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Discharge Readiness among Elderly Stroke Patients and Their Primary Caregivers: A Survey Analysis and Validation of Intervention Program Effectiveness

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Abstract: *Objective:* To investigate the current status of discharge readiness among elderly stroke patients and their primary caregivers, and to develop and validate an intervention program for discharge readiness in this population. *Methods:* A cross-sectional study assessed the level of discharge readiness among elderly stroke patients and their primary caregivers, analyzing influencing factors. Based on findings, an intervention program was developed, integrating literature and expert input. A randomized controlled trial validated its efficacy, enrolling 138 elderly stroke patients and their caregivers (intervention group = 69; control group = 69) from two Grade A tertiary hospitals in northern China between January and June 2025. The intervention group received the developed program, while the control group received routine discharge guidance. Outcomes were assessed using the Discharge Readiness Scale, Caregiver Readiness Scale, and Transition Adaptation Scale, with data collected pre-discharge and at 1 and 3 months post-discharge. *Results:* On the day prior to discharge, the intervention group demonstrated significantly higher scores than the control group in patient discharge readiness, caregiver readiness, total self-management behavior scores, and satisfaction ($P < 0.05$). *Conclusion:* This intervention program, designed for elderly stroke patients and their primary caregivers, effectively enhances discharge readiness, post-discharge adaptation capacity, and self-management behaviors.

Keywords: Elderly stroke patients; Discharge readiness; Caregivers; Nursing

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1. Introduction

Stroke poses a serious threat to patients' quality of life and exacerbates the burden on families and society due to its high incidence, disability rate, and recurrence rate [1]. With China's accelerating population aging, the prevention and treatment of stroke in the elderly face increasingly severe challenges. Discharge, as the critical transition from hospital treatment to community or home-based rehabilitation [2], directly impacts patient prognosis, readmission risk, and caregiver stress [3]. Weak social support networks, challenges in regional medical information integration,

disparities in medical insurance policies, limited accessibility to community rehabilitation resources, and the adaptive pressures faced by caregivers in community and home settings significantly increase the complexity of post-discharge management for elderly stroke patients [4]. This underscores the urgent need to focus on their readiness for hospital discharge. Readiness for hospital discharge refers to the capacity of patients and caregivers to safely manage post-discharge needs across physical, psychological, knowledge, and social support dimensions. Current research on discharge readiness among elderly stroke patients and their caregivers lacks comprehensiveness and systematic rigor. Therefore, this study aims to analyze the readiness for hospital discharge levels of elderly stroke patients and their caregivers through a cross-sectional survey, identify influencing factors, and provide evidence for clinical nursing staff to identify high-risk populations and implement targeted discharge guidance. It also offers practical references for healthcare institutions to optimize continuity of care processes and for communities to improve population health support systems, ultimately enhancing the rehabilitation quality and well-being of the elderly stroke population.

2. Survey on discharge readiness among elderly stroke patients and their primary caregivers

Using cluster sampling, 138 stroke patients and their primary caregivers meeting inclusion and exclusion criteria were recruited from two tertiary hospitals in northern China between January and June 2025. Data collection employed a general information questionnaire, the Readiness for Discharge Scale [5], the Family Caregiver Readiness Scale [6], the Stroke Self-Management Behavior Assessment Scale [7], and the Adaptation Scale [8,9] to assess factors influencing discharge readiness. Multivariate linear regression analysis revealed that age, stroke severity, understanding of medical policies, level of social support, and disease uncertainty significantly influenced patients' readiness for discharge (all $P < 0.05$). For primary caregivers, age, health status, mastery of caregiving skills, level of social support, and familiarity with the caregiving environment were significant predictors of their readiness (all $P < 0.05$), as shown in **Table 1**.

Table 1. Results of multiple linear regression analysis on factors influencing discharge readiness among elderly stroke patients and primary caregivers

Variable type	Influencing factor	β value	SE	*t*-value	*P*-value
Patient readiness for discharge					
	Age	-0.215	0.078	-2.76	0.007
	Stroke severity (NIHSS score)	-0.312	0.092	-3.39	0.001
	Level of understanding of healthcare policies	0.284	0.085	3.34	0.001
	Level of social support	0.198	0.074	2.68	0.008
	Disease uncertainty	-0.227	0.081	-2.80	0.006
Caregiver preparedness					
	Caregiver age	-0.192	0.076	-2.53	0.013
	Caregiver health status	0.234	0.082	2.85	0.005
	Mastery of caregiving skills	0.276	0.079	3.49	0.001
	Level of social support	0.210	0.075	2.80	0.006
	Familiarity with the care environment	0.251	0.083	3.02	0.003

3. Development and effectiveness evaluation of a discharge readiness intervention program for elderly stroke patients and their primary caregivers

3.1. Study population

Using convenience sampling, 138 patients and their primary caregivers who met inclusion and exclusion criteria and were admitted to the neurology ward of a Grade III A hospital in Northern China from January to June 2025 were randomly assigned to a control group and an intervention group, with 69 cases in each group. Inclusion criteria: (1) Age ≥60 years; (2) Diagnosis confirmed by MRI or cranial CT and meeting stroke diagnostic criteria; (3) Clear consciousness with normal communication ability; (4) Hospitalization duration ≥14 days; (5) Voluntary participation with signed informed consent. Exclusion criteria: (1) Cognitive impairment; (2) Concurrent major organ failure (cardiac, pulmonary, hepatic, renal).

Sample size calculation: Based on the "two-sample mean comparison" formula and stroke-related literature, accounting for a 10% dropout rate, the total sample size $n = 138$ was determined.

3.2. Research methods

3.2.1. Control group

Patients in the control group received routine neurology treatment and nursing care. This included medication administration, daily living assistance, psychological support, dietary guidance, condition monitoring, and health education as prescribed. Discharge instructions were provided upon discharge.

3.2.2. Intervention group

The intervention group received a tailored care plan developed based on findings from the baseline survey, literature review, and expert consultation. Specific steps included: systematically retrieving relevant guidelines, expert consensus statements, and systematic reviews on discharge readiness for elderly stroke patients worldwide; conducting quality assessments; synthesizing evidence and evaluating its grades; establishing a research team (comprising a nursing master's student and supervisor, ward attending physician, charge nurse, rehabilitation physician, psychologist, and community nurse) to discuss and integrate findings with the status survey results; drafting an initial intervention plan; and finalizing the intervention plan after two rounds of expert consultation, as detailed in **Table 2**.

Table 2. Intervention protocol for discharge readiness in elderly stroke patients and their primary carers

Intervention phase	Objective	Core content and measures	Responsible implementing personnel
(1) Assessment and program development (initiated on day 1 post-admission)	Identify relevant risks.		
Baseline assessment	In-depth assessment (time/environment/resources/medical insurance), factors influencing rehabilitation.	① Patient: Understanding of insurance claims and healthcare resources. Extent of neurological deficits, comorbidities, cognitive function, ADLs, emotional state, medical history, etc. ② Caregiver: Caregiving capacity, burden, emotional state, preparedness, support network. ③ Environment: Residential safety, community resources (medical facilities/pharmacies/transport).	Responsible Nurse, Senior Physician, Rehabilitation Physician

Table 2 (Continued)

Intervention phase	Objective	Core content and measures	Responsible implementing personnel
Team meetings	Follow-up appointment coordination points.	Develop discharge plan: ① Rehabilitation objectives, medication management, follow-up arrangements. ② Resources and contingency plans for risks.	Research Group
Joint goal setting	Ensure the plan is realistic and ready for inclusion in the discharge core.	Discharge objectives, rehabilitation, and care plans negotiated with the patient/carer.	Responsible Nurse, Lead Physician
(2) Capacity building and education (1–2 weeks prior to discharge)	Strengthen adaptive capacity.		
Disease and rehabilitation education	Integrate educational content into contextual scenarios; materials must contain key information.	① Stroke knowledge, recognition of recurrence symptoms, medication management, home rehabilitation techniques, and complication prevention. ② Materials provide emergency contact details for follow-up appointments.	Responsible Nurse, Supervising Physician, Rehabilitation Physician
Care skills training	Safety in care delivery within targeted training environments.	① Practical training in feeding, hygiene, emergency response, etc. ② Simulated environment drills (e.g., home setting).	Responsible Nurse Rehabilitation Physician
Post-discharge adaptation program	Providing actionable resource information to reduce anxiety.	① Post-discharge local resource pack: hospital, community, pharmacy information, and transport maps. ② Practical guidance on medical insurance claims settlement. ③ Community service links (meal delivery/domestic help). ④ Continuation of nursing procedures and methods.	Responsible Nurse Medical Insurance Specialist
Psychological support	Focus on addressing loneliness and adaptation stress, establishing a social support network.	① Alleviate post-discharge anxiety and teach stress management techniques. ② Facilitate connections with patient support groups.	Responsible Nurse/Psychologist
(3) Rehabilitation plan and rehearsal (1 week prior to discharge)	Ensure seamless transition from hospital discharge to rehabilitation.		
Plan	Treat discharge as a continuation of care, ensuring safety during transit and immediate post-arrival coordination.	Documented details: ① Transport method (medical transfer/public transport/private vehicle) and in-transit care arrangements. ② Post-arrival coordination: safety assessment and contacting local community services within 24 hours. ③ Emergency protocols (contact list).	Responsible Nurse Community Nurse
Key procedure rehearsal	Enhancing practical skills and confidence in response.	Simulate processes including medication administration en route, patient transfer, and liaison with community doctors.	Responsible Nurse
Information integration package	Ensuring seamless cross-regional information transfer with dual paper and electronic backups.	① Discharge summary (including medication list and rehabilitation plan). ② Discharge plan and community resource pack.	Responsible Nurse Supervising Physician
(4) Transition period support (early phase)	Ensuring stability during transition.		

Table 2 (Continued)

Intervention phase	Objective	Core content and measures	Responsible implementing personnel
24–48 hour follow-up	Establish a "hospital-to-community" handover mechanism to prevent loss of contact.	Confirm safe arrival and settlement status.	Responsible Nurse Community Nurse
Multi-modal follow-up	Utilise online technology for ongoing support, reinforcing community accountability.	① Regular follow-ups (weekly/monthly/quarterly): Assess health status, adaptation, and resource utilization. ② Community follow-up: Online support groups (Q&A/peer exchange).	Responsible Nurse Community Nurse
Dynamic adjustment	Rapid response to follow-up appointment crises.	Remote guidance coordinated based on issues.	Responsible Nurse Community Nurse

3.3. Research tools

3.3.1. General information questionnaire

Includes sociodemographic data and disease-related information.

3.3.2. Readiness for hospital discharge scale (RHDS)

The Chinese version of the RHDS, translated and revised by scholars from Taiwan region including Lin [5], was adopted. It consists of 12 items. Each item is scored on a 0–10 scale, yielding a maximum total score of 120 points. Higher scores indicate better discharge readiness. The content validity index is 0.88, and Cronbach's alpha coefficient is 0.89, demonstrating good reliability and validity.

3.3.3. Caregiver preparedness scale (CPS)

Developed by Archbold *et al.* and translated by Liu *et al.* [6], this single-dimension scale comprises 8 items using a 5-point Likert scale (0–4: "strongly disagree" to "strongly agree"), with a maximum score of 32. Higher scores indicate better caregiver preparedness. Cronbach's α coefficient is 0.925, demonstrating good reliability and validity.

3.3.4. Stroke self-management behavior assessment scale

Developed by Wang *et al.* [7], this scale comprises 7 dimensions and 50 items. It employs a 5-point Likert scale with a maximum score of 55 points. Higher scores indicate better self-management levels among patients. The scale's Cronbach's α coefficient is 0.835, with content validity of 0.95, demonstrating good reliability and validity.

3.3.5. Adaptation scale

Patient adaptation levels were assessed using a self-designed discharge adaptation scale. Based on Berry's Cultural Adaptation Scale [8] and the Self-Management Scale for Chronic Disease Patients [9], it comprises three dimensions: utilization of medical resources (5 items), environmental adaptation (4 items), and social integration (3 items), totaling 12 items. A 5-point Likert scale was used, with scores ranging from 0 (very difficult) to 4 (very easy). A pilot test demonstrated good reliability and validity, with a Cronbach's α coefficient of 0.87.

3.3.6. Satisfaction questionnaire

A hospital-designed satisfaction survey was used, with a total score of 100 points.

3.4. Data collection

General information questionnaires were collected on the first day of admission. The Readmission Readiness Scale and Family Caregiver Readiness Scale were collected one day prior to discharge. The Stroke Self-Management Behavior Assessment Scale and Readmission Readiness Scale were collected at 1 month and 3 months post-discharge.

3.5. Statistical methods

Data were entered into an Excel database and analyzed using SPSS 22.0. Quantitative data were described as mean ± standard deviation (SD), while qualitative data were presented as frequency and percentage. Independent-samples *t*-tests and chi-square ($\chi 2$) tests were used to compare differences between groups, with a significance level of $\alpha = 0.05$.

4. Results

4.1. Comparison of baseline characteristics

Both the intervention and control groups included 69 patients and their caregivers. No statistically significant differences existed between groups in baseline characteristics, including age, gender, stroke type, NIHSS score (neurological deficit severity), or number of comorbidities (all $P > 0.05$). Primary caregivers also showed no significant differences in age, caregiving experience, and other general characteristics (all $P > 0.05$), demonstrating comparability (**Table 3**).

Table 3. Comparison of baseline characteristics between patient groups and caregivers (mean ± SD)

Item	Intervention group ($n = 46$)	Control group ($n = 46$)	Statistical value	*P*
Patient data				
Age (years)	68.5 ± 6.2	67.8 ± 7.1	$t = 0.62$	0.537
Gender Male Female	 42 27	 38 31	$\chi 2 = 0.54$	0.462
Stroke type Ischemic Hemorrhagic	59 10	57 12	$\chi 2 = 0.21$	0.649
NIHSS score (points)	10.3 ± 3.5	10.8 ± 3.2	$t = 0.86$	0.392
Number of Comorbidities (types)	2.1 ± 1.0	2.3 ± 1.2	$t = 1.05$	0.296
Caregiver information				
Age (years)	63.2 ± 8.7	64.1 ± 9.3	$t = 0.58$	0.565
Caregiving experience: Yes None	35 34	38 31	$\chi 2 = 0.25$	0.617
Relationship to patient Spouse Child	52 17	49 20	$\chi 2 = 0.33$	0.566

4.2. Comparison of discharge readiness

The discharge readiness scores of patients in the intervention group (98.6 ± 9.4) were significantly higher than those in the control group (85.2 ± 11.3) on the day before discharge, with a statistically significant difference ($P <$

0.001). The caregiver readiness scores of the intervention group (26.5 ± 3.1) were higher than those of the control group (22.1 ± 4.2) on the day before discharge, with a statistically significant difference ($P < 0.001$). See **Table 4** for details.

Table 4. Comparison of discharge preparedness between groups (mean ± SD)

Group	Number of cases	Total patient discharge readiness score	Caregiver readiness total score
Intervention group	69	98.6 ± 9.4	26.5 ± 3.1
Control group	69	85.2 ± 11.3	22.1 ± 4.2
t		7.82	6.94
P		<0.001	<0.001

4.3. Comparison of post-discharge adaptability and self-management behaviors

The intervention group demonstrated significantly higher total scores on the Adaptability Scale at 1 and 3 months post-discharge, as well as higher total scores for self-management behaviors at both time points, compared to the control group ($P < 0.001$). See **Table 5** for details.

Table 5. Comparison of post-discharge adaptation capacity and self-management behaviors between groups (mean ± SD)

Category	Intervention group ($n = 69$)	Control group ($n = 69$)	*t*	*P*
Total score on the Adaptation_Scale at 1 month post-discharge	38.5 ± 4.2	31.2 ± 5.6	8.73	<0.001
Total score on the Adaptation Scale at 3 months post-discharge	42.7 ± 3.8	34.1 ± 5.1	10.65	<0.001
Total score for self-management behaviors at 1 month post-discharge	41.2 ± 4.5	36.3 ± 5.8	5.67	<0.001
Total self-management behavior score at 3 months post-discharge	46.3 ± 5.1	39.8 ± 6.3	6.89	<0.001

4.4. Comparison of satisfaction levels

On the day before discharge and one month after discharge, the satisfaction scores of the intervention group (94.2 ± 5.3) were significantly higher than those of the control group (77.9 ± 10.1), with a statistically significant difference ($P = 0.002$).

5. Discussion

5.1. Scientific and feasible intervention design

The discharge readiness intervention program developed for stroke patients and their primary caregivers integrates evidence-based literature and multidisciplinary expert opinions based on cross-sectional survey findings, establishing a robust theoretical and practical foundation. The program design addresses the core challenges faced by elderly stroke patients—post-discharge resource scarcity, adaptation difficulties, and weak social support—through a "phased, multidimensional" strategy. It covers comprehensive management from admission assessment to post-discharge support, featuring clear objectives and distinct phases. This approach combines scientific rigor

with practical feasibility, facilitating clinical implementation.

5.2. The developed intervention program enhances discharge readiness among stroke patients and primary caregivers

This study confirms that the discharge readiness scores of patients in the intervention group (98.6 ± 9.4) significantly exceeded those of the control group (85.2 ± 11.3) ($P < 0.001$). Caregiver readiness scores also showed significant improvement (26.5 ± 3.1 vs. 22.1 ± 4.2, $P < 0.001$), indicating that the developed discharge readiness intervention program for stroke patients and their primary caregivers can enhance their readiness levels. This finding aligns with the results reported by Gao *et al.* [10]. This effect stems from the program's dual-subject (patient and caregiver) collaborative design. From the patient perspective, adaptive education (e.g., practical guidance on medical insurance procedures, environmental adaptation guidelines) and individualized rehabilitation goal setting addressed the "information gap" issue [11]. From the caregiver perspective, focusing on post-discharge care skill training (e.g., home simulations) and social support network building (e.g., local patient support groups) alleviated their "caregiver anxiety." Compared to the Li *et al.* [12] stroke discharge intervention program, this study specifically addresses inadequate discharge preparation, providing new evidence for transitional care.

5.3. The developed intervention enhances stroke patients' post-discharge adaptation capacity and self-management behavior

During the 1–3 month post-discharge period, the intervention group demonstrated sustained adaptive advantages: Total Adaptation Scale scores were significantly higher than the control group at 1 month (38.5 ± 4.2 vs 31.2 ± 5.6) and 3 months (42.7 ± 3.8 vs 34.1 ± 5.1) ($P < 0.001$); while total self-management behavior scores simultaneously increased (3 months: 46.3 ± 5.1 vs 39.8 ± 6.3, $P < 0.001$). This indicates that the developed discharge readiness intervention program for stroke patients and their primary caregivers enhances post-discharge adaptive capacity and self-management behavior levels. The reasons for these outcomes may be related to the dynamic support mechanisms of the developed program: (1) Short-term adaptive safeguards: The "24–48 hour post-discharge follow-up" and emergency protocols in the discharge plan significantly reduced safety risks during the discharge process; (2) Long-term self-management empowerment: Leveraging online follow-ups (1 month/3 months) and community-based monitoring reinforced health behavior maintenance in the home environment, such as medication adherence and continuity of rehabilitation training. Notably, the improvement in patients' self-management exceeded that observed in local patients in Wang's [13] study, highlighting the necessity of community resource integration for this population.

6. Conclusion

This study addresses China's aging population trend by conducting evidence-based investigations centered on the dual core needs of elderly stroke patients and their caregivers. Through phased, multidimensional strategies, it developed a systematic, multi-stage discharge readiness intervention program and validated its effectiveness. Results indicate that elderly stroke patients and their caregivers exhibit insufficient discharge preparedness. The developed intervention effectively enhances preparedness levels, improves post-discharge adaptation and self-management behaviors, and achieves high satisfaction ratings. However, this study has certain limitations: the sample size was relatively small, and the practice setting was limited to the neurology departments of two tertiary hospitals in northern China, which may not fully reflect the overall status of discharge readiness among elderly

stroke patients and their primary caregivers. Future research could further explore large-sample, multicenter studies to observe the long-term effects of the intervention program.

Disclosure statement

The authors declare no conflict of interest.

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