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REVIEW

# Effectiveness of Discharge Planning Interventions for Stroke and Heart Conditions: A Systematic Review of Interventional Studies

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**Objective:** To evaluate the effectiveness of discharge planning interventions in improving health outcomes among individuals with stroke and heart conditions, synthesizing evidence from randomized controlled trials and quasi-experimental studies.

**Methods:** Following PRISMA guidelines, seven electronic databases (PubMed/MEDLINE, Scopus, ScienceDirect, CINAHL Plus with Full Text, Web of Science, Ovid, and ClinicalKey Nursing) were searched for studies published between 2019 and 2024. Eligible studies included adults with stroke or heart conditions who received discharge planning interventions, with outcomes compared to usual care or alternative interventions. Risk of bias was assessed using the Cochrane Risk of Bias 2 tool for randomized controlled trials and ROBINS-I for quasi-experimental studies. Data were extracted with a standardized chart and synthesized using a convergent integrated approach in accordance with the Joanna Briggs Institute methodology.

**Results:** Sixteen studies (11 randomized controlled trials and 5 quasi-experimental studies) met the inclusion criteria, representing diverse populations across 11 countries. Interventions included structured discharge programs, early supported discharge, interdisciplinary planning, family-based care, nurse-led eHealth rehabilitation, and technology-enhanced approaches such as SMS, telephone, and interactive voice response systems. Six major outcome themes emerged: (1) healthcare utilization and cost outcomes, (2) patient activation and health behavior change, (3) psychological well-being, (4) functional recovery, (5) health-related quality of life, and (6) caregiver outcomes and support. Although mortality and long-term outcomes showed mixed results, most interventions demonstrated positive short-term effects across clinical, behavioral, and psychosocial domains.

**Conclusion:** Discharge planning interventions improve transitional care and support recovery in stroke and heart disease populations, with particular benefits when multidisciplinary, nurse-led, or digitally supported. This review highlights the value of structured and innovative discharge planning models for clinical practice. Incorporating patient- and caregiver-centered strategies can reduce readmissions, strengthen adherence, and improve long-term health outcomes.

**Keywords:** discharge planning, transitional care, stroke, heart conditions, readmission, quality of life, systematic review

## Background

Stroke and heart conditions are major forms of non-communicable diseases (NCDs) and remain among the leading causes of morbidity and mortality worldwide. In 2021, cardiovascular diseases (CVDs), including both heart disease and stroke, accounted for about 20 million deaths, representing nearly one-third of all global deaths, with more than 80% occurring in low- and middle-income countries (LMICs).[1,2] Stroke alone caused approximately 7 million deaths, ranking as the third leading cause of mortality worldwide.[1] These statistics highlight the urgent need for coordinated and effective care strategies, especially during high-risk transition periods such as hospital discharge.



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Hospitalization for stroke or cardiac events often necessitates comprehensive treatment and rehabilitation plans.[3,4] However, the transition from hospital to home remains a vulnerable phase. Ineffective discharge planning can result in fragmented care, miscommunication between providers, unclear roles and responsibilities, and ultimately, poor patient outcomes such as avoidable readmissions or deterioration in functional status.[5,6] For instance, a study by Hesselink et al (2014) highlighted that poor discharge processes contribute significantly to unplanned hospital readmissions.[7] Similarly, Patel and Bechmann (2020) emphasized that inadequate discharge planning is associated with increased risks of medication errors, patient dissatisfaction, and higher readmission rates.[6] These findings underscore the importance of comprehensive discharge planning to ensure continuity of care and improve patient outcomes. Given the fluctuating clinical status and frequent transitions across care settings for these populations, structured and timely discharge planning is essential to support recovery and continuity of care.

In recent years, digital health innovations, such as telemonitoring, electronic care coordination platforms, and mobile health applications, have begun transforming discharge planning.[8,9] These tools facilitate remote monitoring, enhance communication between patients and healthcare teams, and ensure timely follow-up after hospital discharge.[8,9] Integrating such technologies into transitional care models has demonstrated potential to reduce readmissions and strengthen self-management, particularly for individuals with stroke[10,11] and heart conditions.[12,13]

Discharge planning refers to a structured process that ensures patients and their caregivers are adequately prepared to manage care at home. This includes the provision of follow-up services, patient education, and home-based support interventions tailored to individual needs.[6,14,15] For individuals recovering from stroke or managing heart conditions, such planning is particularly crucial to prevent complications, enhance treatment adherence, and promote quality of life.[16–18]

A multidisciplinary or interdisciplinary approach is often recommended in discharge planning to foster collaboration among healthcare professionals.[19–21] By involving diverse team members, nurses, physicians, physiotherapists, case managers, and social workers, this approach enhances care integration, improves communication, and allows for a more comprehensive understanding of the patient's needs.[19–21] Such models are associated with improved patient satisfaction, better self-management, and reduced healthcare utilization. Emerging digital health solutions, including telemonitoring and electronic care coordination platforms, further augment the effectiveness of discharge planning by improving continuity of care and minimizing unnecessary hospital visits.[22,23] These innovations are especially beneficial for stroke and heart disease patients, who often require close monitoring and early detection of deterioration after discharge.

Despite these advancements, evidence on how such multidisciplinary and technology-enhanced approaches translate into measurable health outcomes remains limited. Individuals with stroke and heart conditions are among the most vulnerable groups during care transitions due to the complexity of their conditions and the high risk of adverse outcomes after hospital discharge.[24–26] Despite the recognized importance of discharge planning, there is a lack of consolidated evidence focused specifically on these populations. Existing studies vary in terms of intervention strategies, care settings, and outcome measures, making it difficult to establish best practices. This systematic review will address this gap by synthesizing high-quality empirical evidence from randomized controlled trials and quasi-experimental studies to determine the effectiveness of discharge planning interventions. The findings aim to inform clinical practice, enhance transitional care strategies, and support health policy development for stroke and heart disease management.

# Objective

To systematically evaluate the effectiveness of discharge planning interventions on health-related outcomes among individuals with stroke and heart conditions, based on evidence from randomized controlled trials and quasi-experimental studies.

# Methods

## Identify Relevant Studies

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[27] in this systematic review, presenting a flow diagram of literature identification, screening, exclusion, and inclusion. A systematic search was conducted across seven electronic databases—PubMed/MEDLINE, Scopus, ScienceDirect, CINAHL Plus

with Full Text, Web of Science, Ovid, and ClinicalKey Nursing—to identify relevant studies published between 2019 and 2024 that investigated the effectiveness of discharge planning interventions among individuals with stroke and heart conditions. The search strategy combined Medical Subject Headings (MeSH) and free-text terms using Boolean operators (Supplementary Data 1). Additionally, reference lists of included articles were manually reviewed to identify further relevant studies. All references were stored and managed using EndNote X7, and duplicates were removed prior to screening.

## Study Selection

Titles and abstracts of all retrieved articles were initially screened to identify potentially relevant studies. Subsequently, the full texts of these articles were reviewed to assess their relevance to the review objectives. Studies were selected based on predefined inclusion criteria to ensure alignment with the scope of this review. Concurrently, exclusion criteria were applied to remove articles that did not meet the eligibility requirements (Table 1).

## Risk of Bias Assessment

The methodological quality of the included studies was evaluated using two established tools recommended by the Cochrane Collaboration: the Risk of Bias 2 (RoB 2) tool for randomized controlled trials (RCTs) and the Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) tool for quasi-experimental studies. The RoB 2 tool[28] examines five critical domains: the randomization process, deviations from intended interventions, missing outcome data, measurement of outcomes, and the selection of reported results. Each domain was rated as presenting a low risk of bias, some concerns, or a high risk of bias. For studies without randomization, the ROBINS-I tool[29] was utilized to assess potential bias across seven domains: confounding, participant selection, intervention classification, deviations from intended interventions, missing data, outcome measurement, and reporting of results. Based on these domains, each study was assigned an overall risk rating of low, moderate, serious, or critical. Two reviewers independently conducted all risk of bias assessments. Any disagreements were resolved through discussion, and when necessary, by consulting a third reviewer to maintain consistency and methodological rigor.

## Data Extraction

A standardized chart for data extraction (Supplementary Data 2) was developed to systematically organize and document the characteristics of each included study. All data were extracted independently by two reviewers using the standardized chart, and any disagreements were resolved through discussion or consultation with a third reviewer to ensure accuracy and completeness.

**Table 1** Inclusion and Exclusion Criteria

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| • Adults (≥18 years) diagnosed with stroke and/or heart conditions (eg, heart failure, ischemic heart disease, myocardial infarction). Studies may also include other chronic conditions (eg, diabetes, COPD), as long as stroke or heart conditions are part of the sample or analysis.<br>• Studies evaluating discharge planning interventions, such as structured discharge plans, patient or caregiver education, follow-up appointments, coordination with primary care, or home visits.<br>• Comparisons involving usual care, no intervention, or alternative interventions.<br>• Reporting outcomes relevant to discharge planning, such as hospital readmission, quality of life, treatment adherence, patient satisfaction, mortality, or healthcare utilization.<br>• Randomized controlled trials (RCTs) or quasi-experimental studies.<br>• Published in English between 2019 and 2024 | • Pediatric populations (<18 years) or studies that do not include stroke or heart conditions as part of the target population.<br>• Interventions not focused on discharge planning (eg, those limited to inpatient treatment or rehabilitation without a discharge component).<br>• Studies that do not report discharge-related outcomes (eg, those focusing only on biomarkers, diagnostic accuracy, or laboratory results).<br>• Case reports, case series, commentaries, editorials, opinion pieces, and review articles. |

## Data Synthesis

Data from the included studies were synthesized using a convergent integrated approach, following the Joanna Briggs Institute (JBI) methodology for systematic reviews.[30] The synthesis process was designed to identify key outcome domains improved by discharge planning interventions among individuals with stroke and heart conditions. A thematic analysis framework was applied to systematically examine and categorize the outcomes reported across studies.

At this stage, data are being reviewed to group similar outcome measures into overarching themes. For example, outcomes such as reduced hospital readmission, improved treatment adherence, enhanced patient satisfaction, and better quality of life may be grouped under broader thematic categories such as healthcare utilization, self-management, and patient-centered outcomes. Sub-themes may also emerge to reflect specific intervention effects or contextual differences across studies. This process allows for the integration of findings from both randomized controlled trials and quasi-experimental studies into a structured narrative that highlights the effectiveness of discharge planning across various outcome dimensions.

# Results

Following the PRISMA guidelines,[31] a total of 2,708 records were initially identified through seven electronic databases, including PubMed and MEDLINE (n = 360), Scopus (n = 33), ScienceDirect (n = 1,159), CINAHL Plus with Full Text (n = 452), Web of Science (n = 212), Ovid (n = 347), and ClinicalKey Nursing (n = 145). After duplicate removal (n = 0), 2,708 records remained for title and abstract screening. During this phase, 2,654 records were excluded based on the predefined inclusion and exclusion criteria. Consequently, 54 full-text articles were retrieved and assessed for eligibility. Of these, 38 studies were excluded for reasons such as publication date or language (n = 6), ineligible study design (n = 9), intervention not related to discharge planning (n = 17), population not meeting criteria (n = 2), only abstract available (n = 3), and article retraction (n = 1). Ultimately, 16 studies were included in the final systematic review[32–47] (Figure 1).

## Description of Included Studies

A total of 16 studies were included in this review, encompassing randomized controlled trials and quasi-experimental designs conducted across various countries, including Iran, Colombia, Switzerland, Thailand, Indonesia, China, France, the Netherlands, Australia, Brazil, and the United States. The target populations consisted of adult and older adult patients diagnosed with stroke, coronary artery disease (CAD), heart failure (HF), chronic heart failure (CHF), diabetes mellitus (DM), and other cardiovascular conditions. Several studies also included family caregivers as part of the intervention dyads. Sample sizes in the intervention groups ranged from 14 to 403 participants, with most studies reporting comparable control group sizes. The mean age of participants varied considerably, ranging from approximately 52.8 to 82.5 years, reflecting a predominance of older adults in post-discharge care studies. Most studies included a relatively balanced gender distribution, although some reported a higher proportion of male participants. Discharge planning interventions included a wide range of approaches, such as interdisciplinary discharge planning, structured discharge programs, early supported discharge (ESD), tailored discharge education, nurse-led eHealth rehabilitation, NIC/NOC frameworks, interactive voice response (IVR) support, family-centered programs, and comprehensive transitional care models like Cardiac Care Bridge. Specific interventions included structured summaries (eg, PC-AH-US, PODS), capacity assessment tools (eg, ICAN), and technology-enhanced methods such as SMS or telephone support. Overall, the interventions aimed to improve outcomes such as readmission rates, treatment adherence, self-care behavior, caregiver competence, patient activation, and quality of life. Many studies reported positive effects on at least one health outcome, though some studies noted no significant differences between groups (Table 2).

## Discharge Planning Model or Intervention

The included 16 studies employed diverse discharge planning and transitional care models, highlighting various approaches to support individuals with stroke and heart conditions after hospital discharge (Table 3). While the

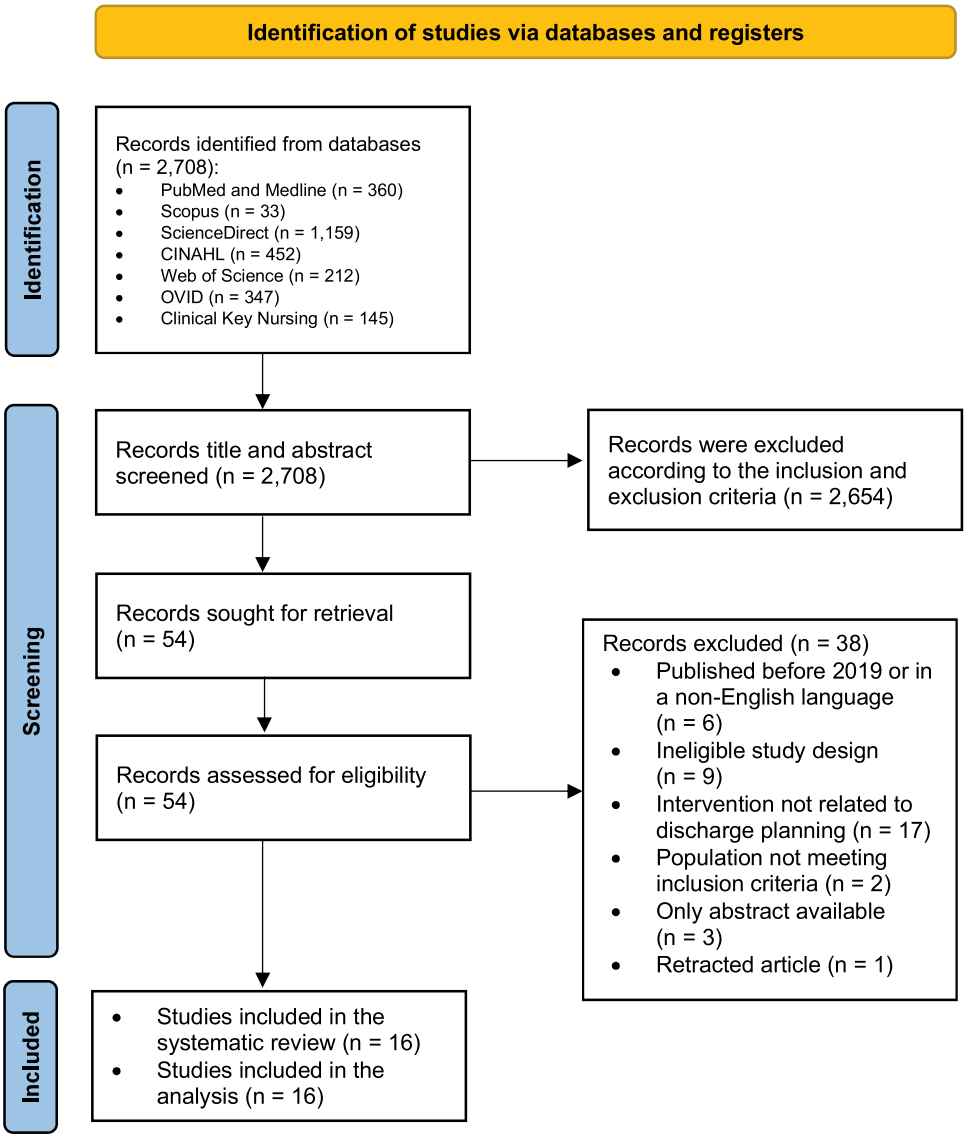


**Figure 1** PRISMA Flow Chart.
**Note**: Adapted from Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.[27]

interventions differed in scope, intensity, and mode of delivery, most emphasized patient education, care continuity, and multidisciplinary collaboration. Several studies utilized interdisciplinary or team-based approaches. Rahpeima et al (2022) implemented a structured discharge model featuring in-person education, printed booklets, and 12-week telephone follow-ups.[44] Similarly, Carvajal Carrascal et al (2024) employed the PC-AH-US model, a proactive, patient-family–centered plan initiated before discharge.[39] Estrada et al (2024) used the CUIDEMOS program, which combined printed educational materials and structured phone support to enhance post-discharge adherence.[38]

Technology-enhanced strategies were also prominent. Bikmoradi et al (2023) introduced SMS-based telenursing to reinforce medication and lifestyle adherence.[37] Piette et al (2021) utilized an IVR-based CarePartner system that involved caregivers and incorporated structured follow-up calls.[36] Su and Yu (2021) conducted a nurse-led eHealth cardiac rehabilitation program via WeChat, focusing on education and behavioral support.[41] Some models incorporated standardized assessment and teaching tools to personalize care. Pellet et al (2024) tailored discharge teaching using the Patient-Oriented Discharge Summary (PODS), the Instrument for Patient Capacity Assessment (ICAN), and the Patient

**Table 2** Description of Included Studies

| Reference | Country | Target Population | Sample Size (Intervention/ Control) | Age (Mean ± SD) | Study Design | Intervention Type | Key Outcome |
|---|---|---|---|---|---|---|---|
| [44] | Iran | Adult patients with coronary artery disease (CAD) undergoing percutaneous coronary intervention (PCI) | Intervention: 35, Control: 35 | Overall: 60.6 ± 11.1<br>Intervention: 59.1 ± 12.1<br>Control: 62.1 ± 10.0 | Quasi-experimental study | Interdisciplinary discharge planning | ↑ Treatment adherence, ↓ Readmission |
| [37] | Iran | Adult patients undergoing coronary artery bypass graft (CABG) surgery | Intervention: 40, Control: 40 | Intervention: 52.8 ± 6.2, Control: 55.8 ± 8.3 | Randomized controlled trial (RCT) | Telenursing via SMS | ↓ Depression, Anxiety, Stress |
| [39] | Colombia | Patients with non-communicable diseases (NCDs) and their family caregivers | Intervention: 403 dyads, Control: 182 dyads | Patients: 67.9 ± 13.6, Caregivers: 48.4 ± 14.2 | Quasi-experimental study | Structured discharge plan (PC-AH-US) | ↑ Caregiving competency, ↓ Perceived caregiving load |
| [35] | Switzerland | Hospitalized adults with multiple chronic conditions | Intervention: 70, Control: 68 | Intervention: 73.5 ± 9.8, Control: 75.7 ± 10.6 | Quasi-experimental study | Tailored discharge teaching | ↑ Patient activation |
| [33] | Brazil | Patients with heart failure (HF) or diabetes mellitus (DM) | HF: 14, DM: 14 (no control) | Overall: 55.1 ± 15.5, HF: 63.1 ± 10.6, DM: 47.1 ± 15.8 | Quasi-experimental study | NIC/NOC-based discharge education | ↑ Disease management knowledge |
| [45] | Iran | Patients diagnosed with heart failure (HF) | Intervention: 60, Control: 60 | Intervention: 66.5 [56–75.7], Control: 72 [63–80.2] | Randomized controlled trial (RCT) | Personalized info prescription | ↓ Readmission, Mortality |
| [46] | France | Patients hospitalized for acute heart failure (HF) | Intervention: 237, Control: 245 | Intervention: 77.3, Control: 77.6 (Median) | Randomized controlled trial (RCT) | Early post-discharge consults | No significant difference |
| [43] | Thailand | Patients with stroke and their family caregivers | Intervention: 31 dyads, Control: 31 dyads | Intervention: Patients (67.0±12.4); Caregivers (54.2± 15.2), Control: Patients (66.2±12.5); Caregivers (52.4± 18.1) | Cluster randomized controlled trial | Family-based care program | ↑ Functional status, ↓ Depression, ↑ Family function, ↓ Caregivers' burden and stress. |
| [47] | Australia | Adults with mild to severe stroke living in the community | Intervention: 28, Control: 13 | Intervention: 67.3, Control: 65.5 (Estimated) | Quasi-experimental study | Early Supported Discharge (ESD) | ↓ Hospital stays |
| [42] | Indonesia | Patients who experienced a stroke due to hypertension | Intervention: 37 (post), Control: 33 (post) | Not reported | Quasi-experimental study | Structured discharge program | ↑ Satisfaction, Independence |
| [41] | China | Patients diagnosed with coronary heart disease (CHD) | Intervention: 73, Control: 73 | Intervention: 55.5 ± 7.3, Control: 56 ± 7.0 | Randomized controlled trial (RCT) | Nurse-led eHealth cardiac rehab | ↑ Lifestyle behaviors, Self-efficacy, QoL |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [32] | China | Patients with chronic heart failure (CHF) | SMS: 252, STS: 255, Control: 260 | SMS: 60 ± 15; STS: 62 ± 14; Control: 61 ± 15 | Randomized controlled trial (RCT) | SMS and phone support | ↑ Self-care behavior, ↓ Readmission |
| [40] | Netherlands | Older patients with cardiovascular disease (CVD) | Intervention: 99, Control: 99 | Intervention: 82.0 ± 6.2, Control: 82.3 ± 6.5 | Randomized controlled trial (RCT) | Cardiac Care Bridge | No adherence improvement |
| [38] | Colombia | Patients with cardiovascular disease (CVD) and their caregivers | Intervention: 40 dyads, Control: 40 dyads | Patients: 68 ± 14, Caregivers: 49 ± 15 | Randomized controlled trial (RCT) | CUIDEMOS education intervention | ↑ Care competence, adherence |
| [34] | Netherlands | Cardiac patients aged 70 years or older | Intervention: 153, Control: 153 | Intervention: 82.5 ± 6.1, Control: 82.3 ± 6.5 | Randomized controlled trial (RCT) | Case & disease management + home CR | No effect on readmission/mortality |
| [36] | USA | Older adults with chronic illnesses are at risk of rehospitalization | Intervention: 143, Control: 140 | Intervention group: 60.9 ± 13.1, Control group: 60.5 ± 12.8 | Randomized controlled trial (RCT) | IVR + CarePartner support | ↓ Rehospitalization, ED visits |

**Abbreviations**: CABG; Coronary Artery Bypass Graft; CAD; Coronary Artery Disease; CHD; Coronary Heart Disease; CHF; Chronic Heart Failure; CR; Cardiac Rehabilitation; CVD; Cardiovascular Disease; DM; Diabetes Mellitus; ED; Emergency Department; ESD; Early Supported Discharge; HF; Heart Failure; IVR; Interactive Voice Response; NCDs; Non-Communicable Diseases; NIC; Nursing Interventions Classification; NOC; Nursing Outcomes Classification; PCI; Percutaneous Coronary Intervention; PC-AH-US; Anticipated and Structured Hospital Discharge Care Plan (Programa de Cuidado Anticipado Hospitalario – Universidad del Santander); QoL; Quality of Life; RCT; Randomized Controlled Trial; SMS; Short Message Service; STS; Structured Telephone Support.


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**Table 3** Discharge Planning Models and Descriptions

| Reference | Discharge Planning Model/Intervention | Brief Description |
|---|---|---|
| [44] | Interdisciplinary discharge planning (team-based with education, booklet, and follow-up calls) | A multidisciplinary approach including face-to-face education, a patient booklet, and follow-up phone calls over 12 weeks. |
| [37] | Telenursing via SMS (reminders for medication, diet, activity, wound care) | Post-discharge SMS reminders and support from a nurse covering key aspects of cardiac recovery, sent 3 times per week for 6 weeks. |
| [39] | PC-AH-US structured discharge plan (proactive, patient-family education) | Proactive discharge planning focused on individualized education for patients and caregivers, delivered before discharge. |
| [35] | Tailored discharge teaching using activation tools (PODS, ICAN, PAM-13) | Personalized discharge education based on patient activation scores, using teaching tools and structured follow-up. |
| [33] | Nursing-based education using NANDA-I, NIC, and NOC taxonomies | Structured teaching during hospitalization based on nursing taxonomies to enhance disease management knowledge. |
| [45] | Personalized information prescriptions by physicians and librarians | Provision of printed, evidence-based information tailored to the patient's needs by physicians and librarians. |
| [46] | Early specialist follow-up post-discharge (consults on days 7, 14, 21) | Scheduled consultations with specialists post-discharge to adjust medications and support transition care. |
| [43] | Family-based care program with stress management and empowerment | A 10-week program combining stress management, empowerment, education, and follow-up for stroke patients and families. |
| [47] | Early Supported Discharge (ESD) to home rehab with a multidisciplinary team | Discharge to home with immediate multidisciplinary rehabilitation support to reduce hospital stay and facilitate recovery. |
| [42] | Structured discharge program for stroke (education, coordination) | Education and discharge preparation were initiated early during admission, aimed at improving satisfaction and independence. |
| [41] | Nurse-led eHealth cardiac rehab via WeChat and online platform | Digital cardiac rehabilitation program led by nurses via WeChat and an online platform, focusing on lifestyle changes. |
| [32] | SMS + structured phone support for CHF management | Use of SMS and one structured call post-discharge to improve CHF management and reduce readmissions. |
| [40] | Cardiac Care Bridge with nurse-pharmacist collaboration and home visits | Home visits and follow-up by community nurses and pharmacists to manage medication adherence post-discharge. |
| [38] | CUIDEMOS discharge education (booklet, structured phone follow-up) | Structured education and telephone support over one month, focusing on discharge transition and treatment adherence. |
| [34] | Integrated discharge program (case management + home cardiac rehab) | Case management, disease management, and home cardiac rehab are delivered through coordinated home visits. |
| [36] | CarePartner IVR system with feedback and follow-up phone calls | IVR system with caregiver involvement and structured follow-ups to reinforce self-management and reduce rehospitalization. |

**Abbreviations**: CHF; Chronic Heart Failure; CUIDEMOS; Cuidado de Enfermería en el Momento del Egreso para la Seguridad (Nursing Care at the Time of Discharge for Safety); ESD; Early Supported Discharge; ICAN; Instrument for Patient Capacity Assessment; IVR; Interactive Voice Response; NANDA-I; North American Nursing Diagnosis Association International; NIC; Nursing Interventions Classification; NOC; Nursing Outcomes Classification; PAM-13; Patient Activation Measure (13-item version); PC-AH-US; Programa de Cuidado Anticipado Hospitalario – Universidad del Santander (Anticipated and Structured Hospital Discharge Care Plan); PODS; Patient-Oriented Discharge Summary; SMS; Short Message Service.

Activation Measure (PAM-13).[48] Lemos et al (2020) structured discharge education using nursing taxonomies—NANDA-I, NIC, and NOC—to enhance disease self-management.[33]

Comprehensive transitional care models were evident in other studies. Daliri et al (2022) described a nurse–pharmacist collaborative model known as the Cardiac Care Bridge, integrating hospital discharge, home visits, and medication monitoring.[40] Jepma et al (2021) implemented an integrated discharge program combining case management and home-based cardiac rehabilitation.[34] Deepradit et al (2023) offered a family-based care program incorporating stress

management and empowerment strategies for stroke survivors and their families.[43] Additional approaches included early specialist outpatient follow-ups (Logeart et al, 2022),[46] a structured stroke discharge coordination model (Sedia et al, 2019),[42] and discharge planning supported by personalized information prescriptions (Kazemi Majd et al, 2021).[45] Chen et al (2019) evaluated a hybrid intervention comprising SMS and structured phone support for patients with chronic heart failure (CHF).[32]

Neale et al (2020) described the Early Supported Discharge (ESD) model, transitioning patients directly to home-based multidisciplinary rehabilitation to reduce hospital stay duration.[47] Overall, these discharge planning models collectively aimed to enhance patient readiness for discharge, improve health outcomes, reduce rehospitalization, and support self-management through coordinated, individualized, and often technology-facilitated strategies.

## The Quality Appraisal of the Included Studies

A total of 11 randomized controlled trials (RCTs) were assessed using the RoB 2 tool, and five non-randomized studies of interventions (NRSIs) were evaluated using the ROBINS-I tool (Figure 2a and c). Among the RCTs, the majority were rated as having a low risk of bias across most domains. However, several studies, such as Su & Yu (2021), Chen et al (2019), Daliri et al (2022), and Estrada et al (2024) were judged to have some concerns primarily in the domains of deviations from intended interventions and measurement of outcomes. None of the RCTs were rated as having a high overall risk of bias, suggesting a generally robust methodological quality.

In contrast, the five quasi-experimental studies assessed using ROBINS-I showed more variability in methodological rigor. Three studies, Carvajal Carrascal et al (2023), Pellet et al (2023), and Neale et al (2020), were rated as having an overall moderate risk of bias, while Lemos et al (2020) and Sedia et al (2019) were judged to have a serious risk of bias.


**Figure 2** Quality Assessment Assessed and Risk Bias.


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These ratings were largely influenced by issues related to confounding, participant selection, and measurement of outcomes, particularly in studies lacking randomization or blinded outcome assessment.

Bar charts and risk-of-bias visualizations (Figure 2b and d) further summarize domain-specific ratings for both RCTs and NRSIs. As shown, RCTs displayed higher methodological consistency, while NRSIs exhibited a broader range of risk, particularly in domains such as confounding control. All visualizations were produced using the robvis tool,[49] an open-access R-based application that supports transparent reporting in evidence synthesis. We acknowledge the developers for facilitating reproducible and standardized quality assessment reporting.

## The Effect of Discharge Planning in Individuals with Stroke and Heart Conditions

Six themes emerged from the included studies on the effects of discharge planning in individuals with stroke and heart conditions: (1) healthcare utilization and cost outcomes, (2) patient activation and health behavior change, (3) psychological well-being, (4) functional recovery, (5) health-related quality of life, and (6) caregiver outcomes and support. These themes highlight the broad impact of discharge planning across clinical, behavioral, and psychosocial domains. A summary of outcomes across these six domains is presented in Figure 3.

Although each theme is reported separately for clarity, the outcomes are interrelated and demonstrate synergy across domains. For instance, improvements in functional recovery often enhance health-related quality of life (HRQoL), while greater caregiver support can foster patient activation and adherence. Psychological well-being and self-efficacy also contribute to sustained engagement in health-promoting behaviors. Together, these interactions highlight how discharge planning interventions function synergistically to promote holistic recovery and continuity of care.

### Healthcare Utilization and Cost Outcomes

Twelve studies reported healthcare utilization and cost-related outcomes following discharge planning interventions. The most frequently assessed indicators included hospital readmission (n = 8), mortality (n = 4), length of stay (n = 1), healthcare costs (n = 1), and patient satisfaction (n = 1). Approximately half of the studies demonstrated significant or favorable reductions in readmission rates among intervention groups implementing interdisciplinary, evidence-based discharge education and technology-integrated programs.[32,36,44,45] Rahpeima et al (2022) reported no readmissions at three months among post-coronary angioplasty patients in the intervention group, compared with an 11.4% rate in

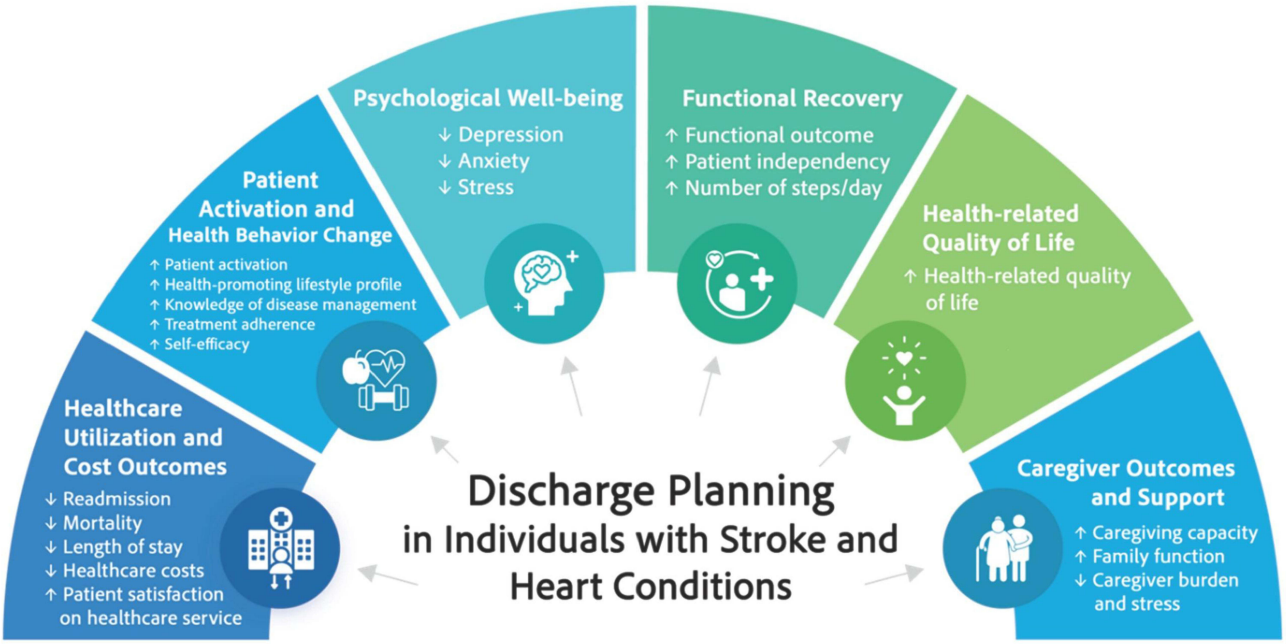


**Figure 3** Effects of Discharge Planning on Individuals with Stroke and Heart Conditions Across Six Outcome Domains.
**Note**: ↑ indicates an *increase or improvement* in the outcome; ↓ indicates a *decrease or reduction* in the outcome.

controls.[44] Kazemi Majd et al (2021) found significantly lower 12-month readmissions in heart failure patients receiving tailored discharge education (RR = 0.61; 95% CI: 0.40–0.93).[45] Piette et al (2021) observed reduced 90-day rehospitalizations (20.8% vs 32.2%) and emergency visits using interactive voice response technology,[36] and Chen et al (2019) reported lower 180-day readmission rates among patients receiving SMS reminders and structured phone support.[32] Other studies implementing personalized education, specialist consultations, or nurse-led e-health rehabilitation found non-significant but favorable trends.[34,36,41,46] Mortality outcomes were evaluated in four studies. One study found a lower mortality rate at six months (RR = 0.60, p = 0.46) and at 12 months (RR = 0.47, p = 0.05),[45] whereas Logeart et al (2022) and Chen et al (2019) showed no statistically significant changes.[32,46] Conversely, Jepma et al (2021) reported a higher 12-month mortality in the intervention group (RR = 1.44, p = 0.028), likely due to a frailer population with multiple comorbidities.[34] Neale et al (2020) assessed length of stay and cost among stroke survivors in an Early Supported Discharge (ESD) program. The ESD group had significantly shorter stays in both acute wards (5 vs 6.2 days, p = 0.03) and rehabilitation units (9 vs 15 days, p < 0.001), with lower but non-significant treatment costs (p = 0.99).[47] Sedia et al (2019) found significantly improved patient satisfaction following structured discharge planning, with higher scores for room services (p = 0.019) and overall satisfaction within the intervention group, though between-group differences were not statistically significant.[42] Overall, these studies indicate that structured, technology-supported discharge planning can reduce healthcare utilization and improve patient experiences, although findings regarding mortality and cost remain mixed.

## Patient Activation and Health Behavior Change

Six studies examined outcomes related to patient activation, disease management knowledge, treatment adherence, self-efficacy, and health-promoting lifestyle behaviors.[32,33,35,40,41,44] Patient activation, defined as patients' knowledge, skills, and confidence to manage their own health,[35] showed improvement following discharge planning interventions. A quasi-experimental study among patients with multimorbidity reported significantly higher activation scores at 7–10 days post-discharge in the tailored discharge teaching group (p = 0.05).[35] Similarly, another quasi-experimental study among patients with heart failure or diabetes found significant gains in disease-specific knowledge for both conditions (p = 0.002 and p < 0.001, respectively).[33]

Two studies reported on treatment adherence.[40,44] In a quasi-experimental study among coronary artery disease patients, interdisciplinary discharge planning significantly improved adherence compared with usual care (p < 0.001).[44] Conversely, a single-blind multicenter RCT evaluating the Cardiac Care Bridge intervention found no significant effect on adherence, though post-hoc analysis suggested a modest benefit among participants not using multidose drug dispensing systems ($p_{interaction}$ = 0.085).[40]

Self-efficacy outcomes were reported in a single-blind RCT, which found significant improvement at 12 weeks post-intervention compared with controls (p = 0.005).[41] Two studies assessed health-promoting lifestyle behaviors.[32,41] One RCT among coronary heart disease patients found significant increases in daily steps, weekly activity minutes, and overall lifestyle profile at both 6 and 12 weeks post-intervention (p < 0.05 for all comparisons).[41] Another non-blinded RCT among patients with chronic heart failure reported significant improvement in self-care behaviors, including medication compliance (p = 0.011) and water restriction adherence (p = 0.013), in the intervention group receiving educational and reminder messages.[32] Collectively, these findings suggest that structured and tailored discharge planning enhances patient activation, knowledge, and self-care behaviors, although results for treatment adherence remain mixed across studies.

## Psychological Well-Being

Two included studies reported positive effects on psychological outcomes.[37,43] For instance, Bikmoradi et al (2023) examined the effects of a discharge intervention using telenursing combined with SMS follow-up in 40 adult patients diagnosed with coronary artery disease (CAD) who had undergone coronary artery bypass graft (CABG) surgery. The study found that telenursing-based discharge care significantly reduced levels of stress (p < 0.001), anxiety (p = 0.002), and depression (p = 0.04).[37] Similarly, Deepradi et al (2023) investigated the effects of a family-based program in 31 stroke

patient-caregiver dyads in Thailand. The program was implemented over a 10-week period following hospital discharge. The results demonstrated a reduction in depression levels among participants who received the intervention ($p < 0.05$).[43]

### Functional Recovery

There are three studies that support the theme of functional recovery.[41–43] Outcomes that were discovered for stroke patients include the functional outcome[43] and patient independence[42] and those for congenital heart disease patients include the number of steps patients take per day.[41] All three studies showed improvement of their respective outcomes in each study. Deepradit et al (2023) implemented a family-based discharge program among stroke patients and their families and found statistically significant improvements in the patients' functional status compared to the control group ($p < 0.05$).[43] Although three patients in the intervention group experienced complications compared to the seven from the control group. Sedia et al (2019) implemented a structured interdisciplinary discharge program among stroke patients due to hypertension and found that patient independence scores significantly increased after the intervention ($p < 0.05$).[42] Su & Yu (2021) implemented a disease management program for CHD patients and found significant improvements in the number of steps patients take per day for the intervention group, at six weeks post-intervention ($p = 0.022$) and at twelve weeks post-intervention ($p = 0.006$).[41]

### Health-Related Quality of Life

Health-related quality of life (HRQoL) is one of the health indicators that evaluate the effectiveness of care programs, offering a comprehensive assessment across multiple dimensions, including physical, psychological, and psychosocial well-being. There were two studies that examined the impact of discharge planning on HRQoL.[32,41] Su and Yu (2021) reported that a nurse-led e-health cardiac rehabilitation (NeCR) program, combining online education, telemonitoring, and remote support to promote recovery and self-management in post–cardiac surgery patients, significantly improved HRQoL at 84 days post-intervention ($p < 0.05$).[41] In contrast, Chen et al (2019) evaluated a post-discharge short message service (SMS) program for heart failure patients, which provided regular reminders, education, and motivational messages to reinforce self-care behaviors, and found no significant HRQoL differences among groups at the 180-day follow-up, as measured by the Minnesota Living with Heart Failure Questionnaire (MLHFQ).[32]

### Caregiver Outcomes and Support

Three discharge planning programs have been shown to enhance caregiver capacity and reduce caregiver burden.[38,39,43] Deepradit et al (2023) developed a discharge model based on a family-based program that simultaneously promoted patient discharge and caregiver support.[43] The 10-week intervention resulted in improved family function and a reduction in caregivers' burden and stress ($p < 0.05$). These findings are consistent with Carvajal Carrascal et al (2023) study examining the effects of a tailored discharge planning program (PC-AH-US) on caregiving load.[39] The results demonstrated an increase in caregiving competencies and a reduction in perceived caregiving burden ($p < 0.001$ for all dimensions). Similarly, Estrada et al (2024) conducted a study in Colombia among 80 patient–caregiver dyads of individuals with hypertension and/or diabetes mellitus, finding a significant increase in caregiving competence among dyads ($p < 0.001$).[38]

Across themes, technology-enhanced discharge planning interventions, including SMS reminders, interactive voice response systems, telemonitoring, and nurse-led digital platforms, emerged as a consistent trend supporting improved continuity of care and patient engagement. These digital approaches demonstrate growing potential to complement traditional multidisciplinary strategies and extend the reach of discharge planning beyond hospital settings.

## Discussion

This systematic review synthesized evidence from 16 studies, including randomized controlled trials and quasi-experimental designs, to evaluate the effectiveness of discharge planning interventions among individuals with stroke and heart conditions. The findings reveal consistent benefits across multiple domains, including healthcare utilization, treatment adherence, psychological well-being, functional recovery, health-related quality of life, and caregiver outcomes. These results underscore the critical role of structured discharge planning as a key component of transitional care for populations at high risk of poor outcomes after hospital discharge. The most consistently reported benefit of discharge

planning interventions was the reduction in hospital readmissions. Several studies demonstrated significant improvements, particularly when interventions incorporated structured education, interdisciplinary collaboration, or technology-enabled follow-up. These findings align with previous studies showing that comprehensive discharge planning reduces unplanned readmissions and supports care continuity.[50–52] However, not all studies demonstrated statistically significant reductions, suggesting that intervention fidelity, patient characteristics, and health system capacity may influence effectiveness.[53,54] Mortality outcomes were mixed; while some studies suggested reductions, others reported no significant change or even increased mortality among frail subgroups, indicating that patient selection and clinical complexity remain critical considerations. Six included studies reported improvements in treatment adherence, disease knowledge, self-care, and patient activation. Tailored education and structured discharge teaching interventions appeared especially effective in empowering patients to engage in self-management behaviors.[55,56] The positive outcomes reflect the importance of patient-centered strategies that promote activation and confidence in managing chronic illness. However, the inconsistency observed in some trials suggests that sustained engagement, reinforcement, and integration of digital support tools may be necessary to maintain behavioral improvements over time. Our review found that discharge interventions that incorporated psychosocial support demonstrated significant reductions in depression, anxiety, and stress. These findings highlight the potential of discharge planning not only to address clinical and functional needs but also to support psychological recovery. The integration of family-based approaches and nurse-led follow-up was particularly effective in reducing psychological burden, consistent with evidence that caregiver engagement and emotional support are central to recovery in stroke and cardiac populations.[57,58]

Several included studies demonstrated improvements in independence, mobility, and functional status following structured or family-based discharge interventions. Early supported discharge models were effective in shortening hospital stays while maintaining or improving functional recovery.[59] These results reinforce the value of timely, coordinated transitions that facilitate rehabilitation in the home and community setting. Functional recovery benefits appear especially relevant in stroke patients, where independence and daily living ability are critical to long-term outcomes.

Evidence regarding health-related quality of life (HRQoL) was mixed. While nurse-led eHealth cardiac rehabilitation significantly improved HRQoL, other interventions, such as SMS-based reminders, showed no measurable effect. These differences may reflect variations in intervention intensity, follow-up duration, and outcome measures. Overall, the findings suggest that discharge planning interventions that incorporate ongoing engagement, personalized feedback, and digital monitoring are indeed more effective in improving broader quality-of-life outcomes compared to education alone. These comprehensive approaches address multiple facets of patient care, leading to better preparedness, reduced readmissions, and enhanced overall patient satisfaction and quality of life.[60–62]

Three included studies highlighted significant improvements in caregiver competence and reductions in burden following structured, family-based, or dyadic discharge interventions. These findings underscore the importance of involving caregivers as active partners in transitional care. Given their critical role in supporting adherence, monitoring symptoms, and providing emotional support, discharge planning should be designed as a dyadic process that addresses the needs of both patients and caregivers. Adopting a multidisciplinary, individualized, and supportive approach can enhance satisfaction, reduce readmissions, and improve overall health outcomes for both patients and caregivers.[63,64]

Collectively, our findings support the integration of structured, multidisciplinary, and nurse-led discharge planning into standard care pathways for stroke and heart disease patients. The effectiveness of technology-enhanced interventions, such as SMS, interactive voice response, and eHealth platforms, suggests that digital tools can extend the reach of discharge planning, particularly in resource-constrained settings. Policymakers should prioritize investment in discharge planning models that promote continuity of care, caregiver engagement, and patient activation, with adaptations for local health system capacities.

## Limitations

This systematic review has a number of limitations that warrant consideration. First, the included studies were heterogeneous in terms of populations, intervention components, delivery platforms, and outcome measures, which limited the ability to conduct a meta-analysis and precluded firm conclusions regarding the relative effectiveness of

specific models. Second, although the methodological quality of the randomized controlled trials was generally robust, the quasi-experimental studies demonstrated variable rigor, with several rated as having moderate to serious risk of bias, particularly due to confounding and outcome measurement issues. Third, most included studies were conducted in middle- or high-income countries, which may limit the generalizability of findings to resource-constrained settings where discharge planning practices and health system infrastructures differ significantly. Fourth, the follow-up periods varied considerably, with several interventions evaluated only in the short term, making it difficult to assess the sustainability of benefits over time. Finally, the restriction to English-language publications may have introduced language bias.

## Practical Applications and Future Research Directions

The findings of this systematic review highlight several practical applications for healthcare professionals and policy-makers. First, implementing structured and multidisciplinary discharge planning as a standard practice can enhance continuity of care and reduce hospital readmissions among individuals with stroke and heart conditions. Integrating digital health technologies, such as telemonitoring, SMS reminders, and electronic care coordination platforms, can further strengthen patient engagement, improve self-management, and support timely clinical follow-up. In addition, involving family caregivers in discharge planning can optimize patient recovery, reduce caregiver burden, and improve long-term outcomes.

Future research should build on these findings by conducting longitudinal studies to assess the sustainability of intervention effects and the long-term impact on mortality, healthcare utilization, and quality of life. Studies examining cost-effectiveness and scalability of digital and nurse-led discharge interventions, particularly in low- and middle-income countries, are also needed. Moreover, comparative effectiveness research across diverse care settings could help identify context-specific strategies that enhance transitional care outcomes.

## Conclusion

This systematic review synthesized evidence from 16 randomized controlled trials and quasi-experimental studies evaluating the effectiveness of discharge planning interventions for individuals with stroke and heart conditions. The findings indicate that discharge planning contributes to reduced readmissions and emergency visits, enhanced treatment adherence and self-care, improved psychological well-being and functional recovery, and increased caregiver competence and satisfaction. However, evidence regarding mortality and long-term outcomes remains mixed.

Overall, the review highlights that well-structured and multidisciplinary discharge interventions are effective in facilitating care transitions and improving patient-centered outcomes. Notably, nurse-led approaches, digital health solutions, and family involvement further enhance the impact of these interventions. These results underscore the importance of integrating discharge planning as a standard component of post-acute care for stroke and heart disease patients. Policymakers and healthcare organizations are encouraged to adopt and scale evidence-based discharge models to strengthen continuity of care, reduce healthcare utilization, and improve quality of life. Future research should explore long-term outcomes, cost-effectiveness, and implementation scalability, particularly in low- and middle-income countries.

## Data Sharing Statement

The data generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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