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ORIGINAL RESEARCH

Determinants of Transitional Care Utilization Among Older Adults with Chronic Diseases: An Analysis Based on Andersen's Behavioral Model

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Objective: This study aims to assess the current utilization status of transitional care service among older adults with chronic diseases and identify factors influencing their use.

Methods: Utilizing Andersen's Behavioral Model, a cross-sectional survey was conducted in a specific region from October 2023 to December 2023 using convenience sampling. The survey aimed to analyze the impact of predisposing factors, enabling factors, and need factors on the utilization of transitional care services by older adults with chronic diseases.

Results: Disease guidance had the highest utilization rate at 61.92% among various types of professional guidance on transitional care, while other professional guidance and services had utilization rates below 50%. Regarding predisposing factors, older adults with chronic diseases who were unmarried, employed part-time or full-time, or previously unemployed indicated lower utilization of transitional care services. In terms of enabling factors, those with a primary caregiver, high monthly family income, and medical insurance were more likely to use transitional care. With respect to need factors, older adults with a higher number of chronic diseases and impaired activities of daily living were less likely to use transitional care services.

Conclusion: Older adults with chronic diseases tend to underutilize transitional care services. Based on Andersen's Behavioral Model, factors influencing the utilization of these services include marital status, employment status, previous occupation, primary caregiver presence, monthly family income, method of medical expense payment, number of chronic diseases, and Activities of Daily Living score.

Keywords: Anderson's Behavioral Model, chronic disease among older adults, professional guidance, transitional care, utilization

Introduction

Population aging is a global challenge, with China currently experiencing an unprecedented surge in its aging population. The country ranks first worldwide in both the size and growth rate of its older adult population.[1] As individuals age, the prevalence of chronic diseases increases, affecting up to 99% of older adults, many of whom suffer from one to three chronic conditions.[2]

China faces significant challenges in healthcare due to the combined impact of aging and the rising burden of chronic diseases. Limited medical resources, coupled with financial constraints, prevent many older adults with chronic conditions from receiving prolonged hospitalization, nursing care, and rehabilitation services. Upon returning home, these individuals often lack access to scientific treatment, professional nursing care, and rehabilitation guidance, increasing their risk of complications and repeated hospitalizations.

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Transitional care is a model that ensures patients receive consistent, collaborative care across various healthcare settings, including transitions between different healthcare environments and within the same setting. Its primary goal is to facilitate a smooth transition for patients from the hospital to their home or community, thereby enhancing their recovery post-discharge.[3] A systematic review on the impact of transitional care interventions provided by the emergency department (ED) of medical facilities on clinical, process, and service utilization outcomes suggests that comprehensive patient needs assessments, ED discharge planning, and service coordination by healthcare professionals specializing in transitional care can optimize care transitions and reduce readmission risks among older patients admitted to the ED.[4] Additionally, multiple studies have confirmed the effectiveness of transitional care interventions in improving patient outcomes.[5,6]

Effective utilization of transitional care is essential for addressing the needs of older adults with chronic diseases. Consequently, an increasing number of studies are examining the utilization of transitional care and its influencing factors.[7,8] However, the implementation of transitional care is influenced by differences in medical resources and cultural backgrounds. Therefore, developing localized strategies requires a comprehensive understanding of the transitional care needs of older Chinese adults and the factors affecting its utilization.

Geng et al identified that factors such as marital status, education level, previous occupation, social connections, health insurance, comorbidities, and exercise habits were associated with the utilization of information support during transitional care.[9] Zeng et al found that a decrease in the activities of daily living (ADL) among older adults negatively impacted their health status and increased their dependence on medical and health services.[10] Consequently, ADL has been identified as a key factor influencing the healthcare-seeking behavior of older Chinese adults. However, most existing research on the utilization of transitional care and its influencing factors consists of qualitative studies or meta-analyses, and there is no consensus on the factors influencing transitional care utilization. There is a notable gap in high-quality quantitative studies.

The objective of Andersen's Behavioral Model, initially proposed by Ronald M. Andersen in 1968, is to explain and predict the behavior of individuals in utilizing health services.[11] According to the model, the use of health services by an individual is influenced by three types of factors:

1. Predisposing Factors: These include the biological attributes of an individual (eg, age, sex), socio-demographic characteristics (eg, education level, occupation, marital status), health beliefs and values, and behavioral habits (eg, smoking, alcohol consumption, exercise). These factors may predispose individuals to either demand or utilize health services.
2. Enabling Factors: These refer to external conditions and resources that affect the ability of an individual to access and effectively use health services. Key enabling factors include economic status and health insurance coverage, which determine the actual capacity of an individual to obtain and use health services.
3. Need Factors: These are the direct drivers that prompt individuals to seek and utilize health services, reflecting both objective medical needs (eg, health status, functional status) and subjective needs (eg, self-perceived health status and perceived need for care).

Andersen's Behavioral Model has become a foundational theoretical framework in international medical sociology and health services research.[12] It is widely used to study the utilization of medical and health services among both general and specialized populations.[13]

Although some studies have proposed recommendations for transitional care, further research is needed to refine transitional care strategies and specific implementation methods. In particular, identifying the factors influencing the utilization of transitional care is essential for optimizing its effectiveness.[14–18] Given that Andersen's Behavioral Model is a well-established framework for examining the utilization of medical and health services and provides a comprehensive analysis of factors affecting the use of personal health services, this study adopted the model to explore variations in the demand for and utilization of transitional care services among older adults with chronic diseases. These variations were examined from the perspectives of predisposing factors, enabling factors, and need factors. By

investigating these influencing factors, this study aims to provide a reference for enhancing transitional care services provided by relevant medical institutions and departments.

Methods

Study Participants

Older adults with chronic diseases who had been hospitalized at the outpatient clinic of a Class A tertiary hospital and a community hospital in Nantong City between October 2023 and December 2023 were recruited for this study.

Inclusion Criteria

Participants were eligible for inclusion if they met the following criteria:

(1) Aged ≥ 60 years, with a history of hospitalization, and provided informed consent to voluntarily participate in the study.
(2) Diagnosed with chronic diseases (eg, diabetes mellitus, stroke, hypertension, coronary heart disease) as confirmed by medical institutions.
(3) Possessed adequate auditory and verbal abilities to comprehend the questionnaire content.

Exclusion Criteria

Participants were excluded if they met any of the following conditions:

(1) Hospitalized in intensive care.
(2) Experiencing an acute exacerbation of a chronic disease that prevented them from completing the survey.
(3) Unable to complete the entire survey.

Study Methods

Survey Tools

(1) Survey Tool for Assessing the Utilization of Transitional Care Services by Older Adults with Chronic Diseases.[19]

Participants were categorized based on the practical support dimensions of the Transitional Care Tool Support Questionnaire for Older Adults with Chronic Diseases, which include the type of transitional care service, service personnel, service channel, and service expense. If a participant had not received the content related to any of these dimensions, it was considered that the relevant transitional care had not been utilized (unutilized group). Conversely, if the participant had received the content, it was considered that the relevant transitional care had been utilized (utilized group).

(2) Survey Tool for Influencing Factors

General Demographic Information Questionnaire:[19] This questionnaire includes entries for age, sex, nationality, marital status, education level, work status, previous occupation, number of supportive relatives and friends, presence of a primary caregiver, monthly family income, and method of payment for medical expenses.

Health-Related Information Questionnaire:[19] This questionnaire collects data on chronic disease diagnoses, alcohol consumption history, smoking history, exercise duration, and exercise type. Chronic diseases covered include circulatory system diseases, respiratory system diseases, endocrine and metabolic disorders, neurological disorders, digestive system diseases, locomotor system diseases, urological diseases, hematological disorders, and rheumatological and immune system diseases.

ADL Scale:[20] The ADL scale is divided into basic ADL and instrumental ADL. Basic ADL include eating, using the toilet, dressing, grooming, walking, and bathing, which primarily assess the self-care capabilities of the individual in fundamental daily activities. Instrumental activities include making phone calls, shopping, preparing meals, performing housework, washing clothes, using transportation, taking medication, and managing money and goods, which assess the ability of the individual to manage more complex daily tasks requiring higher cognitive and social skills. The total ADL

score ranges from 14 to 56, with scores of < 16 indicating normal function, 16–21 indicating slight dysfunction, and ≥ 22 indicating significant dysfunction.

Theoretical Model

Based on Andersen's Behavioral Model, a theoretical framework was developed to analyze the influencing factors of transitional care utilization among older adults with chronic diseases (Figure 1).

Sample Size Calculation

The sample size for this cross-sectional survey was determined using the sample size calculation formula:

$$n = \frac{Z^2_{1-\alpha/2} \times P(1-P)}{d^2}$$

With a significance level (α) set at 0.05 and no prior data on the proportion of transitional care utilization among older adults with chronic diseases, the expected utilization rate (P) was assumed to be 0.5. This assumption was made because P(1-P) reaches its maximum value at P = 0.5, thereby ensuring the largest possible sample size and avoiding underestimation. The allowable margin of error (d) was set at 5%. Based on this, the calculated minimum sample size was 384 participants.

To account for a 10% rejection rate and a 10% rate of invalid questionnaires, the required sample size was adjusted to 480. To further enhance the validity of the questionnaire and improve the generalizability of the findings, the study ultimately aimed to include at least 800 older adults with chronic diseases.

Sampling Method

This study employed a convenience sampling method to conduct a cross-sectional survey on the factors influencing the utilization of transitional care among older adults with chronic diseases. A total of 820 questionnaires were distributed at a Class A tertiary hospital and a community hospital between October 2023 and December 2023.

At the conclusion of the survey, 804 questionnaires were successfully recovered, yielding a recovery rate of:

Recovery rate = (number of questionnaires recovered/number of questionnaires distributed) × 100% = (804/820) × 100% = 98.05%.

Following data cleaning and validity checks, 801 questionnaires were deemed valid, resulting in a valid response rate of:

Valid response rate = (number of valid questionnaires/numbers of recovered questionnaires) × 100% = 99.63%.

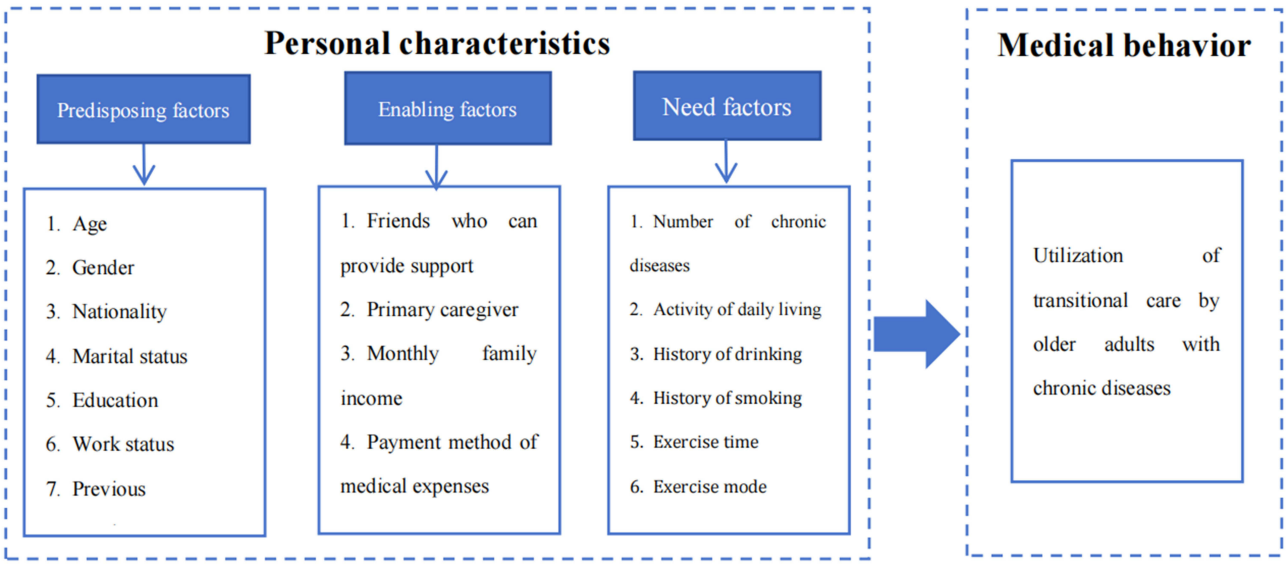

Figure 1 Anderson's Behavioral Model used in this study.

Statistical Methods

SPSS 26.0 software was used for statistical analysis. Descriptive statistics were used to summarize general demographic data, with measurement data presented as mean ± standard deviation ($\overline{x} \pm s$) and categorical data expressed as frequency and percentage (n, %). Based on the theoretical framework of Andersen's Behavioral Model, a univariate analysis was conducted using the chi-squared test across three dimensions: predisposing factors, enabling factors, and need factors.

Multivariate logistic regression analysis was conducted with the use of transitional care after discharge as the dependent variable. Three models were constructed: Model 1 included only predisposing factors; Model 2 included both predisposing and enabling factors; and Model 3 incorporated predisposing factors, enabling factors, and need factors. The influence of predisposing, enabling, and need factors on the utilization of transitional care after discharge was assessed by analyzing the R2 values for each model. The three models were as follows:

Model 1: $F1\ (p) = \alpha_1+\beta_{11}X_{\text{predisposing factors}}+\varepsilon_1$

Model 2: $F2\ (p) = \alpha_2+\beta_{21}X_{\text{predisposing factors}}+\beta_{22}X_{\text{enabling factor}}+\varepsilon_2$

Model 3: $F3\ (p) = \alpha_3+\beta_{31}X_{\text{predisposing factors}}+\beta_{32}X_{\text{enabling factor}}+\beta_{33}X_{\text{need factor}}+\varepsilon_3$

Results

Demographic and Clinical Data of Older Adults with Chronic Diseases

The mean age of the 801 older adults with chronic diseases in this study was 71.68±7.84 years. Among these, 417 were male (52.06%), and most were married (91.01%). Hypertension was the most common condition, affecting 403 (50.31%) participants, followed by coronary heart disease, which was present in 163 (20.35%) participants. Additionally, 132 (16.48%) participants had a history of alcohol consumption, and 102 (12.73%) participants had a history of smoking.

Status of Transitional Care Utilization by Older Adults with Chronic Diseases

Of the 801 participants in this study, 675 (84.27%) received transitional care after discharge, indicating utilization of transitional care, while the remaining 126 (15.73%) did not receive such care. Among the types of guidance/services received, disease guidance was the most common, received by 496 (61.92%) participants, followed by medication guidance, which was received by 381 (47.57%) participants. In terms of communication channels for receiving professional guidance/services, telephone follow-up was the frequently used method, used by 481 (60.05%) participants, followed by network platforms, used by 298 (37.20%) participants. Regarding the personnel delivering professional guidance/services, nurses were the most common providers, serving 650 (81.15%) participants. Concerning the expenses for professional guidance/services, social medical insurance was the most prevalent source among national government funds, covering 598 (74.66%) participants, followed by long-term care insurance, which covered 65 (8.11%) participants. Details are provided in Table 1.

Analysis of Factors Influencing the Utilization of Transitional Care by Older Adults with Chronic Diseases

Univariate Analysis of the Utilization of Transitional Care by Older Adults with Chronic Diseases

(1) Predisposing Factors: Among the predisposing factors, age, gender, nationality, and education level did not significantly influence the utilization of transitional care by older adults with chronic diseases ($p > 0.05$). However,

Table 1 Results on the Current Utilization of Transitional Care by Older Adults with Chronic Diseases

Characteristics	Cases (n)	Proportion (%)
Whether transitional care is accepted after discharge		
Not accepted	126	15.73
Accepted	675	84.27

(*Continued*)

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Table 1 (Continued).

Characteristics	Cases (n)	Proportion (%)
Type of professional guidance/services received after discharge		
Professional guidance		
Disease guidance	496	61.92
Medicine guidance	381	47.57
Self-test guidance	273	34.08
Functional rehabilitation guidance	268	33.46
Activity/exercise guidance	253	31.59
Diet guidance	242	30.21
Lifestyle guidance	141	17.60
Psychological guidance	110	13.73
Complication prevention	97	12.11
Safety guidance	71	8.86
Professional services		
Vital signs detection	252	31.46
Oral medication	88	10.99
Oxygen therapy	22	2.75
Wound stoma care/dressing change	20	2.50
Physical cooling	18	2.25
Canal care	16	2.00
Injection therapy	16	2.00
Infusion therapy	12	1.50
Analgesic therapy	10	1.25
Perineal care	9	1.12
Pressure sore care	9	1.12
Others	2	0.25
Channels for obtaining professional guidance/services after discharge		
Communication channels		
Telephone follow-up	481	60.05
Network platform	298	37.20
Information publicity	297	37.08
Television publicity	212	26.47

(*Continued*)

Table 1 (Continued).

Characteristics	Cases (n)	Proportion (%)
Face-to-face channels		
Outpatient follow-up	175	33.46
Family visits	86	10.74
Health talks	65	8.11
Home bed management	52	6.49
Others	6	0.75
Personnel providing professional guidance/services after discharge		
No	77	9.61
Yes	724	90.39
Medical Staff		
Nurse	650	81.15
Doctor	545	68.04
Pharmacist	80	9.99
Rehabilitator	54	6.74
Dietitian	52	6.49
Psychological consultant	26	3.25
Caregivers		
Family members	95	11.86
Relatives and friends	49	6.12
Nursing workers	43	5.37
Other personnel		
Community workers	50	6.24
Volunteers	23	2.87
Social workers	11	1.37
Others	4	0.50
Type of payment method for professional guidance/service expenses after discharge		
National government		
Social medical insurance	598	74.66
Long-term care insurance	65	8.11
Poverty relief	29	3.62
Aids rental subsidy	23	2.87

(*Continued*)

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Table 1 (Continued).

Characteristics	Cases (n)	Proportion (%)
Individual family		
Borne by the family	163	20.35
Borne by the individual independently	71	8.86
Help from friends	8	1.00
External assistance		
Commercial medical insurance	46	5.74
Assistance from religious and social groups (unofficial)	4	0.50
Others	7	0.87

marital status, work status, and previous occupation were identified as significant influencing factors for the utilization of transitional care ($p < 0.05$). A higher proportion of transitional care utilization was observed among older adults with chronic diseases who were married, retired, or were previously employed in roles such as professional technician, manager, teacher, or civil servant. The detailed results are presented in Table 2.

(2) Enabling Factors: Among the enabling factors, the number of relatives and friends available for support did not significantly impact the utilization of transitional care by older adults with chronic diseases ($p > 0.05$). However, the

Table 2 Univariate Analysis of Predisposing Factors for the Utilization of Transitional Care by Older Adults with Chronic Diseases (n = 801)

Characteristics	Cases	Not accepted (n = 126) [cases (%)]	Accepted (n = 675) [cases (%)]	χ^2 value	*P* value
Age (years)				2.850	0.241
	382	65(17.02)	317(82.98)		
	268	44(16.42)	224(83.58)		
	151	17(11.26)	134(88.74)		
Gender				1.642	0.200
Male	417	59(14.15)	358(85.85)		
Female	384	67(17.45)	317(82.55)		
Nationality				1.556	0.212
Han	791	123(15.55)	668(84.45)		
Minority	10	3(30.00)	7(70.00)		
Marital status				14.387	0.002
Married	729	107(14.68)	622(85.32)		
Divorced	10	4(40.00)	6(60.00)		
Widowed	49	9(18.37)	40(81.63)		
Unmarried	13	6(46.15)	7(53.85)		

(*Continued*)

Table 2 (Continued).

Characteristics	Cases	Not accepted (n = 126) [cases (%)]	Accepted (n = 675) [cases (%)]	χ^2 value	*P* value
Education				6.418	0.093
Elementary school and below	228	33(14.47)	195(85.53)		
Junior middle school	202	42(20.79)	160(79.21)		
High school/technical secondary school	180	21(11.67)	159(88.33)		
Junior college and above	191	30(15.71)	161(84.29)		
Work status				72.702	<0.001
Retired	523	52(9.94)	471(90.06)		
Full-time/ part-time job	114	42(36.84)	72(63.16)		
No job	164	32(19.51)	132(80.49)		
Previous occupation				18.492	<0.001
Jobless/ Unemployed	62	8(12.90)	54(87.10)		
Farmer	176	44(25.00)	132(75.00)		
Worker	270	27(10.00)	243(90.00)		
Others*	293	47(16.04)	246(83.96)		

Note: *Others include: professional technicians, managers, teachers, civil servants, etc.

presence of a primary caregiver, family income, and the method of medical expense payment were significant factors affecting transitional care utilization ($p < 0.05$). Higher utilization of transitional care was observed among older adults whose primary caregiver was a spouse and whose medical expenses were covered by basic medical insurance for urban residents/workers. Conversely, those with a family income less than RMB 4000 per month revealed lower rates of transitional care utilization. Detailed results are presented in Table 3.

(3) Need Factors: The history of drinking, history of smoking, exercise duration, and exercise mode did not significantly affect the utilization of transitional care by older adults with chronic diseases ($p > 0.05$). However, the number of chronic diseases and the ADL scores were significant influencing factors for transitional care utilization ($p < 0.05$). A higher proportion of transitional care utilization was observed among older adults with a greater number of chronic diseases and higher ADL scores. Detailed results are provided in Table 4.

Table 3 Univariate Analysis of Enabling Factors on the Utilization of Transitional Care by Older Adults with Chronic Diseases

Characteristics	Cases (n = 801)	Not Accepted (n = 126) [cases (%)]	Accepted (n = 675) [cases (%)]	χ^2 value	*P* value
Number of relatives and friends who can provide support (persons)				5.634	0.131
0	8	3(37.50)	5(62.50)		
1~2	174	34(19.54)	140(80.46)		
3~5	337	49(14.54)	288(67.66)		
≥6	282	40(14.18)	242(85.82)		

(*Continued*)

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Table 3 (Continued).

Characteristics	Cases (n = 801)	Not Accepted (n = 126) [cases (%)]	Accepted (n = 675) [cases (%)]	χ^2 value	*P* value
Primary caregiver				15.279	0.002
None	58	19(32.76)	39(67.24)		
Spouse	402	58(14.43)	344(85.57)		
Children	268	42(15.67)	226(84.33)		
Caregiver or relative	73	7(9.59)	66(90.41)		
Family income (RMB/month)				8.179	0.042
<4000	216	42(19.44)	174(80.56)		
4001~6000	197	29(14.72)	168(85.28)		
6001~8000	191	19(9.95)	172(90.05)		
>8000	197	36(18.27)	161(81.73)		
Payment method of medical expenses				9.738	0.021
Basic medical insurance for urban residents / workers	567	75(13.23)	492(86.77)		
New Rural Co-operative Medical System	190	43(22.63)	147(77.37)		
Commercial medical insurance/free medical service	34	6(17.65)	28(82.35)		
Fully self-funded/ poverty relief	10	2(20.00)	8(80.00)		

Table 4 Univariate Analysis of Need Factors Affecting the Utilization of Transitional Care by Older Adults with Chronic Diseases

Characteristics	Cases (n = 801)	Not Accepted (n = 126) [cases (%)]	Accepted (n = 675) [cases (%)]	χ^2 value	*P* value
Chronic diseases (types)				14.925	<0.001
1	276	57(20.65)	219(79.35)		
2	205	16(7.80)	189(92.20)		
≥3	320	53(16.56)	267(83.44)		
History of drinking				0.004	0.951
No	669	105(15.70)	564(84.30)		
Yes	132	21(15.90)	111(84.10)		
History of smoking				2.081	0.149
No	699	105(15.02)	594(84.98)		
Yes	102	21(20.59)	81(79.41)		

(*Continued*)

Table 4 (Continued).

Characteristics		Cases (n = 801)	Not Accepted (n = 126) [cases (%)]	Accepted (n = 675) [cases (%)]	χ^2 value	*P* value
Exercise time (h/week)					1.879	0.391
<7		480	73(15.20)	407(84.80)		
7~14		251	38(15.14)	213(84.86)		
>14		70	15(21.43)	55(78.57)		
Exercise mode						
Jogging/ walking	641	95(14.82)	546(85.18)	2.004	0.156	
	160	31(19.4)	129(80.6)			
Square dancing	77	13(16.88)	64(83.12)	0.085	0.770	
	724	113(15.61)	611(84.39)			
Tai chi chuan	72	10(13.89)	62(86.11)	0.202	0.653	
	729	116(15.91)	613(84.09)			
Swimming/ medical exercise/yoga	30	6(20.00)	24(80.00)	0.429	0.513	
	771	120(15.56)	651(84.44)			
Others	124	18(14.52)	106(85.48)	0.163	0.686	
ADL score					9.456	0.008
< 16		638	113(17.71)	525(82.29)		
16–21		128	11(8.60)	117(91.40)		
≥ 22		35	2(5.71)	33(94.29)		

Multivariate Analysis of the Utilization of Transitional Care by Older Adults with Chronic Diseases

A logistic regression model was developed with the utilization of transitional care after discharge as the dependent variable to further examine the influence of predisposing factors, enabling factors, and need factors on transitional care utilization by older adults with chronic diseases post-discharge. As each set of influencing factors was introduced, the −2Log likelihood values of the models decreased progressively, while the Cox & Snell R^2, Nagelkerke R^2 and likelihood ratio chi-squared values increased, indicating enhancements in model fit and explanatory power.

Model 3, which included all three types of factors, demonstrated the highest explanatory power regarding the utilization of transitional care. Specifically, in Model 2, the inclusion of enabling factors resulted in a significant increase in Nagelkerke R^2. Model 3, which added need factors to Model 2, revealed an additional but smaller increase in explanatory power, indicating that enabling factors had the most substantial impact on transitional care utilization among older adults with chronic diseases. The detailed results are presented in Table 5.

The results indicate that among the predisposing factors, older adults with chronic diseases who were not married, were currently employed part-time/full-time or unemployed, and had previously been jobless, underutilized transitional care ($p < 0.05$). Among the enabling factors, those with a primary caregiver, higher monthly family income, and medical insurance were more likely to utilize transitional care ($p < 0.05$). Regarding the need factors, older adults with a greater number of chronic diseases and impaired ADL were less likely to utilize transitional care. Detailed results are provided in Table 5.

Table 5 A Logistic Regression Analysis of the Utilization of Transitional Care by Older Adults with Chronic Diseases

Factor	Characteristics	Reference Group	Comparison Group	OR (95% CI)		
				Model 1	Model 2	Model 3
Predisposing factors	Age (years)	60~69	70~79	0.715 (0.415,1.345)	0.984 (0.571,1.584)	1.104 (0.715,1.758)
			≥80	0.824 (0.585,1.847)	1.143 (0.729,2.157)	1.276 (0.564,2.657)
	Gender	Male	Female	0.813 (0.327,1.264)	0.874 (0.361,1.323)	0.915 (0.461,1.458)
	Nationality	Han	Minority	0.891 (0.516,1.247)	0.915 (0.621,0.138)	0.875 (0.497,1.276)
	Marital status	Married	Others	0.685** (0.279,0.954)	0.717** (0.354,0.917)	0.759** (0.421,0.964)
	Education	Elementary school and below	Junior middle school	1.216 (0.675,1.768)	0.998 (0.584,1.651)	1.135 (0.689,1.645)
			High school/technical secondary school	1.321 (0.681,2.105)	1.375 (0.703,2.219)	1.431 (0.835,2.421)
			Junior college and above	1.345 (0.672,2.187)	1.458 (0.876,2.752)	1.541 (0.974,3.376)
	Work status	Retired	Full-time/ part-time job	0.453* (0.175,0.971)	0.395* (0.143,0.838)	0.463* (0.203,0.957)
			No job	0.846* (0.458,1.435)	0.813* (0.412,1.398)	0.767* (0.379,1.285)
	Previous occupation	Jobless/ Unemployed	Farmer	1.157 (0.676,2.125)	1.217 (0.718,2.275)	1.329 (0.876,2.541)
			Worker	1.897** (1.341,4.005)	1.764** (1.184,3.284)	1.842** (1.305,3.567)
			Others	2.341** (1.007,4.125)	2.457** (1.234,4.345)	2.651** (1.567,4.651)

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Enabling factors	Number of relatives and friends who can provide supports (persons)	0	1–2		1.231 (0.457,2.431)	1.175 (0.419,2.215)
			3–5		1.435 (0.675,2.879)	1.387 (0.654,2.793)
			≥ 6		1.765 (0.763,3.125)	1.675 (0.678,2.998)
	Primary caregiver	None	Spouse		3.986** (2.176,5.375)	4.125** (2.625,6.127)
			Children		3.125** (1.457,4.765)	3.675** (1.678,5.097)
			Caregiver or relative		2.875** (1.341,4.546)	2.796** (1.327,4.342)
	Family income (RMB/month)	<4000	4000~6000		1.543** (1.231,3.654)	1.487** (1.198,3.544)
			6001~8000		1.657** (1.327,3.985)	1.714** (1.415,4.125)
			>8000		2.124** (1.447,4.425)	2.225** (1.542,4.547)
	Payment method of medical expenses	Fully self-funded/ poverty relief	Basic medical insurance for urban residents /workers		2.126** (1.482,4.687)	1.898** (1.398,4.121)
			New Rural Co-operative Medical System		1.678** (1.321,2.965)	1.712** (1.397,2.989)
			Commercial medical insurance/free medical service		2.587** (1.487,4.765)	2.612** (1.431,5.114)
Need factors	Number of chronic diseases (types)	1	2			1.894* (1.274,3.125)
			≥3			2.541* (1.747,4.120)
	History of drinking	No	Yes			0.786 (0.321,1.286)
	History of smoking	No	Yes			1.124 (0.657,1.162)
	Exercise time (h/week)	<7	7~14			1.215 (0.712,2.117)
			≥14			1.476 (0.896,3.120)
	Exercise mode	Jogging/ walking	Square dancing			0.984 (0.396,1.987)
			Tai chi chuan			1.075 (0.451,2.124)
			Swimming/medical exercise/yoga			1.125 (0.541,2.457)

(*Continued*)

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Table 5 (Continued).

Factor	Characteristics	Reference Group	Comparison Group	OR (95% CI)		
				Model 1	Model 2	Model 3
			Others			0.985 (0.341,2.165)
	ADL (points)	<16	16~21			1.873* (1.235,3.832)
			≥22			2.327* (1.875,4.986)
			−2Log likelihood	576.872	517.460	495.124
			Cox&Snell R^2	0.025	0.107	0.671
			Nagelkerke R^2	0.041	0.289	0.436
			χ^2 value	18.876	65.987	117.975

Notes: *P<0.05; **P<0.01. OR is the odds ratio. 95% CI is the 95% confidence interval. The −2 log-likelihood statistic is used to assess the goodness of fit of the model, with a lower value indicating better fit. Cox&Snell R^2 is a statistic used to assess the goodness of fit of a model; its value ranges from 0 to 1, with a higher value indicating greater explanatory power of the model for the dependent variable. Nagelkerke R^2 is the standardized Cox&Snell R^2, which is calculated by dividing Cox&Snell R^2 by its maximum possible value; a higher value indicates that the model has greater explanatory power for the dependent variable.

Discussion

Older Adults with Chronic Diseases Have a Low Actual Utilization Rate of Transitional Care

(1) Low Utilization Rate of Professional Guidance and Services: Despite 657 out of 801 (84.27%) older adults utilizing transitional care, the survey results indicated that the actual utilization rates of various types of professional guidance and services were generally low. Except for disease guidance, which was utilized by 61.92% of the participants, the utilization rates for other types of professional guidance and services were all below 50%. Specifically, "lifestyle guidance" was utilized by 17.60% of participants, "psychological guidance" by 13.73%, "complication prevention" by 12.11%, and "safety guidance" by 8.86%, reflecting the lowest proportions. Lifestyle enhancement and complication prevention are key for mitigating the progression of chronic diseases among older adults, and the primary objective of transitional care is to enhance the quality of life and delay disease progression. Therefore, the types of professional guidance and services should be a key focus for enhancement in transitional care, and efforts should be made to optimize these services in the future.

(2) Optimization of Channels and Platforms for Transitional Care Services: Telephone follow-up was the primary channel through which older adults with chronic diseases accessed transitional care, with a utilization rate of 60.05%. This preference may be attributed to telephone follow-up being a key mode of post-discharge care, providing a convenient, cost-effective, and efficient method for patient follow-up in China. Additionally, telephone follow-ups help reduce the time and financial burdens associated with hospital visits.[21,22] In addition to telephone follow-up, network platforms were also a significant channel for transitional care utilization, used by 37.20% of participants. With advancements in electronic medical records and health record systems, along with the development of various hospital service APPs, the range of information transfer channels available to older adults is expanding. This evolution aims to meet the growing need for effective information exchange among older adults with chronic diseases.

Influencing Factors of the Utilization of Transitional Care by Older Adults with Chronic Diseases

Predisposing Factors

(1) Marital status is a significant determinant in the utilization of transitional care services. Older adults with chronic diseases who are married are 24.1% more likely to utilize transitional care services post-discharge compared to those who are divorced, widowed, or unmarried (OR = 0.759, $p < 0.05$). Previous research has indicated that older adults with spouses demonstrate superior self-management abilities for their chronic conditions and higher utilization rates of device support in transitional care compared to those without spouses.[23] This disparity can be attributed to the greater family support that married older adults typically receive, including caregiving resources, financial assistance, and psychological support. This enhanced social support structure is instrumental in enabling older adults with chronic disease to manage their conditions more effectively, thereby facilitating the increased use of transitional care service resources.[24]

(2) Work status and previous occupation are closely linked to the utilization of transitional care services. In this study, retired older adults with chronic diseases were more likely to effectively utilize transitional care services. Compared to retired participants, the likelihood of utilizing transitional care post-discharge was 0.463 times (OR = 0.463, $p < 0.05$) for those with full-time or part-time jobs and 0.767 times (OR = 0.767, $p < 0.05$) for unemployed individuals.

Similarly, participants who had been workers or professionals (like technicians, managers, teachers, civil servants, etc.) were more likely to utilize transitional care post-discharge compared to unemployed older adults with chronic diseases (both OR > 1, $p < 0.05$). This trend may be attributed to the fact that those with prior occupations typically fall into the retired category, providing them with pensions as an economic safety net, freeing them from work-related constraints, reducing psychological stress, and allowing them more time and energy for self-management. As a result, retired individuals may be better equipped to manage their conditions more effectively than their non-retired counterparts. These findings are consistent with a study by Nikbakht-Nasrabadi et al, which identified psychological stress and lack of economic support as primary factors contributing to the discontinuation or abandonment of "hospital-home" transitional care.[25]

Enabling Factors

(1) The presence of a primary caregiver serves as a protective factor for the utilization of transitional care services. Older adults with chronic diseases who have primary caregivers are significantly more likely to utilize transitional care post-discharge compared to those without caregivers. Specifically, older adults whose primary caregivers are spouses, children, or relatives/caregivers are 3.125 times (OR = 4.125, $p< 0.05$), 2.675 times (OR = 3.675, $p < 0.05$), and 1.796 times (OR = 2.796, $p < 0.05$) more likely to utilize transitional care, respectively. Joo et al found that older adults with primary caregiver support tend to experience higher quality transitional care.[26] Primary caregivers play a crucial role in influencing the health behaviors of patients with chronic diseases through decision-making, information transfer, and self-care.[27] Therefore, it is recommended that the significant role of caregivers be emphasized in the transitional care service process to enhance the effective utilization of these services.

(2) Higher monthly family income significantly enhances the utilization of transitional care services. Compared to older adults with chronic diseases whose family income is less than RMB 4000 per month, those with family incomes of RMB 4001–6000, RMB 6001–8000, and greater than RMB 8000 per month were 0.487, 0.714, and 1.225 times more likely to utilize transitional care after discharge, respectively. Prior research has identified that family income is a major determinant of the social support level for older adults in the community.[28] Individuals with higher monthly family incomes tend to have greater social support, perceive a lower burden from chronic diseases, and are more likely to manage their conditions positively, thereby facilitating the use of transitional care services.[13] Cui et al also found that older adults with higher monthly family incomes are more likely to receive diversified support during the transitional care process.[23] Therefore, to optimize transitional care for older adults with chronic diseases, it is essential to examine the intrinsic association between the financial burden of these patients and the utilization of transitional care services.

(3) The payment method for medical expenses is significantly associated with the utilization of transitional care services. Compared to older adults with chronic diseases who are fully self-funded or receiving poverty relief, those with medical insurance were more likely to utilize transitional care after discharge (OR > 1, $p < 0.05$). These findings align with previous research indicating a higher utilization rate of medical and healthcare services among older adults enrolled in medical insurance programs.[29]

One possible explanation is that older adults with medical insurance may possess higher health literacy. Geng et al found that older adults with chronic diseases and medical insurance had higher utilization of informational support during transitional care, indicating that these individuals are more attentive to changes in medical insurance policy and more proactive in learning about policies related to transitional care compared to those who are fully self-funded or receiving poverty relief.[9] Additionally, the increased utilization of transitional care services may be related to the reimbursement of part or all of the care expenses provided by medical insurance. Notably, individuals covered by urban and rural resident medical insurance tend to have lower home care needs than those covered by urban employee medical insurance.[30] When investigating the demand for transitional care among older adults with chronic diseases, the majority expressed a preference for paying for transitional care through social medical insurance, corroborating the fact that the payment method of medical expenses is a key factor affecting the utilization of transitional care services.

However, it is important to note that the current payment methods for transitional care expenses are not standardized. This highlights the need to further enhance the social medical insurance system to ensure the health needs of older adults with chronic diseases are adequately met.

Need Factors

(1) Older adults with a higher number of chronic diseases are more likely to utilize transitional care services. When compared to older adults suffering from only one chronic disease, those with two or more chronic diseases are 0.894 times and 1.541 times more likely to utilize transitional care after discharge, respectively. A review conducted by Xiang et al, based on Anderson's Behavioral Model, similarly identified the number of chronic diseases as a significant factor influencing the utilization of medical services, corroborating the findings of this study.[31] This trend can be attributed to the more complex health management needs and more urgent requirements for transitional care among older adults with multiple chronic diseases compared to those with a single chronic condition. Moreover, health status may also affect the utilization of transitional care services by influencing willingness to pay.[32] Future research should focus on developing

effective transitional care models tailored to the comorbidities of older adults with chronic diseases, with the objective to alleviate their disease burden and enhance their overall health outcomes.

(2) Decreased ADL significantly increases the utilization of transitional care services. This study found that older adults with chronic diseases who had ADL scores of 16–21 and ≥ 22 points were 1.837 times and 2.327 times more likely to utilize transitional care services, respectively, compared to those with ADL scores of < 16 points. This indicates that older adults with greater restrictions on daily activities are more reliant on transitional care services. Similar findings were reported in a study analyzing the patterns and predictors of healthcare-seeking behavior among older Chinese adults, which found that as the ADL of older adults decreased, their need for medical and health services increased correspondingly.[33] Additionally, research on home care needs and influencing factors based on transition theory found that lower ADL levels were associated with greater home care needs.[30]

This trend can be attributed to the fact that older adults with impaired ADL often require professional guidance, including disease management and psychological care. Transitional care services play a crucial role in assessing their needs, identifying care issues, and providing specialized support related to daily activities. As a result, older adults with lower ADL scores are more likely to utilize transitional care services to help manage their daily living needs and overall health.

Conclusion

In China, older adults with chronic diseases tend to underutilize transitional care services, resulting in a low actual utilization rate of professional guidance and support. An analysis of influencing factors reveals that marital status, work status, and previous occupation (predisposing factors), primary caregiver, monthly family income, and payment method of medical expenses (enabling factors), as well as the number of chronic diseases and ADL scores (need factors), are significant determinants of transitional care utilization among older adults with chronic diseases.

To improve transitional care utilization, special attention should be given to patients who are unmarried, unemployed, lack caregivers, have low income, lack medical insurance, or suffer from multiple chronic diseases or impaired daily living abilities. Strengthening social support and financial security for these populations may enhance their access to and engagement with transitional care services, ultimately improving health outcomes.

Abbreviations

ADL, Activity of daily living.

Data Sharing Statement

The datasets generated and/or analysed during the current study are not publicly available but are available from the corresponding author (Gui- Ling Geng) on reasonable request.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of Nantong First People's Hospital (approval number:2024KT304). A written informed consent was obtained from all participants.

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