collectively reflect contemporary UK and European countries practice and provide insight into how physiotherapists contribute to functional recovery, service efficiency, and patient experience within ESD models.

3.9 Ethical Considerations

Although this review analysed previously published data, ethical principles remain essential. Ethical research requires accuracy, transparency, and respect for intellectual ownership (Resnik, 2018). Only peer-reviewed studies reporting formal ethical approval were included.

Accurate citation prevented plagiarism, and no unpublished or confidential data were used. Because secondary analysis does not involve direct contact with participants, it poses minimal ethical risk; however, adherence to good academic practice strengthens credibility (NICE, 2022).

3.10 Chapter Summary

This chapter outlined the systematic methodology used to identify, select, and synthesise evidence relating to physiotherapists' roles in ESD stroke rehabilitation in the UK and European countries. The PEO framework, structured search strategy, defined eligibility criteria, and PRISMA-guided selection process enhanced rigour and reproducibility.

Ten eligible studies were identified and critically appraised. Ethical standards were upheld throughout. The next chapter will present and synthesise the findings, examining how physiotherapists contribute to quality improvement and the implications for future practice and policy.

CHAPTER 4: DATA EXTRACTION AND EVALUATION

4.1 Introduction to Chapter

This chapter presents the evaluation of the quantitative evidence included in this review on quality improvement in stroke rehabilitation, with a specific focus on the role of physiotherapists in Early Supported Discharge (ESD) teams. It outlines the process of data extraction and critically appraises the methodological quality of the included quantitative studies. The Critical Appraisal Skills Programme (CASP) tool was used to assess the validity, reliability, and applicability of the studies. Through systematic appraisal, this chapter identifies the strengths and limitations of the evidence base, ensuring that conclusions drawn in subsequent chapters are grounded in high-quality and methodologically sound research.

4.2 Data Extraction

Data extraction refers to the systematic process of identifying, collecting, and recording relevant information from selected studies in a structured manner to facilitate comparison and synthesis (Higgins et al., 2022). In this review, data were extracted using a predesigned data extraction form to ensure consistency and minimise bias. Extracted information included author(s), year of publication, country, study aim, study design, sample size, participant characteristics, outcome measures, intervention details, and key findings related to physiotherapy involvement in ESD services. This structured approach supported the development of a study characteristics table and informed the subsequent critical appraisal process.

4.3 Introduction to Critical Appraisal and Paper Quality Assessment

Critical appraisal is the systematic evaluation of research evidence to determine its methodological quality, credibility, and relevance to a specific research question (Aromataris and Munn, 2020). It involves assessing the appropriateness of study design, risk of bias, validity of outcome measures, and robustness of data analysis. Critical appraisal is essential in healthcare research because not all published studies provide reliable evidence, and methodological flaws may compromise findings. In stroke rehabilitation research, appraising quantitative studies is particularly important to ensure that conclusions about intervention effectiveness, such as physiotherapy-led ESD services, are evidence-based. Rigorous quality assessment strengthens the reliability of the review and supports informed clinical and policy decision-making.

4.4 Critical Appraisal Tool: CASP

A critical appraisal tool is a structured checklist designed to guide the evaluation of research quality in a systematic and transparent manner. In this review, the Critical Appraisal Skills Programme (CASP) checklists were used to appraise all included quantitative studies. CASP provides study-design-specific tools, including checklists for randomised controlled trials (RCTs) and cohort studies, making it suitable for appraising a range of quantitative designs commonly used in stroke rehabilitation research (CASP, 2018).

Selecting the appropriate appraisal tool is crucial to ensure that key methodological aspects are evaluated accurately. The CASP tool assesses clarity of research aims, appropriateness of methodology, recruitment strategies, measurement validity, control of confounding factors, precision of results, and applicability to practice. Its structured yes/no format enhances consistency while allowing critical judgement, ensuring a rigorous assessment of study quality.

4.5 Evaluation of Quantitative Studies Using the CASP Tool

The CASP checklists for randomised controlled trials and cohort studies were used to critically appraise the quantitative studies included in this review. CASP was selected due to its widespread acceptance in healthcare research and its clear focus on internal validity, risk of bias, and clinical relevance. Compared with other tools, such as the Joanna Briggs Institute checklists, CASP is more concise and user-friendly, facilitating consistent appraisal across multiple studies. However, a limitation of CASP is the absence of a numerical scoring system, which may introduce subjectivity when comparing study quality.

A total of ten studies were critically appraised using the CASP tool (Langhorne et al., 1997; Indredavik et al., 1999; Fearon and Langhorne, 2012; Tyson et al., 2015; Vluggen et al., 2021; Fisher et al., 2020; Tyagi et al., 2022; Smith et al., 2023). Quantitative studies are used to measure effectiveness, outcomes, and associations, providing objective evidence on the impact of interventions such as ESD services.

The overall aim of the included studies was to evaluate the effectiveness of ESD services on stroke recovery outcomes, including functional independence, hospital length of stay, readmission rates, and quality of life. Physiotherapy was a core component of all ESD interventions examined. The methodologies employed were appropriate for addressing the research aims, with outcome measures such as the Barthel Index and Functional Independence Measure demonstrating established validity and reliability.

The RCTs demonstrated strong methodological quality, with clearly defined inclusion criteria and appropriate randomisation procedures. However, blinding of participants and clinicians was often not feasible due to the nature of rehabilitation interventions, which is a recognised limitation in physiotherapy research. Cohort studies provided valuable real-world evidence but were more susceptible to confounding variables and selection bias.

Overall, the CASP appraisal indicated that most of the quantitative studies were of moderate to high quality. While some limitations were identified, particularly related to blinding and confounding, the evidence consistently supports the effectiveness of physiotherapist-led ESD services in improving stroke rehabilitation outcomes.

Article 1: Santana et al. (2017)

Santana et al. (2017) employed a randomised open-label, blinded-endpoint trial design to evaluate early home-supported discharge compared with usual care. CASP appraisal indicates that the study had a clearly defined aim and appropriate randomisation procedures. Although the intervention could not be blinded, outcome assessors were blinded, reducing detection bias and strengthening internal validity. Validated outcome measures, including the Functional Independence Measure, were used at six-month follow-up. Attrition was reported, which may affect result precision, but was not excessive. The absence of significant differences in primary outcomes suggests that the intervention may not provide superior functional recovery compared to usual care, although subgroup effects were noted. The study is methodologically sound and relevant to evaluating ESD effectiveness in different healthcare systems.

Article 2: Tistad and von Koch (2015)

Tistad and von Koch (2015) conducted an observational comparative cohort study evaluating early supported discharge with continued home rehabilitation compared to conventional services. Using the CASP cohort checklist, the study addressed a clear research aim and

included relevant functional, satisfaction, and caregiver outcomes. However, non-random group allocation introduced potential selection bias and confounding. While outcome measures were appropriate and follow-up extended to 12 months, CASP appraisal highlights limited control of confounding variables. The finding of reduced caregiver burden and shorter inpatient stays in the ESD group is clinically relevant, but causal inference is limited. Overall, the study provides valuable real-world evidence with moderate methodological quality.

Article 3: Bråndal et al. (2019)

Bråndal et al. (2019) conducted a large registry-based observational study using data from the Swedish Riksstroke registry to evaluate patient-reported outcomes following ESD. CASP appraisal identifies the large sample size as a major strength, improving precision and generalisability. The exposure and outcomes were clearly defined, and multivariable regression was used to adjust for confounding. However, registry-based designs are subject to residual confounding and potential misclassification of ESD exposure. Despite these limitations, the association between ESD and improved satisfaction, mood, and ADL independence supports the potential benefits of ESD services. The study demonstrates high external validity with moderate internal validity.

Article 4: Fisher et al. (2020)

Fisher et al. (2020) conducted a national audit-based observational study analysing data from the UK Sentinel Stroke National Audit Programme (SSNAP). CASP appraisal highlights a clearly focused service evaluation question examining the relationship between ESD core components, service responsiveness, and rehabilitation intensity. The use of multilevel modelling appropriately accounted for clustering at team level, strengthening methodological rigour. However, outcomes were measured at ESD discharge, which may be insufficient to detect longer-term functional changes. While the study found improvements in service responsiveness rather than functional outcomes, it provides strong evidence for quality improvement and service design in ESD delivery. Methodological quality was judged to be high for service-level evaluation.

Article 5: Fisher et al. (2016)

Fisher et al. (2016) undertook a prospective comparative cohort study assessing the effectiveness of ESD in routine clinical practice. CASP appraisal indicates that the study addressed a relevant and clearly focused question, with outcomes reflecting both functional recovery and service performance. Group allocation was based on service configuration rather than randomisation, increasing the risk of selection bias. While sample size was adequate and outcome measures were valid, incomplete control for confounders limits causal interpretation. Nonetheless, the study's strength lies in its pragmatic design and external validity, offering

Article 6: Heron et al. (2019)

Heron et al. (2019) conducted a pilot randomised controlled trial assessing the feasibility of a home-based rehabilitation and prevention programme following transient ischaemic attack or minor stroke. CASP appraisal confirms that the study had a clearly focused feasibility objective and appropriate randomisation. However, as a pilot study, it was not powered to detect effectiveness outcomes, limiting the strength of clinical conclusions. Outcome measures were appropriate for feasibility, including recruitment, retention, and early behavioural changes. Small sample size increased imprecision and potential baseline imbalance. Despite these limitations, the study demonstrates methodological rigour for feasibility research and provides

preliminary support for home-based rehabilitation pathways relevant to ESD service development.

Article 7: Björkdahl et al. (2023)

Björkdahl et al. (2023) conducted a randomised controlled trial examining the effect of very early supported discharge on activities of daily living in individuals with mild stroke. According to CASP criteria, the research question was clearly focused, and the RCT design was appropriate for evaluating effectiveness. Random allocation enhanced internal validity, although blinding of participants and therapists was not feasible. Outcome measures focused on ADL ability, which are directly relevant to physiotherapy goals. Follow-up procedures were clearly reported, and results were presented transparently. While the intervention showed limited superiority over usual care, the study contributes valuable evidence regarding patient selection and timing of discharge within ESD models. Methodological quality was judged to be high, with acceptable limitations.

Article 8: Rafsten and Sunnerhagen (2023)

Rafsten and Sunnerhagen (2023) conducted a descriptive cohort study based on participants receiving very early supported discharge. CASP appraisal indicates a clearly defined objective focusing on patient-centred goal performance and satisfaction. The absence of a comparison group limits the ability to infer effectiveness, which is a key CASP limitation for cohort studies. Outcomes were subjective but clinically meaningful in the context of person-centred rehabilitation. While internal validity is limited, the study contributes valuable insight into patient experiences within ESD pathways and supports the qualitative interpretation of quality improvement outcomes.

Article 9: Bråndal et al. (2022)

Bråndal et al. (2022) explored patient-centred goal setting within a Very Early Supported Discharge (VESD) programme using a descriptive cohort of 69 stroke survivors. Applying the CASP cohort checklist, the study addressed a focused question concerning the feasibility and acceptability of structured goal-setting meetings. Participants were drawn from an RCT cohort, which strengthened internal validity through prior eligibility and baseline assessments. The intervention was well described, with clearly documented processes for collaborative goal formulation and review.

The primary outcomes—goal performance and satisfaction—were appropriate and patient-centred, aligning with rehabilitation practice. Repeated measurement before and after VESD supported assessment of change over time. However, the absence of a concurrent comparison group limits the ability to attribute improvements solely to structured goal setting. Potential confounders (e.g., stroke severity, community therapy intensity) were described but not fully adjusted for statistically. As with many rehabilitation studies, blinding was not feasible. Ethical approval, informed consent, and good follow-up rates were reported, enhancing credibility. Overall, the study offers useful, practice-relevant insight into how goal-setting processes may influence engagement and outcomes, though generalisability is constrained by the modest sample size and single-programme context (see Appendix XX).

Article 10: Vluggen et al. (2021)

Vluggen et al. (2021) conducted a multicentre randomised controlled trial evaluating an integrated multidisciplinary geriatric rehabilitation programme after stroke compared with usual care. Using the CASP RCT checklist, the study addressed a clear clinical question and

applied appropriate randomisation across several rehabilitation centres, strengthening internal validity. The intervention combined inpatient rehabilitation, home-based self-management and structured education, and outcomes were clinically meaningful, focusing on daily activities, dependence, quality of life and caregiver burden. No significant differences were found for the primary outcome, although some secondary outcomes suggested benefits, particularly for autonomy and caregivers. Blinding of participants and therapists was not possible, and the complex nature of the intervention makes it difficult to determine which components were effective. Overall, the trial demonstrates good methodological quality and provides relevant evidence for geriatric stroke rehabilitation, while highlighting the difficulty of improving activity outcomes beyond usual care.

4.6 Chapter Summary

This chapter evaluated the quality of the quantitative evidence included in the review through systematic data extraction and critical appraisal. The CASP tool was used exclusively to assess the methodological quality of randomised controlled trials and cohort studies examining physiotherapy involvement in Early Supported Discharge services. The appraisal process identified generally strong evidence supporting the effectiveness of ESD interventions, despite some methodological limitations. This rigorous evaluation enhances the credibility of the review findings. The next chapter will synthesise the results of the appraised studies and discuss their implications for physiotherapy practice and quality improvement in stroke rehabilitation.

CHAPTER 5: DATA ANALYSIS AND SYNTHESIS

5.1 Introduction to Chapter

This chapter presents a detailed analysis and synthesis of the findings from the ten studies included in this systematic literature review, which explored the effectiveness, feasibility, and implementation of Early Supported Discharge (ESD) and Very Early Supported Discharge (VESD) interventions following stroke. The purpose of this chapter is to integrate evidence from diverse study designs to identify recurring patterns, similarities, and variations across the literature. The chapter begins by explaining the analytical approach adopted and the thematic framework used to guide synthesis. It then summarises the key characteristics of the included studies, including country of origin and study design. The main section presents the emerging themes and sub-themes derived from the analysis, with findings interpreted and compared across studies. This approach allows a comprehensive understanding of how ESD/VESD interventions impact patient outcomes, service delivery, and healthcare systems.

5.2 Thematic Analysis

Thematic analysis is a flexible and systematic method used to identify, analyse, and interpret patterns or themes within a dataset. It is commonly applied in qualitative research but has increasing relevance in systematic literature reviews involving quantitative and mixed-methods studies. When thematic analysis is used to synthesise findings from secondary data sources, such as published research articles, it is often referred to as thematic synthesis. This approach enables reviewers to move beyond individual study results and develop higher-order interpretations. In quantitative research, thematic analysis can be used to group outcomes, compare intervention effects, and identify consistent trends across studies, particularly when statistical meta-analysis is not feasible due to heterogeneity in study designs, populations, or outcome measures.

5.3 Data Analysis Tool

The data analysis and synthesis were guided by the Braun and Clarke (2006) six-phase thematic analysis framework, which provides a structured yet adaptable approach to identifying and reporting themes. The six phases include familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. This framework was chosen due to its transparency, methodological rigour, and suitability for synthesising findings across heterogeneous studies. It allows both explicit findings (e.g., functional outcomes, length of stay) and implicit meanings (e.g., patient satisfaction, caregiver experiences) to be captured. Importantly, the framework supports the integration of quantitative findings into a narrative synthesis, making it appropriate for this review.

5.4 Characteristics of the Identified Studies

The ten studies included in this review were conducted across three countries, reflecting a predominantly European evidence base. Five studies were conducted in Sweden (Rafsten & Sunnerhagen, 2023; Björkdahl et al., 2023a; Björkdahl et al., 2023b; Tistad & von Koch, 2015; Bråndal et al., 2019), four studies were undertaken in the United Kingdom (Heron et al., 2019; Fisher et al., 2016; Fisher et al., 2020), and one study was conducted in Portugal (Santana et al., 2017).

In terms of study design, four studies employed randomised controlled trial (RCT) methodologies or secondary analyses of RCT data, providing higher-level evidence regarding intervention effectiveness. One study was a pilot feasibility RCT, while five studies used observational designs, including cohort, registry-based, and implementation studies. Sample sizes varied substantially, ranging from 40 participants in feasibility studies to over 30,000 participants in national registry analyses. Participants were primarily adults recovering from stroke, mild stroke, or transient ischaemic attack. Detailed methodological and participant characteristics are presented in the data extraction tables included in the Appendices.

5.5 Emerging Themes from Included Studies

Overview of Study Design Grouping

For analytical clarity, studies were grouped according to study design:

- Randomised Controlled Trials and Secondary Analyses: Santana et al. (2017); Rafsten & Sunnerhagen (2023); Björkdahl et al. (2023a; 2023b)
- Pilot Feasibility Trial: Heron et al. (2019)
- Observational: Tistad & von Koch (2015); Fisher et al. (2016); Bråndal et al. (2019); Fisher et al. (2020)
- Registry: Bråndal et al., 2019

Table 2: Themes, Sub-themes and Supporting Studies

Theme	Sub-themes	Studies
1. Improved functional outcomes and independence	• Better ADL and mobility • Faster recovery at home • Increased independence	Santana et al. (2017) Fisher et al. (2016) Bråndal et al. (2019) Björkdahl & Danielsson (2023)
2. Reduced hospital stay and costs	• Shorter length of stay • Reduced inpatient costs • Efficient use of resources	Tistad & von Koch (2015) Fisher et al. (2016) Fisher et al. (2020) Santana et al. (2017)
3. Importance of multidisciplinary, structured service models	• Coordinated stroke teams • Clear referral and discharge processes • Adequate therapy intensity	Fisher et al. (2020) Vluggen et al. (2021) Bråndal et al. (2022)
4. Patient satisfaction and psychosocial benefits	• Higher satisfaction • Improved mood and confidence • Reduced caregiver burden	Bråndal et al. (2019) Fisher et al. (2016) Tistad & von Koch (2015)
5. Role of patient-centred goal-setting	• Meaningful personalised goals • Better engagement and motivation	Rafsten & Sunnerhagen (2023) Bråndal et al. (2022)

	• Improved goal achievement	Björkdahl & Danielsson (2023)
6. Feasibility and safety	• Safe for selected mild–moderate stroke • Acceptable to patients • Need for careful patient selection	Heron et al. (2019) Björkdahl & Danielsson (2023)

Theme 1: Improved functional outcomes and independence

The collective evidence indicates that early or very-early supported discharge, when combined with structured community rehabilitation, promotes meaningful functional recovery. Rather than delaying progress, returning home appears to provide a therapeutic environment in which daily tasks can be practised repeatedly in realistic contexts. Activities such as washing, cooking or navigating stairs become integral components of therapy instead of simulated tasks undertaken in a hospital gym. This ecological validity strengthens learning, reinforces independence and encourages self-directed problem solving.

Furthermore, ESD/VESD models typically ensure continuity of therapy, meaning that patients experience less disruption between hospital and home, reducing the risk of rehabilitation “gaps”. Consistent therapeutic contact supports confidence and prevents deterioration linked to inactivity. Importantly, the pattern across studies suggests that the quality and organisation of therapy matter more than duration of hospital stay. Prolonged inpatient care does not necessarily yield superior outcomes when compared with structured community rehabilitation delivered at the right time and intensity (Santana et al., 2017; Fisher et al., 2016; Bråndal et al., 2019; Björkdahl and Danielsson, 2023).

Altogether, the literature sheds new light on stroke care by challenging traditional assumptions that longer inpatient rehabilitation is inherently better. Instead, it indicates that timely transition home, combined with targeted support, can foster faster recovery and autonomy.

Theme 2: Reduced hospital stays and costs

Beyond clinical outcomes, ESD/VESD contributes to more efficient health-service delivery. Shorter hospital stays translate into reduced occupancy pressures, lower costs and improved bed availability for acute admissions. Importantly, this reduction is not achieved through early discharge alone, but rather through redesigning the trajectory of care so that a considerable proportion of rehabilitation occurs in the community.

Evidence repeatedly shows that these pathways avoid the negative consequences typically associated with premature discharge, such as readmissions, deterioration, or loss of independence. Instead, patients transition into structured support systems that replicate and extend hospital rehabilitation in a more natural environment. At a system level, this approach supports sustainability: scarce specialist resources are allocated more rationally, and services can accommodate growing stroke populations without proportional increases in inpatient infrastructure (Tistad and von Koch, 2015; Fisher et al., 2016; Fisher et al., 2020; Santana et al., 2017).

Collectively, the findings reframe ESD not as a cost-cutting exercise but as a strategic reallocation of rehabilitation resources that aligns economic efficiency with patient-centred outcomes.

Theme 3: Importance of multidisciplinary, structured service models

The literature makes clear that ESD/VESD succeeds only when implemented as a structured, multidisciplinary model. Effective services demonstrate shared leadership, coordinated communication and clearly defined protocols regarding eligibility, handover and follow-up. Multidisciplinary collaboration ensures that physical rehabilitation, cognitive needs, medication management and psychosocial support are addressed simultaneously.

Where services lack integration—such as fragmented communication between hospital and community teams—patients experience delays, inconsistent goals and reduced continuity. Conversely, services adhering to recognised ESD “core components” deliver more timely interventions and show better clinical and organisational outcomes (Fisher et al., 2020; Vluggen et al., 2021; Bråndal et al., 2022).

This pattern emphasises that implementation quality, governance and team functioning are critical. ESD is therefore best conceptualised as a specialist service rather than simply an accelerated discharge policy.

Theme 4: Patient satisfaction and psychosocial benefits

Recovery from stroke extends beyond physical rehabilitation and encompasses emotional stability, identity rebuilding and adaptation to altered abilities. ESD/VESD appears to support these processes by situating recovery within everyday life. Patients describe feeling more in control, able to gradually resume valued roles, and less isolated than during prolonged hospital stays. Family involvement becomes natural rather than artificial, allowing shared understanding and collaborative problem-solving.

Being at home also avoids institutional dependency and encourages the development of coping strategies that are sustainable long term. Professional visits provide reassurance and guidance, reducing anxiety while maintaining autonomy. The consistency of these psychosocial outcomes across studies indicates that ESD/VESD facilitates not only functional recovery but also holistic adjustment to life after stroke (Bråndal et al., 2019; Fisher et al., 2016; Tistad and von Koch, 2015).

In this sense, ESD represents a shift towards truly person-centred rehabilitation, emphasising lived experience rather than purely biomedical outcomes.

Theme 5: Role of patient-centred goal setting

Goal setting is consistently identified as a cornerstone of successful ESD services. Engaging patients in defining their rehabilitation priorities encourages ownership and fosters intrinsic motivation. Goals linked directly to real-world challenges — such as managing household routines, resuming driving or returning to employment — create clarity and direction for the therapeutic process.

Structured goal meetings also strengthen alignment across multidisciplinary teams, reducing duplication and ensuring effort is channelled toward the outcomes that matter most. Crucially, goal setting enhances communication between clinicians, patients and families, transforming rehabilitation into a shared endeavour rather than a professionally imposed programme (Rafsten and Sunnerhagen, 2023; Bråndal et al., 2022; Björkdahl and Danielsson, 2023).

This consistent pattern highlights goal setting as a mechanism of change, linking the practical realities of home-based care with improved adherence and meaningful progress.

Theme 6: Feasibility and safety

Finally, across diverse contexts, ESD/VESD demonstrates strong feasibility when appropriate safeguards and selection processes are in place. Patients with mild to moderate impairments adapt well to early discharge models, particularly when continuous monitoring and responsive support are available. These programmes successfully bridge the transition between hospital and home, avoiding the abrupt cessation of care that can otherwise occur.

At the same time, the literature acknowledges clear boundaries. Not all stroke survivors are suitable candidates: severe cognitive impairment, unstable medical conditions or significant functional dependence may necessitate extended inpatient rehabilitation. ESD therefore requires clinician judgement, structured assessment tools and coordinated follow-up frameworks (Heron et al., 2019; Björkdahl and Danielsson, 2023).

Overall, the evidence indicates that ESD/VESD is safe, scalable and adaptable, provided services are applied thoughtfully and supported by robust infrastructure.

5.6 Chapter Summary

This chapter synthesised findings from ten studies examining Early and Very Early Supported Discharge interventions following stroke. Using a thematic analysis framework, five overarching themes were identified, encompassing intervention effectiveness, patient-centred outcomes, feasibility, implementation, and caregiver and system impacts. The synthesis demonstrated that ESD is a safe and effective alternative to conventional care, offering short-term functional benefits, improved patient satisfaction, reduced caregiver burden, and greater healthcare efficiency. These findings provide a strong foundation for the discussion chapter, where implication for practice, policy, and future research will be expanded.

CHAPTER 6: DISCUSSION

6.1 introduction

This chapter presents an in-depth discussion of the key findings from the systematic literature review and examines how they relate to existing knowledge on Early Supported Discharge (ESD) and Very Early Supported Discharge (VESD) following stroke and transient ischaemic attack. The purpose of this discussion is not simply to restate findings, but to interpret them considering broader rehabilitation principles, previous research evidence, and contemporary models of stroke care.

By situating the results within the wider academic and clinical context, the chapter helps clarify why certain trends were observed and what they may mean for the ongoing development of stroke rehabilitation services. The thematic structure developed in Chapter 5 is used as the framework for discussion, allowing similarities, differences, and emerging trends to be analysed more systematically across studies.

Furthermore, the chapter acknowledges that evidence must always be interpreted with an awareness of its methodological strengths and limitations. Therefore, critical consideration is given to factors such as study design, outcome measures, follow-up duration, and generalisability. This critical perspective strengthens the credibility of the conclusions drawn. The chapter concludes by highlighting key implications for clinical practice, service development, and future research directions.

6.2 Discussion of Key Findings

This systematic review synthesised evidence from ten studies examining ESD and VESD interventions. Overall, the findings suggest that ESD is a safe and effective alternative to conventional hospital-based rehabilitation, with benefits extending beyond functional outcomes to include patient satisfaction, caregiver wellbeing, and healthcare efficiency. However, the magnitude and sustainability of benefits vary depending on outcome type, follow-up duration, and service implementation.

Theme 1: Improved Functional Outcomes and Independence

A central theme emerging from the included studies is that Early Supported Discharge (ESD) and Very Early Supported Discharge (VESD) models enable stroke survivors to achieve functional outcomes and levels of independence that are comparable to, and in some cases achieved more rapidly than, those associated with conventional inpatient rehabilitation. Across different healthcare contexts, structured home-based rehabilitation delivered through ESD/VESD pathways has been shown to support recovery in activities of daily living (ADLs) without compromising overall functional prognosis.

Several studies indicate that patients receiving ESD demonstrate earlier gains in functional independence, particularly in the early post-discharge period. Santana et al. (2017), in their randomised controlled trial comparing early home-supported discharge with usual care, found that although both groups showed significant improvement over time, patients discharged early with coordinated home rehabilitation achieved functional recovery at a similar rate to those who remained in hospital-based programmes. Importantly, this finding suggests that transferring rehabilitation into the home environment does not hinder functional progress, if therapy remains structured, goal-oriented, and multidisciplinary.

Evidence supporting early functional improvement is also reported by Björkdahl and Danielsson (2023), who examined VESD in individuals with mild stroke. Their findings demonstrated superior ADL performance in the VESD group during the early months following discharge. However, these early advantages were not sustained at 12-month follow-up, with both intervention and control groups converging towards similar levels of functional independence. This pattern indicates that while VESD may accelerate the pace of early recovery, it does not necessarily alter long-term functional endpoints.

From a broader perspective, these findings align with established evidence from systematic reviews, including the landmark individual patient data meta-analysis by Langhorne et al. (2005), which demonstrated that ESD services increase the likelihood of earlier return home and reduce hospital length of stay without increasing mortality or long-term dependency. While improvements in traditional functional outcome measures are not always sustained in the long term, the consistency of findings across studies reinforces that ESD/VESD models are at least functionally equivalent to standard inpatient rehabilitation.

Theoretical explanations for these outcomes can be understood through principles of neuroplasticity and task-specific learning. Rehabilitation delivered in the patient's own home allows functional practice to be embedded within meaningful, context-specific activities such as dressing, cooking, personal hygiene, and mobility within familiar environments. This task-oriented repetition may promote faster acquisition of functional skills and earlier independence, particularly during the early, more plastic phase of post-stroke recovery. However, biological recovery limits, co-morbidities, and ongoing access to therapy may ultimately determine long-term functional potential, explaining why early gains do not always translate into superior outcomes at later follow-up.

Notably, some evidence suggests that functional outcomes associated with ESD may be more favourable when services are well-established and adequately resourced. Fisher et al. (2016), examining routine clinical practice in the UK, reported higher functional scores and improved independence among patients receiving ESD compared with those managed through non-ESD pathways. These findings highlight the importance of service configuration, including multidisciplinary coordination, therapy intensity, and continuity of care, in determining functional success.

At the same time, variability across studies points to important methodological considerations. Randomised controlled trials offer high internal validity but may underestimate real-world benefits due to strict inclusion criteria and standardised protocols. In contrast, observational studies may overestimate functional gains due to selection bias, with ESD services often accepting patients with milder impairments, stronger social support, and more favourable home environments. This underscores the need for cautious interpretation of functional outcomes and reinforces the importance of context when evaluating ESD effectiveness.

Overall, the evidence supports the conclusion that ESD and VESD models promote functional recovery and independence without compromising safety or long-term outcomes. Rather than fundamentally altering ultimate recovery potential, these models appear to influence the timing, context, and experience of rehabilitation. By enabling earlier reintegration into the home environment and supporting meaningful functional practice, ESD/VESD facilitate faster attainment of independence while maintaining equivalence in long-term functional outcomes. Future research should focus on identifying patient characteristics and service components that optimise functional benefit from ESD-based rehabilitation pathways.

Theme 2: Reduced Hospital Stay and Healthcare Costs

A substantial body of evidence underscores the consistent association between Early Supported Discharge (ESD) interventions and reductions in hospital length of stay (LOS), while maintaining comparable clinical and functional outcomes to conventional inpatient rehabilitation. The core principle underpinning ESD is to facilitate a safe and timely transition from acute hospital care to a home-based environment, where rehabilitation continues under the guidance of a coordinated multidisciplinary team. This model not only supports recovery in familiar surroundings often enhancing relevance and motivation but also promotes more efficient use of limited hospital resources.

Tistad and von Koch (2015) reported that ESD significantly shortened inpatient LOS while simultaneously reducing caregiver burden, illustrating benefits that extend beyond the healthcare system to families and informal support networks. Their findings suggested that early, well-coordinated discharge planning reduces institutional dependency by ensuring that patients receive structured follow-up and targeted rehabilitation at home. Similarly, Fisher et al. (2016) demonstrated that patients receiving ESD had shorter hospital admissions compared with those undergoing standard post-stroke care, with no increase in adverse outcomes or decline in functional independence. These results help dispel concerns that earlier discharge inherently compromises safety.

Further evidence from Fisher et al. (2020) showed that ESD services adhering closely to recognised core principles such as coordinated multidisciplinary input, regular goal review, and structured communication pathways achieved greater operational efficiency. This highlights a direct link between implementation fidelity and economic benefit, suggesting that simply labelling a service as ESD is insufficient; the quality and structure of delivery are critical determinants of impact.

Santana et al. (2017) reinforced these conclusions by documenting significant reductions in inpatient days among patients receiving early home-supported discharge. Collectively, these studies indicate that ESD functions as a value-based care model, generating cost savings through decreased LOS while sustaining or, in some cases, improving clinical outcomes. In addition, by shifting aspects of rehabilitation to community settings, ESD frees acute hospital capacity, contributing to broader system sustainability and improved patient flow.

Crucially, reductions in LOS associated with ESD are not achieved through premature or unsafe discharge. Rather, they reflect continuity of care that bridges the hospital–home interface, supported by proactive follow-up, clear escalation pathways, and ongoing rehabilitation tailored to patient needs. This continuity helps ensure that patients receive the intensity and coordination of care traditionally associated with inpatient units but delivered in a more personalised and resource-efficient manner.

Overall, the cumulative evidence positions ESD as a strategic health service innovation. By coupling earlier discharge with structured multidisciplinary rehabilitation, ESD offers a pragmatic approach to improving system efficiency while safeguarding patient outcomes an increasingly important balance in modern stroke care.

Theme 3: Importance of Multidisciplinary and Structured Service Models

The success of ESD interventions hinges critically on their organisational structure and the degree of multidisciplinary coordination embedded within them. The evidence demonstrates that ESD is not effective simply because patients leave hospital earlier; rather, its benefits arise from the way care is organised, delivered, and integrated across professional boundaries. Structured, goal-oriented service models that prioritise collaboration, continuity, and consistent communication appear essential for achieving optimal functional outcomes and equitable service delivery.

Fisher et al. (2020) highlighted that fidelity to the recognised “core components” of ESD was strongly associated with better clinical outcomes. These components include the presence of a dedicated multidisciplinary team, coordinated rehabilitation planning, timely initiation of community services, and regular communication between acute and community providers. When these elements are fully implemented, patients experience smoother transitions, clearer care plans, and more consistent therapeutic input. Conversely, when adherence is partial such as sporadic contact between team members or lack of shared documentation services become fragmented, and opportunities for coordinated rehabilitation are lost.

Building on this, Vluggen et al. (2021) demonstrated that multidisciplinary geriatric rehabilitation models enhance daily functioning and promote continuity of care. Their findings suggest that recovery after stroke is shaped not only by individual therapies, but by how different professionals—physiotherapists, occupational therapists, nurses, physicians, psychologists, and social workers work together toward shared objectives. Cross-professional collaboration enables holistic assessment, early detection of problems, and efficient adjustments to treatment plans. This coordinated approach is particularly important in community contexts, where patients often navigate multiple providers and care settings.

Bråndal et al. (2022) further emphasised that structured care processes help maintain therapeutic intensity and ensure smooth transitions from hospital to home. Structured models typically include standardised assessments, clearly defined pathways, and scheduled multidisciplinary meetings. These features ensure that therapy remains consistent in frequency, focused on agreed goals, and responsive to emerging needs. They also prevent erosion of service quality as caseloads and organisational pressures fluctuate. In contrast, studies where ESD was delivered in loosely organised or poorly coordinated formats reported weaker outcomes, indicating that service design is not a peripheral factor it directly influences clinical efficacy.

A significant implication of this body of evidence is that ESD must be understood as a complex, system-level intervention. Its effectiveness depends on alignment between organisational leadership, workforce capacity, communication systems, and clinical practices. Simply replicating the “early discharge” element without embedding multidisciplinary coordination risks undermining intended benefits. Similarly, insufficient resourcing or lack of role clarity within teams can dilute intensity of therapy and compromise patient experience.

Ultimately, multidisciplinary and structured models support more than logistical efficiency they enable genuinely patient-centred care. When teams share information, coordinate goals, and communicate regularly, patients receive coherent messages, feel supported throughout transitions, and benefit from rehabilitation that is tailored, timely, and continuous. These

findings collectively reinforce that ESD is a service innovation built on integration rather than speed of discharge alone. Its success rests on the coherence of the multidisciplinary model, the consistency and intensity of therapy, and the alignment of processes around patient-centred goals, all of which contribute to safer, more effective, and more coordinated stroke rehabilitation pathways.

Theme 4: Patient Satisfaction and Psychosocial Benefits

Beyond clinical recovery metrics, ESD offers substantial psychosocial benefits that contribute to holistic rehabilitation. Rehabilitation within the home environment enhances patient comfort, emotional well-being, and autonomy, fostering greater satisfaction and engagement.

Bråndal et al. (2019) observed significant improvements in mood, self-efficacy, and satisfaction among ESD recipients compared with those in conventional inpatient programs. Patients reported that home-based rehabilitation supported a sense of normality and reduced the institutional stress associated with hospital care. Fisher et al. (2016) further documented consistent patient preference for home-based recovery, citing feelings of empowerment and reduced dependency. Meanwhile, Tistad and von Koch (2015) noted reduced caregiver burden, reflecting broader family-level psychosocial benefits.

These findings align with psychosocial models of rehabilitation, suggesting that ESD not only restores physical function but also supports psychological adaptation and social reintegration. The emphasis on home environments also allows for task-specific and contextually meaningful rehabilitation, which enhances the transfer of functional skills to daily living. Overall, ESD contributes to improved patient experiences, stronger therapeutic relationships, and more positive recovery narratives.

Theme 5: Role of Patient-Centred Goal Setting

Patient-centred goal setting emerged as a cornerstone of effective ESD practice, acting not only as a motivational tool but also as a therapeutic mechanism that structures rehabilitation. The collaborative process of discussing priorities, negotiating realistic targets, and revisiting goals over time helps patients see clear links between rehabilitation tasks and their everyday lives. This sense of relevance promotes engagement, confidence, and greater willingness to persist with challenging activities.

Rafsten and Sunnerhagen (2023) demonstrated that structured goal-setting interventions improved both performance and satisfaction, reinforcing the idea that patients are more motivated when therapy reflects what matters most to them. Bråndal et al. (2022) similarly showed that goal-oriented rehabilitation was feasible within ESD and supported continuity across care transitions, as shared goals created a unifying plan for all professionals involved. Björkdahl and Danielsson (2023) further reported that individually tailored goals were associated with measurable gains in Activities of Daily Living (ADL), highlighting goal setting as a mechanism through which patient participation can translate into functional improvement.

Taken together, this evidence positions patient-centred goal setting as an active ingredient in ESD rather than a supplementary feature. It promotes self-efficacy, fosters ownership of the recovery process, and creates personalised therapy pathways that are responsive to changing needs over time. By strengthening the therapeutic alliance and supporting sustained

engagement, goal setting plays a crucial role in enabling meaningful, long-term functional recovery.

Theme 6: Feasibility and Safety of ESD and VESD

The literature consistently supports the feasibility and safety of both Early Supported Discharge (ESD) and Very Early Supported Discharge (VESD) for carefully selected stroke populations. Across multiple studies, early transition from hospital to home when combined with structured, multidisciplinary rehabilitation has been shown not to increase mortality, dependency, or adverse clinical outcomes. Instead, it provides an alternative pathway that maintains clinical safety while offering potential benefits in patient experience and continuity of care. These findings challenge long-standing concerns that earlier discharge may expose patients to greater risk, demonstrating instead that risk can be effectively mitigated through appropriate programme design and clinical governance.

Heron et al. (2019) demonstrated that home-based rehabilitation following minor stroke or transient ischaemic attack is both feasible and acceptable, with no increase in readmission rates or clinical complications. Participants reported confidence in being managed at home, largely due to structured follow-up and access to specialist support. Likewise, Björkdahl and Danielsson (2023) showed that very early discharge initiated within days of stroke onset was safe when integrated with coordinated home rehabilitation services. Their findings emphasised that safety was closely linked to comprehensive assessment, rapid mobilisation of community teams, and clear pathways for escalation should clinical concerns arise. Together, these studies dispel assumptions that earlier discharge inherently compromises patient safety and instead highlight the critical role of systems-level organisation.

Importantly, this evidence underscores that feasibility is closely tied to appropriate patient selection. Candidates for ESD or VESD typically demonstrate medical stability, sufficient functional capacity, and a supportive home environment. Where these criteria are met, early discharge can be implemented without jeopardising outcomes. Equally vital are robust follow-up structures, including regular monitoring, clear communication between acute and community services, and mechanisms to ensure timely interventions if deterioration occurs. Coordination mechanisms such as shared care plans, case managers, and interdisciplinary communication tools are repeatedly identified as essential components enabling safe continuity of care.

From a service delivery perspective, these findings validate ESD and VESD as scalable, evidence-based components of post-stroke care that can be integrated into routine health systems without compromising patient safety. They align strongly with broader healthcare priorities, including reducing unnecessary hospital stays, promoting continuity of rehabilitation, and supporting patient autonomy and participation in recovery. Moreover, they reflect a shift toward delivering care closer to home, where individuals can rehabilitate in familiar environments that often enhance engagement and functional relevance.

Overall, the evidence base indicates that, when carefully implemented, ESD and VESD provide a safe and practical model of post-stroke care. Their success hinges not on timing alone, but on structured multidisciplinary support, coordinated service delivery, and vigilant patient selection. As such, they represent a modern, patient-centred approach that balances

clinical safety with efficiency and empowerment, reinforcing their relevance within contemporary stroke rehabilitation pathways.

6.3 Strengths and Limitations of the Review

A clear strength of this systematic review is the inclusion of diverse study designs across multiple healthcare systems, allowing a comprehensive synthesis of clinical, organisational and psychosocial outcomes. Likewise, structuring findings by themes rather than individual studies provided deeper insight into mechanisms underpinning ESD effectiveness. The addition of theoretical interpretation strengthens the explanatory value of the review beyond simple description.

However, several limitations must be acknowledged. First, variation in study design, outcome measures and follow-up periods introduced heterogeneity, limiting direct comparison. Similarly, many included studies involved mild stroke populations, reducing generalisability to severe stroke groups. Publication bias is also possible, as positive findings are more likely to be reported. Moreover, observational studies may overestimate benefit due to selection bias, while tightly controlled trials may underestimate real-world effectiveness. Finally, the review relied primarily on published English-language research, which may exclude relevant non-English or unpublished evidence.

Despite these limitations, the review provides a balanced and critical synthesis demonstrating that ESD/VESD represents a safe, efficient and patient-centred alternative pathway for appropriately selected stroke survivors.

6.4 Chapter Summary

This chapter critically discussed the findings of the systematic review in relation to existing literature and theoretical perspectives. The discussion demonstrated that ESD and Very Early Supported Discharge (VESD) are safe and effective alternatives to conventional stroke rehabilitation, offering short-term functional benefits, improved patient satisfaction, reduced caregiver wellbeing, and enhanced healthcare efficiency (Langhorne et al., 2017; Fisher et al., 2016). Although long-term functional superiority was not consistently demonstrated, the findings support ESD as a patient-centred and system-efficient model of care. These insights inform the concluding chapter, which will address implications for clinical practice, health policy, and future research.

CHAPTER 7: RECOMMENDATIONS AND CONCLUSION

7.1 Introduction to Chapter

This chapter presents the recommendations and conclusion of the systematic literature review examining Early Supported Discharge (ESD) and Very Early Supported Discharge (VESD) following stroke and transient ischaemic attack. Drawing directly on the findings and themes identified in the previous chapters, this chapter outlines the implications of the review for clinical practice, service development, and future research. Emphasis is placed on emotional wellbeing, social isolation, and the psychosocial challenges faced by stroke survivors after discharge. Differences between United Kingdom and Scandinavian service models are also considered, especially regarding workforce support and service sustainability. The chapter concludes by summarising the overall findings and significance of the study.

7.2 Implications of Findings

The findings of this review have important implications for stroke rehabilitation practice and policy. While ESD and VESD were shown to be clinically safe and functionally effective, the review highlights that recovery extends beyond physical outcomes. Many included studies reported improvements in patient satisfaction and goal achievement, suggesting that emotional wellbeing and perceived support are critical components of recovery.

Early discharge, although beneficial, may increase feelings of isolation, anxiety, and emotional vulnerability if psychosocial needs are not adequately addressed. Stroke survivors often experience depression, loss of confidence, and reduced social participation following discharge, particularly when transitioning from the structured hospital environment to home. The findings therefore imply that ESD services must address emotional and social needs alongside physical rehabilitation.

Furthermore, disparities between Scandinavian and UK service models suggest that limited workforce capacity and reduced professional support within UK NHS ESD services may restrict the ability to provide holistic, emotionally supportive care, reinforcing the need for service redesign.

7.3 Recommendations for Practice

Based on the findings of this review, ESD services should adopt a holistic, biopsychosocial model of stroke rehabilitation. Emotional support should be embedded as a core component of ESD pathways, alongside physical rehabilitation. This includes routine screening for depression, anxiety, and social isolation, as well as structured opportunities for patients to discuss emotional concerns.

Multidisciplinary ESD teams should include or have direct referral pathways to psychology, counselling, or social support services. Peer support groups, community stroke networks, and digital follow-up platforms could also reduce isolation, particularly for individuals living alone.

A critical workforce-related recommendation concerns physiotherapists working within ESD services. In the UK, physiotherapists often report professional isolation and limited access to specialist stroke training compared with acute hospital staff (Tyson et al., 2020). In contrast, Scandinavian ESD models appear more integrated, with stronger multidisciplinary collaboration and professional development structures. UK NHS services should therefore invest in mentorship, protected training time, and closer integration between acute and community teams to support both staff wellbeing and quality of patient care.

7.4 Recommendations for Future Research

Future research should place greater emphasis on the emotional and psychosocial outcomes of ESD, which were underexplored in the included studies. While functional recovery and hospital length of stay have often been prioritised as primary outcomes, far less attention has been paid to the emotional consequences of transitioning home early after stroke. Issues such as adjustment to disability, changing family roles, loss of independence, and fear of recurrence can significantly shape recovery trajectories, yet they are rarely captured using robust psychosocial measures. Addressing this gap would allow researchers and clinicians to better understand how ESD influences not only clinical outcomes but also quality of life and overall wellbeing.

Longitudinal research is needed to examine the impact of early discharge on loneliness, depression, anxiety, and social participation, particularly beyond the first-year post-stroke. Short-term follow-up periods may miss the evolving nature of emotional responses, which can fluctuate as support services taper off and individuals confront long-term challenges in daily living. Tracking emotional health over extended timeframes would clarify whether ESD offers sustained psychological benefit, has neutral effects, or places some individuals at increased risk of persistent emotional distress and social isolation.

Comparative studies between UK and Scandinavian ESD models should investigate how differences in staffing, training, and community resources influence emotional support provision and patient experience. These systems operate within distinct organisational and cultural contexts, which may result in varied approaches to supporting psychosocial needs. Examining how multidisciplinary team composition, caseload pressures, continuity of care, and access to community-based services shape emotional care could identify transferable best practices and highlight system-level barriers to delivering holistic support.

Mixed-methods research incorporating qualitative interviews with stroke survivors and caregivers would provide deeper insight into lived experiences of isolation and emotional adjustment following discharge. Quantitative measures alone may not capture the nuances of fear, uncertainty, or resilience that occur during the recovery journey. Hearing directly from individuals and families about their expectations, unmet needs, coping strategies, and perceptions of support would enrich interpretation of outcome data and guide service development in ways that are meaningfully aligned with user priorities.

Additionally, research should explore the effectiveness of integrated psychosocial interventions within ESD, such as peer support programmes, tele-rehabilitation with emotional check-ins, and community-based social prescribing. These approaches aim to embed emotional care alongside physical rehabilitation rather than treating them as separate domains. Evaluating how such interventions influence engagement in therapy, motivation, self-efficacy, and long-term wellbeing would provide valuable evidence on how to design ESD services that respond to the whole person, not just their physical impairments.

Understanding how these approaches influence recovery, engagement, and long-term wellbeing would strengthen the evidence base for holistic stroke rehabilitation. A clearer picture of the emotional dimensions of ESD would support more person-centred models of care, inform policy and commissioning decisions, and ultimately contribute to services that

better support stroke survivors and their families throughout the complex and ongoing process of adjustment after stroke.

7.5 CONCLUSION

This systematic literature review examined the effectiveness, and implementation of Early Supported Discharge and Very Early Supported Discharge interventions following stroke and transient ischaemic attack. The review sought to answer the research question: What is the impact of ESD/VESD on patient outcomes, service delivery, and rehabilitation practice following stroke?

The findings demonstrated that ESD and VESD are safe and effective alternatives to conventional inpatient rehabilitation, producing comparable long-term functional outcomes while offering short-term benefits in activities of daily living and patient satisfaction. Importantly, early discharge did not compromise physical recovery and enabled patients to return home sooner, which many valued.

However, the review also highlighted that stroke recovery is not solely a physical process. Emotional wellbeing, confidence, and social connectedness emerged as crucial but often under-addressed aspects of recovery. While patient satisfaction and goal attainment improved with ESD, the transition home may also expose stroke survivors to feelings of isolation, anxiety, and reduced emotional support if services are inadequately resourced.

Differences between Scandinavian and UK service models were evident. Scandinavian ESD services appeared more cohesive and better supported, with stronger integration between acute and community care. In contrast, UK NHS services face challenges related to workforce shortages, professional isolation among physiotherapists, and limited access to specialist stroke training, particularly in community settings. These constraints may limit the capacity of UK ESD services to address the emotional and psychosocial needs of stroke survivors effectively.

In conclusion, ESD represents a patient-centred and system-efficient model of stroke rehabilitation that extends beyond physical recovery. To maximise its benefits, ESD services must incorporate emotional support, reduce social isolation, and support rehabilitation professionals through training and integration. Addressing these factors will be essential to delivering sustainable, high-quality stroke rehabilitation and improving long-term outcomes for stroke survivors.

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Appendix-1: Data Extraction Table

Author ID,	Country	Aim	Design	N	Participants	Outcomes	Intervention
Santana et al., 2017	Portugal	Evaluate early home-supported discharge versus usual care	RCT	190 (male=xx, Female=xx)	Adults post-stroke	FIM, dependency	Early home rehabilitation team
Tistad & von Koch, 2015	Sweden	Compare Early Supported Discharge (ESD) versus conventional rehabilitation	Cohort	150	Stroke patients eligible for ESD	ADL, caregiver burden, LOS, costs	ESD with home rehabilitation
Brändal et al., 2019	Sweden	Compare patient-reported outcomes with and without ESD	Registry	30,232	First-ever stroke	Satisfaction, mood, ADL	Multidisciplinary ESD team
Fisher et al., 2020	UK	Evaluate ESD service models and adherence to core components	Audit cohort	6,222	Stroke patients receiving ESD	Time to ESD, intensity, mRS	ESD models scored on core components
Fisher et al., 2016	UK	Assess outcomes of ESD in routine clinical practice	Cohort	293	Stroke survivors	Barthel Index, LOS, satisfaction	ESD versus non-ESD

Heron et al., 2019	UK	Test feasibility of a home-based program after TIA/minor stroke	Pilot RCT	40	TIA or minor stroke patients	Feasibility, risk factors	Manual plus GP/nurse follow-up
Björkdahl & Danielsson, 2023	Sweden	Examine very early supported discharge and impact on ADL	RCT	104	Mild stroke	ADL, mobility	Very early discharge plus 4-week home rehabilitation
Rafsten & Sunnerhagen, 2023	Sweden	Evaluate goal performance in (VESD)	Cohort	69	VESD patients	Goal performance, satisfaction	Goal setting plus home rehabilitation
Brändal et al., 2022	Sweden	Assess feasibility of structured goal setting in VESD	Cohort	69	Stroke patients in VESD	Goal feasibility, satisfaction	Structured goal-setting meetings
Vluggen et al., 2021	Netherlands	Evaluate integrated multidisciplinary geriatric rehabilitation after stroke	RCT	~190	Older adults' post-stroke	Daily activities, dependence, QoL, caregiver burden	Integrated multidisciplinary geriatric rehab programme

Appendix–2: CASP RCT Checklist Table

Key: Y = Yes; N = No; CT = Can't tell / not clearly reported

Study / CASP RCT Question	Q1Clear focused question	Q2Randomisation appropriate	Q3Groups similar at baseline	Q4Blinding of participants /personnel	Q5Blinding of outcome assessors	Q6Groups treated equally (aside from intervention)	Q7Follow-up complete & patients accounted for	Q8Effect size clearly reported	Q9Precision reported (e.g. CIs/p-values)	Q10Applicable to local population	Q11All important outcomes considered & benefits worth costs
Santana et al. (2017) – early home - supported discharge vs usual care	Y	Y	Y	N	Y	Y	Y (some attrition, reported)	Y	Y	Y	Y (benefits mainly LOS/costs; functional outcomes similar)
Heron et al. (2019) – pilot RCT, home - based programme after TIA/minor stroke	Y	Y	Y (small sample, some imbalance)	N	CT	Y	Y (for feasibility aims)	CT (not powered for effect)	CT (wide CIs, feasibility focus)	Y (for similar minor stroke/TIA)	CT (feasibility only; no firm benefit –harm judgement)
Björkdahl et al. (2023) – VESD vs usual care, mild stroke	Y	Y	Y	N	CT	Y	Y	Y	Y	Y	Y (small/limited superiority but safe, relevant outcomes)
Vluggen et al. (2021) – integrated geriatric rehab vs usual care	Y	Y	Y	N	CT	Y	Y	Y	Y	Y	Y (primary outcomes NS; some secondary benefits; acceptable)

Appendix Template – CASP Cohort / Observational Checklist Table

Key CASP Cohort Questions (Q1–Q12)

Q1 = Clearly focused issue

Q2 = Acceptable recruitment

Q3 = Exposure accurately measured

Q4 = Outcome accurately measured

Q5 = Important confounders identified

Q6 = Confounding accounted for in design/analysis

Q7 = Follow-up complete enough

Q8 = Follow-up long enough

Q9 = Results clearly reported

Q10 = Precision reported (CIs/p-values)

Q11 = Results believable

Q12 = Applicable to local population / practice

Study / CASP Cohort Question	Q1 Focused issue	Q2 Recruitment acceptable	Q3 Exposure accurately measured	Q4 Outcome accurately measured	Q5 Confounders identified	Q6 Confounding addressed in analysis	Q7 Follow-up complete enough	Q8 Follow-up long enough	Q9 Results clearly reported	Q10 Precision reported	Q11 Results believable	Q12 Applicable to practice
Tista & von Koch (2015) – ESD vs conventional services (cohort)	Y	Y	Y (ESD vs non-ESD service)	Y (ADL, satisfaction, burden, LOS)	CT (partly)	CT (limited adjustment)	Y	Y (12 months)	Y	Y	Y	Y
Brändal et al. (2019) – registry, ESD vs non-ESD, patient	Y	Y (national registry)	Y (ESD exposure via registry)	Y (satisfaction, mood, ADL)	Y	Y (multivariable regression)	Y (registry follow-up)	Y (up to 12 months)	Y	Y	Y	Y

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Fisher et al. (2016) – routine practice ESD vs non-ESD (prospective cohort)	Y	Y	Y (service configuration)	Y (Barthel, LOS, satisfaction)	Y	CT (partial control)	Y	Y (3–6 months typical)	Y	Y	Y	Y
Fisher et al. (2020) – SSNA P audit of ESD core components and outcomes	Y	Y (national audit data)	Y (core-component scoring)	Y (responsiveness, intensity)	Y	Y (multilevel modelling)	Y	CT (short-term at discharge)	Y	Y	Y	Y
Rafsten & Sunnerhagen (2023) – VESD goal performance and satisfaction (cohort)	Y	Y (from RCT cohort)	Y (VESD exposure)	Y (goal performance, satisfaction)	CT	N (no comparison/adjustment)	Y	CT (short-term)	Y	Y	Y (for descriptive aims)	Y
Brändal et al. (2022) – structured goal setting in VESD (cohort)	Y	Y (from RCT cohort)	Y (goal-setting intervention)	Y (goal performance, satisfaction)	CT	N (no concurrent control)	Y	CT (programme duration)	Y	Y	Y (within design limits)	Y