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Based on APIM Model to Study the Mutual Effect of Stroke Patients' and the Caregivers' Satisfaction with Environmental Management

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Abstract

To analyze stroke patients' and the caregivers' satisfaction with environmental management as well as the mutual influence mechanism. General hospitals and community medical institutions in Shanghai City were randomly sampled 600 pairs of stroke inpatients and the caregivers for the questionnaire survey during January – June, 2016, and 575 pairs were eventually received. The "Actor-Partner Interdependence" model (APIM) was constructed to study the mutual influence of two interdependence variables on the satisfaction with environmental management. Patients' age and caregivers' education level showed significant effects on patients' and the caregivers' satisfaction with environmental management (influence coefficients β=-0.10 and β=0.08, respectively). In other words, the higher patients' age and the lower caregivers' education level revealed the lower satisfaction with environmental management. Patients' self-care degree at admission presented remarkably positive effects on their and the caregivers' satisfaction with environmental management (influence coefficients β=0.11 and β=0.07, respectively). In other words, the higher patients' self-care at admission would enhance the satisfaction with environmental management and caregivers' satisfaction with environmental management. Besides, the influence coefficient of the former was higher than it of the latter (β=0.11>β=0.07). Patients' length of stays merely appeared notably negative effects on the satisfaction with environmental management (influence coefficient β=-0.02). Both patients' and the caregivers' satisfaction with inpatient service showed significantly negative effects on the satisfaction with environmental management (β=-0.33 and β=-0.16, respectively). In this case, the higher patients' and the caregivers' satisfaction with inpatient service appeared the higher satisfaction with environmental management. Besides, the influence coefficient of the former is higher than it of the latter (β=0.33>β=0.16). Medical staff and health decision makers could apply correspondent measures, enhance individual satisfaction with inpatient service by taking the combination of individual characteristics and disease characteristics of the two into account, and eventually promote stroke patients' satisfaction with environmental management.

Keywords: stroke, caregiver, satisfaction with environmental management, APIM

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INTRODUCTION

Stroke refers to local or comprehensive brain function deficit syndrome caused by acute cerebral circulatory disorder; it is also named acute cerebrovascular event or cerebrovascular accident. Along with the rapid development of economy, changes in people's environmental management styles, enhancement of living standards, unbalanced nutrition intake, and population aging domestically, the morbidity rate of stroke is increasing and getting younger. Stroke has become a public health problem to seriously endanger the environmental management and health of middle aged and elderly people.

Stroke event does not simply affect patients, but also influence the caregivers by changing the environmental management styles and roles. Binder pointed out the following influences of (1) huge economic burden for family, (2) patients' mental and psychological disabilities, especially the accompanied mental disorder, resulting in great difficulties in nursing, and (3) patients'

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requirements for more concerns and support from other family members also increasing the psychological burden of family members. Patients' satisfaction with environmental management refers to patients' multi-attribute and multi-layer cognition and evaluation of the living conditions when receiving medical health services (Tang 2012). Domestic and international researchers have proceeded studies on stroke patients' satisfaction with environmental management, but ignored the caregivers. Theories and practice prove that stressing on caregivers' satisfaction with environmental management and helping caregivers keep physiological and psychological health as well as good social adaptability could avoid the emergence of another patient to further indirectly enhance the quality of accompany nursing, reduce the needs for medical resources, and ease social burden. As a matter of fact, patient-caregiver is the two-person relationship without leaving or discarding. A party might strongly affect another party's cognition, emotion, and behavior. A party's attribute and behavior might influence another party's outcome (Dong et al. 2015). For this reason, the satisfaction with environmental management of stroke patients and caregivers is directly correlated.

Starting from the interdependence and influence between stroke patients and caregivers, factors in stroke patients' and the caregivers' satisfaction with environmental management are analyzed in this study to analyze the mutual influence mechanism for making treatment and rehabilitation nursing measures, enhancing patients' and caregivers' physical and mental health, and releasing their pressure, especially to guarantee caregivers' satisfaction with environmental management when taking care of patients, so as to promote stroke patients' satisfaction with environmental management and rehabilitation from illnesses.

OBJECT AND METHOD

Research Object

The research team randomly sampled 600 pairs of stroke inpatients and the caregivers from general hospitals and community medical institutions in Shanghai during March – September, 2016. The standards for selecting patients include (1) ones conforming to the stroke standards made by The Fourth National Conference on Cerebrovascular Diseases in 1995 and being confirmed with CT and MRI (Chen et al. 2008), (2) those with clear consciousness, without total aphasia and severe cognitive dysfunction nor past records of Alzheimer's disease and mental illness, (3) the one with 1 constant caregiver (not including a constant babysitter or a care worker), aged 18～59, being able to proceed rehabilitation training as well as communicate and comprehend text contents, and (4) those voluntarily participating in the research and signing the agreement.

The exclusion standards contain (1) patients with transient cerebral ischemia, (2) ones not being able to filling the questionnaire because of unconsciousness, and (3) those with more than 2 caregivers or frequently changing caregivers.

Research Tool

Satisfaction with environmental management scale for patients and the caregivers

The measurement of satisfaction with environmental management in this study applies single entry questions. With Likert 5-point scale, the higher score stands for the higher stroke patients' and the caregivers' satisfaction with environmental management.

Barthel index

This scale is used for measuring stroke inpatients' self-care degree at admission to understand patients' needs for medical care and confirm the conformity to the application for nursing workers. The lower score of the scale shows the inadequate self-care ability of an elderly patient.

Satisfaction scale for stroke patients and the caregivers

The original English scales of the former and the latter scales contain 19 and 11 entries, respectively. The former includes inpatient treatment service satisfaction subscale and home rehabilitation service satisfaction subscale, which are translated into Chinese by the researchers Dong et al. and are proven the favorable reliability and validity. Eventually, 16 entries for stroke patients' satisfaction, including 8 entries for the inpatient treatment service satisfaction subscale and 8 entries for the home rehabilitation service satisfaction subscale, are confirmed. Each entry is scored from 1 (completely agree) to 4 (extremely disagree). In this study, merely 8 entries for the inpatient treatment service satisfaction subscale and 11 entries of the caregiver satisfaction scale are used. The smaller scores represent the higher evaluation of stroke patients and the caregivers on inpatient treatment service.

APIM Model

The model involves the test of actor effect and partner effect (Teng et al. 2011). Since patients and caregivers present inseparable two-person relationship,

there might be higher correlations between independent variables. This study focuses on the effect of patient-caregiver interdependence on patients' satisfaction with environmental management. (1) Correlation analysis is first preceded. Independent variables in the two-person relationship and dependent variables (satisfaction with environmental management) of patients and the correspondent caregivers are proceeded correlation analyses. (2) Hierarchical linear regression analysis is then preceded. The zero model (model 1) regression analysis is first proceeded to calculate the estimate of intra-class correlation coefficient (ICC). The ICC calculation equation shows $ICC = V_{12}/\sqrt{(V_{12}+V_1)(V_{12}+V_2)}$, where V_{12} is the patient-caregiver interdependence variance, V_1 is patient variance, and V_2 is caregiver variance. Nested model (model 2) regression analysis in hierarchy 2 is then preceded. A patients' independent variable, the caregiver's independent variable, and the accompanying person's interdependence variable are included in the equation for regression analysis of patients' satisfaction with environmental management. It is to test the effect of patients' and caregivers' interdependence variable on patients' satisfaction with environmental management.

Statistics Method

Pearson correlation analysis is applied to test the relationship between stroke patients' and the caregivers' independent variable and dependent variable; and, hierarchical linear regression analysis is used for testing the effects of patients' independent variable, caregivers' independent variable, and patient-caregiver interdependence variable on patients' satisfaction with environmental management. SPSS17.0 is used for basic data analysis, correlation analysis, and hierarchical regression analysis, $P<0.05$ reveals the difference with statistical meanings, and two-sided test is utilized.

RESEARCH RESULT

Basic Data Analysis

With the statistics, total 575 valid copies of questionnaire (i.e. 575 pairs of patients and caregivers) are received, with the total response rate 95.8%. From **Table 1**, most stroke patients are male (52.9%), while most caregivers are female (59.1%); stroke patients and caregivers show the average ages of 67.13±14.74 and 50.38±14.89, respectively; the average education level of patients and caregivers appear 3.02 and 3.49, respectively, i.e. high school education level; most patients and caregivers are married, about 78.6% and 92.7%, respectively; the relationship between caregivers and patients show companion relationship 47.8%, child relationship 35.5%, sibling 1.6%, and others 15.1%; the level of patients' and caregivers' satisfaction with inpatient service appears 1.50 and 1.55, respectively, and the latter is higher than the former; and, the level of patients' and caregivers' satisfaction with environmental management shows 2.98 and 3.26, respectively, and the latter is also higher than the former.

Table 1. Basic data analysis (n=575 pairs)

variable	mean (standard deviation) or percentage
patient characteristics	
gender (female)	271 (47.1%)
age	67.13 (14.74)
education level	3.02 (1.11)
marital status (married)	452 (78.6%)
self-care degree at admission	66.36 (31.92)
length of stays	11.88 (6.78)
satisfaction with inpatient service	1.50 (0.41)
caregiver characteristics	
gender (female)	340 (59.1%)
age	50.38 (14.89)
education level	3.49 (1.12)
marital status (married)	533 (92.7)
satisfaction with inpatient service	1.55 (0.40)
two-person relationship characteristics	
living together	429 (74.6%)
relationship between the two	
companion	275 (47.8%)
child	204 (35.5%)
sibling	9 (1.6%)
other relationship	87 (15.1%)

Correlation Analysis

From **Table 2**, stroke patients' satisfaction with inpatient service and self-care degree at admission appear negative correlations, meaning that the higher satisfaction with inpatient service of stroke patients corresponds to the higher self-care degree at admission and shows positive correlations with length of stays. That is, patients' higher satisfaction with inpatient service corresponds to the less length of stays. Patients' satisfaction with environmental management presents negative correlation with age and length of stays, but positive correlations with self-care degree at admission.

Table 2. Correlation analysis of patients and the caregiver characteristics and satisfaction with environmental management (n=575 pairs)

	1	2	3	4	5	6	7	8	9
patients									
1.age	1								
2.education level	-0.392**	1							
3.self-care degree at admission	-0.274**	0.181	1						
4.length of stays	0.187*	-0.174	-0.274**	1					
5.satisfaction	0.158	-0.228	-0.023*	0.233**	1				
6. satisfaction with environmental management	-0.135**	0.134	0.304**	-0.130**	-0.199**	1			
caregivers									
7.age	0.205**	-0.05	0.098	-0.125	0.061	0.078	1		
8.education level	-0.168	0.430**	0.034	-0.214	-0.247	0.009	-0.312*	1	
9.satisfaction	0.118	-0.157	0.088	0.211	0.658*	-0.017	0.126**	-0.302**	1
10. satisfaction with environmental management	0.071	-0.111	0.027**	-0.229*	-0.032	0.349**	-0.097*	0.061**	0.017

* $P<0.05$; ** $P<0.01$

Stroke caregivers' satisfaction with inpatient service presents positive correlations with patients' satisfaction with inpatient service and age, meaning that stroke patients' higher satisfaction with inpatient service corresponds to higher caregivers' satisfaction with inpatient service and stroke patients' higher satisfaction with inpatient service corresponds to younger caregivers. Caregivers' satisfaction with environmental management reveals positive correlations with patients' self-care degree at admission, patients' satisfaction with environmental management, and caregivers' education level, but negative correlations with patients' length of stays and caregivers' age.

Hierarchical Linear Regression Analysis

From **Table 3**, the intra-class correlation coefficient (ICC) of model 1 at the first stage appears 0.46, showing the interdependence of patients' and caregivers' satisfaction with environmental management. The analysis results of model 2 at the second stage reveal that patients' age (β=-0.10) and caregivers' education level (β=0.08) respectively present significant effects on patients' and caregivers' satisfaction with environmental management. Patients' self-care degree at admission shows remarkably positive effects on the satisfaction with environmental management as well as caregivers' satisfaction with environmental management. Besides, the former appears larger influence than the latter (β=0.11>β=0.07), and patients' length of stays merely appears significantly negative effects on patients' satisfaction with environmental management (β=-0.02).

Table 3. Hierarchical linear regression analysis result (n=575 pairs)

model	model 1		model 2	
	coefficient	standard error	coefficient	standard error
patients				
constant			0.50**	0.08
gender			-0.07	0.07
age			-0.10**	0.05
education level			0.02	0.03
marital status			0.05	0.09
living together with caregiver			0.03	0.08
caregiver being the companion			-0.06	0.08
self-care degree at admission			0.11*	0.01
length of stays			-0.02**	0.04
satisfaction with inpatient service			-0.33**	0.08
caregivers				
constant	0.47**	0.01	0.55**	0.14
gender[a]			0.09*	0.06
age			-0.09	0.03
education level			0.08*	0.03
marital status[b]			0.03	0.09
living together with patient[c]			0.04	0.08
patient being the companion[c]			-0.02	0.08
self-care degree at admission			0.07**	0.04
length of stays			-0.01	0.03
satisfaction with inpatient service			-0.16*	0.09
two-person relationship variance	0.05	0.01	0.04	0.01
patients variance	0.08	0.01	0.05	0.01
caregivers variance	0.04	0.01	0.06	0.01
degree of fit of the model(-2LL)	299.21		157.97	
explanation of patient variance (%)				32.1
caregivers variance (%)				7.9
intra-class correlation coefficient (ICC)	0.46		0.42	

* $P<0.05$; ** $P<0.01$;a:0=male, 1=female;b:0 =single, divorced, or widowed ; 1=married ; c : 0=No, 1=Yes

Patients' satisfaction with inpatient service presents remarkably negative effects on the satisfaction with environmental management, and caregivers' satisfaction with inpatient service also shows notably negative effects on caregivers' satisfaction with environmental management; and, the influence of the former is larger than it of the latter ($|\beta|$=0.33>$|\beta|$=0.16).

In sum, 141.2 factors in model 2 are improved, comparing to model 1 (zero model), which respectively explains 32.1% and 7.9% of patients' and caregivers' variance, revealing good fit of the model and the empirical data, **Table 3**.

DISCUSSION AND SUGGESTION

This study aims to research the factors in stroke patients' and the caregivers' satisfaction with environmental management and the effect of the satisfaction with inpatient service on the satisfaction with environmental management.

First, patients' and caregivers' personal characteristics affect the satisfaction with environmental management. Patients with higher age show lower satisfaction with environmental management because of worse physical functions and increasing probability of complications to influence daily functions and result in low satisfaction with environmental management. However, education level does not appear remarkable correlations with satisfaction with environmental management. Female caregivers with high education level show higher satisfaction with environmental management, which is consistent with early research (Chen et al. 2008, Dahlrup et al. 2015). The conclusions of effects of patients' age on the health are distinct. Some researchers considered age as a factor (Cheng et al. 2016, Teng et al. 2011, Yu et al. 2014), while others did not (Nie 2016). Furthermore, research on the effect of age on satisfaction with environmental management or quality of environmental management also appeared distinct conclusions. Some researchers regarded the highest comprehensive satisfaction of patients aged 35～59, while others pointed out the highest satisfaction with quality of environmental management of stroke patients aged above 60 (Yu et al. 2014). In this study, patients aged 45-59 reveal the highest satisfaction with environmental management.

Second, patients' disease characteristics positively affect satisfaction with environmental management. Patients' self-care degree at admission and length of stays influence the satisfaction with environmental management. Stroke patients' self-care degree at admission positively affects the satisfaction with environmental management, while length of stays shows negative effects. Such results are consistent with early research conclusions (Mao and Guo 2016, Rasmussen et al. 2016), because the worse patients' self-care degree at admission would result in longer length of stays and recovery time for daily functions, and the higher sickness rate would cause lower satisfaction with environmental management. What is more, patients' self-care degree at admission also positively affects caregivers' satisfaction with environmental management, as patients with high self-care would reduce the time for caregivers' accompany to result in less mental stress and anxiety; caregivers therefore could achieve higher satisfaction with environmental management. Regarding the effects of patients' self-care degree on the satisfaction with environmental management higher than on caregivers' satisfaction with environmental management, it might because stronger patients' self-care ability appears more direct influence on patients than on caregivers that the function is more obvious. Some research also showed the same conclusion (Åström et al. 1992, Xu et al. 2013). In regard to the research on length of stays, some literatures revealed the highest satisfaction with environmental management on less than 10 days (Gao et al. 2015), which is consistent to this research result. Other literatures proposed 23 days (Cen et al. 2016), and even 56.6 days (Zhang and Han 1999). However, length of stays does not appear notable effects on caregivers' satisfaction with environmental management, which is inconsistent with early research conclusions (Lu and Gu 2014, Xu et al. 2015), possibly because of insignificant influence of patients' length of stays on caregivers' satisfaction with environmental management in this study.

Third, patients' and the caregivers' satisfaction with inpatient service reveal effects on the satisfaction with environmental management; the higher satisfaction with inpatient service shows the higher satisfaction with environmental management. Patients' subjective evaluation of the satisfaction with inpatient is an important indicator of medical service quality, which could well reflect hospital service quality. The enhancement presents critical functions on a hospital improving the treatment process, improving doctor-patient relationship, promoting medical service quality, and releasing the burden of patients, family, and society, which is consistent with early research conclusions (Ji and Zhai 2009, Ostwald et al. 2009). Moreover, the influence of patients' satisfaction with inpatient service is larger than it of caregivers, possibly because the inpatient service offered by hospitals or doctors mainly focuses on patients that they perceive deeper satisfaction with inpatient service. Patients' subjective evaluation is therefore higher than caregivers' satisfaction with inpatient service to further affect the satisfaction with environmental management. Nevertheless, the influence of caregivers cannot be ignored (Fens et al. 2014, Quinn et al. 2014). On one hand, it would request medical staff for rehabilitation nursing service on stroke patients, improving nursing service quality, and enhancing the level of function rehabilitation, e.g. establishing "patient centered" service awareness, providing differential service aiming at stroke patients' age and illness degree, offering friendly and respectful service for patients, concerning patients' personal needs, and actively discussing causes with patients to provide proper and sufficient personalized rehabilitation treatment service. On the other hand, it is necessary to combine caregiver-patient interdependence and take

measures to enhance caregivers' satisfaction with inpatient service. In addition to concerning caregivers' personal needs, improving the treatment and rehabilitation process during the hospitalization, discussing causes with caregivers, and keeping information symmetry of both parties, it also requires hospital managers proceeding health education for caregivers to understand how to assist patients in environmental management nursing and psychological counseling. The enhancement of satisfaction with environmental management would eventually enhance patients' satisfaction with environmental management.

CONCLUSION

Patients and the caregivers show inseparable relationship that APIM model could be used for analyzing the effects of the interdependence between patients and the caregivers on the satisfaction with environmental management and the cross influence. This study concludes that patients with higher age show lower satisfaction with environmental management and female caregivers with higher education level present higher satisfaction with environmental management; patients with higher self-care degree at admission and less length of stays reveal higher satisfaction with environmental management, and the caregivers' satisfaction with environmental management is higher; the effect of patients' self-care degree on the satisfaction with environmental management is larger than it on caregivers' satisfaction with environmental management; stroke patients and the caregivers with higher satisfaction with inpatient service show higher satisfaction with environmental management; the effect of patients' satisfaction with inpatient service on the satisfaction with environmental management is larger than the effect of caregivers' satisfaction with inpatient service on the satisfaction with environmental management. Consequently, medical staff and health policy makers in a hospital could combine personal characteristics of patients and the caregivers and the illness characteristics to enhance stroke patients' and the caregivers' satisfaction with inpatient service, take micro and macro measures to enhance rehabilitation nursing quality, and further promote patients' satisfaction with environmental management.

REFERENCES

Åström M, Adolfsson R, Asplund K, Åström T (1992) Environmental management before and after Stroke : Living Conditions and Environmental management Satisfaction in Relation to a General Elderly Population. Cerebrovascular Diseases, 2(1): 28-34. https://doi.org/10.1159/000108984

Cen H, Yang H, Lu C, Huang Y, Meng J, Lo S, Xu J, Cai J (2016) The composition of stroke patients' hospitalization times and expenses in two tertiary hospitals in Guangxi and the factor analysis. Chinese Journal of Prevention and Control of Chronic Diseases, 24(10): 737-740.

Chen Y, Li X, Lin Q (2008) Research on correlation facvtors of health education to non-relatives watchers in improving early rehabilitation of stroke patients. Dang Dai Hu Shi, (8): 10-12.

Cheng Q, Liu K, You L, Zhang L, Zhu X, Zheng J, Bu S (2016) Survey on inpatient satisfaction with healthcare and its influencing factors in Level 2 and Level 3 hospitals in China. Chinese Nursing Management, 16(11): 1482-1488.

Dahlrup B, Ekström H, Nordell E, Elmståhl S (2015) Coping as a caregiver: a question of strain and its consequences on environmental management satisfaction and health-related quality of environmental management. Archives of Gerontology & Geriatrics, 61(2): 261-270. https://doi.org/10.1016/j.archger.2015.06.007

Dong E, Bao Y, Liu W (2015) A review of the effects of environmental management satisfaction between stroke patients and caregivers. Chinese Health Service Management, 32(4): 298-300.

Fens M, Van Heugten CM, Beusmans G, Metsemakers J, Kester A, Limburg M (2014) Effect of a stroke-specific follow-up care model on the quality of environmental management of stroke patients and caregivers: A controlled trial. Journal of Rehabilitation Medicine, 46(1): 7-15. https://doi.org/10.2340/16501977-1239

Gao F, Lin P, Liu L (2015) Investigation and study of satisfaction of patients with different length of stay for hospital or doctor. Chinese Community Doctors, (17): 168-169.

Ji H, Zhai H (2009) Correlation analysis of accompanying role cognition and inpatient satisfaction. Chinese Nursing Research, 23(34): 3128-3130.

Lu B, Gu Q (2014) Correlation Analysis between patient satisfaction and discharged care days. Journal of Chinese Medicine, (B07): 500-501.

Mao C, Guo L (2016) Application of self-care ability evaluation form to rehabilitation exercise of stroke patients. Health Magazine, 10(5): 278-279.

Nie S (2016) Study on the satisfaction and the factor of 626 inpatients in a third class hospital with nursing. Chinese General Practice Nursing, 14(34): 3643-3645.

Ostwald SK, Godwin KM, Cron SG (2009) Predictors of environmental management satisfaction in stroke survivors and spousal caregivers after inpatient rehabilitation. Rehabilitation Nursing, 34(4): 160-167+174.

Quinn K, Murray C, Malone C (2014) Spousal experiences of coping with and adapting to caregiving for a partner who has a stroke: A meta-synthesis of qualitative research. Disability and Rehabilitation, 36(3): 185-198. https://doi.org/10.3109/09638288.2013.783630

Rasmussen RS, Skerris A, Skou C, Christoffersen J, Seest LS, Poulsen MB, Overgaard K (2016) Stroke rehabilitation at home before and after discharge reduced disability and improved quality of environmental management: A randomised controlled trial. Clinical Rehabilitation, 30(3): 225. https://doi.org/10.1177/0269215515575165

Tang L (2012) The influences of patient's satisfaction with medical service delivery, assessment of medical service, and trust in health delivery system on patient's environmental management satisfaction in China. Health Qual Environmental management Outcomes, 10(1): 111. https://doi.org/10.1186/1477-7525-10-111

Teng Z, Zhang A, Lan Y (2011) Personal factors in outpatient satisfaction and the influence. Chinese Journal of Health Statistics, 28(3): 283-285.

Xu Z, Gu Y, Zhao H, Chen Y, Feng B, Wang X, Zheng S (2013) Survey on environmental management satisfaction of elderly patients in a hospital in Shanghai. Chinese Journal of Modern Nursing, 19(3): 269-272.

Xu Z, Zhao H, Wang X, Gu Q, Chen Y, Feng B, Zheng S (2015) Accompanying persons education effectiveness and ethical analysis in the department of Geriatrics. Chinese Journal of Medical Ethics, (5): 798-801.

Yu C, Wang S, Xu H, Liu R, Yu Y, Kou Z, Li C, Wang X (2014) Investigation on satisfaction to quality of environmental management among community patients with stroke in Chnagchun city. Chinese Journal of Public Health, 30(11): 1429-1432.

Zhang F, Han Y (1999) Factors in the length of hospital stay in stroke patients. Foreign Medicine Science: Physical Medial Rehabilitation, (02): 96-97.