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The efficacy of transitional care services in patients with transient ischemic attack

A retrospective cohort study

Jing Lin[a], Meiling Jiang[a], Jinmiao Liu[a], Lan Yao[a,*]

Abstract

Transient ischemic attack (TIA) carries a particularly high short-term risk of stroke, which is associated with brain dysfunction caused by a regional reduction in blood flow. Transitional care services present benefits in improving ischemic neurological function and decreasing the recurrence in patients with TIA. The purpose of this study was to investigate the effects of transitional care on clinical outcomes in patients hospitalized for TIA. We retrospectively collected data about 1288 patients with TIA from May 2017 to June 2019. Patients were divided into mild (n = 438), moderate (n = 420) and severe group (n = 430) accessed by age, blood pressure, type of TIA, and duration ($ABCD_2$) score. Participants were patients hospitalized due to TIA, assigned to transitional care (n = 643) or usual care (n = 645), and followed up for 24 months. Physical function of patients was evaluated using the 6-minute walk test. We evaluated patient reach, implementation using hospital quality measures, hospital-level sustainability physical function, ischemic neurological score, composite quality indicator score, and recurrence of TIA between transitional care or usual care group. TIA patients in transitional care group had better physical function and quality indicator score, lower ischemic neurological score and recurrence of TIA, and shorter hospital stay than patients in usual care group. Results demonstrated that transitional care significantly improved the patients' satisfaction compared to usual care. Patients in mild, moderate, and severe group presented more benefits than usual care clinical outcomes in patients hospitalized for TIA. Transitional care is associated with better functional status for patients with TIA.

Abbreviations: $ABCD_2$ = scoring, age, blood pressure, type of transient ischemic attack, duration, QI = quality indicator, QoL = quality of life, TIA = transient ischemic attack.

Keywords: ischemic neurological score, recurrence, transient ischemic attack, transitional care, usual care

1. Introduction

Transient ischemic attack (TIA) has been implicated in the pathogenesis of cryptogenic stroke, arterial desaturation, decompression illness, and migraine, which is characterized by short-term symptoms of acute, focal cerebral, or monocular dysfunction.[1] Clinically, TIA may lead to cognitive impairment and experiences secondary prophylactic therapies.[2] Generally, patients with TIA attributable to large artery atherosclerosis accounts for the highest risk of early stroke recurrence and poor outcomes after an initial TIA event.[3] Therefore, the processes of transitional care and treatments in TIA patients should be conducted during hospitalization and recovery.

Transitional care services that bridge the gap from stroke to rehabilitation can improve therapeutic outcomes.[4] Transitional care interventions play crucial role in reducing readmissions, mortality, and rehospitalizations for patients with TIA.[5] Comprehensive transitional care reduces the length of hospital stay and improves stroke rehabilitation in TIA patients compared to usual care.[6] However, there are no widely accepted indicators to assess the difference of patients with TIA between transitional care and usual care. Therefore, the risk of near-term stroke in patients is determined by $ABCD_2$ scoring (age, blood pressure, type of TIA, duration) after TIA.

The purpose of this study was to investigate the effect of transitional care on clinical outcomes in patients with TIA. We compared patient reach, implementation using hospital quality measures, hospital-level sustainability physical function, ischemic neurological score, composite quality indicator (QI score), and recurrence of TIA between transitional care or usual care.

2. Materials and Methods

2.1. Study design

This study is a single-site trial and the study population comprised patients with TIA in Hongqi Hospital Affiliated to

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

[a] *Second Department of Neurology, Department of Oncology, Hongqi Hospital Affiliated to Mudanjiang Medical University, Mudanjiang 157001, China.*

**Correspondence: Lan Yao, No. 5, Tongxiang Road, Aimin District, Mudanjiang City, Heilongjiang Province 157001, China (e-mail weiwei_xumdj@163.com).*

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Mudanjiang Medical College (Mudanjiang, China) from May 2017 to March 2019. All patients with TIA had cognitive abnormalities within 24 hours of onset. Symptoms of mild patients with TIA had resolved within 24 hours after excluding alternate etiologies. Part of moderate and severe patients with TIA experienced persistent cognitive and motor impairments. All patients were diagnosed according to the International Classification of Diseases as described previously.[7] Patients were divided into mild group, moderate, and severe patients accessed by $ABCD_2$ score.[8] TIA patients were assigned usual care (n = 645) or transitional care (n = 643) during hospitalization and discharge to home. This study was approved by Ethics Committee of Hongqi Hospital Affiliated to Mudanjiang Medical College (Approval No. MDJMC 20170501X1). All patients with TIA signed the informed consent.

2.2. Patients

We enrolled 1288 patients with TIA. Diagnosis of TIA was confirmed by 3 clinical doctors. All patients were received transitional care (n = 643) or usual care (n = 645). Patients with TIA are assessed over a 24-month follow-up period beginning at hospital discharge.

2.3. Inclusion and exclusion criteria

Patients were included within 1 week of symptom onset of TIA. Patients were excluded if they were <18 years old. Patients with history of atrial fibrillation, acute large vessel dissection, hemorrhagic stroke, sleep apnea, suspected sleep disorder other than sleep apnea, hospice, or receiving comfort measures or inability to participate the study were excluded from the study.

2.4. Usual care

Control patients received usual care during experimental period. Patients and their primary care providers were informed of polysomnographic results; patients with sleep apnea were encouraged to receive continuous positive air pressure. Patients in the control group were neither dissuaded nor encouraged to seek polysomnography as part of usual care during the follow-up.

2.5. Transitional care

The design of the transitional care program is designed basing on the Omaha System, which provides a method to describe the needs of patients and interventions and solves patient problems.[9] In brief, the Omaha System consists of 3 parts: problem classification scheme, intervention scheme, and problem rating scale. The problem classification scheme includes psychosocial, physiological, 4 environmental domains, and health-related behaviors. Transitional care included usual care and additional care. The transitional care intervention scheme includes guidance, teaching and counseling, postoperative management, clinical treatments, and 4 broad surveillance categories. Transitional care of predischarge interventions include early assessment after hospital admission, medication reconciliation, and discharge planning patient education. Transitional care of postdischarge interventions include supportive care for self-management through education (online education every 1 month) or home visit (telephone call visit every 7 days), links between hospital and home nurses and patients, balance of care between the patient and family and professional providers (primary care provider visit every 1 month). The problem rating scale includes 3 Likert 5-point scales to measure client's knowledge, behavior, and status. In addition, transitional care of this study also includes 23 SLE-related health problems (9 physiological, 4 psychosocial, 2 environmental and 8 health-related behaviors care problems).

2.6. Clinical assessment

Quality of life (QoL) was evaluated using the Dutch version of the World Health Organization QoL assessment instrument (WHOQOL-100).[10] Ischemic event was defined based on radiological signs of ischemia in each TIA patient. Ischemic neurological score was evaluated using National Institute of Health Stroke Scale as described previously.[11] Sustainability physical function was evaluated using the 6-minute walk test as reported by *Am. J. Respir. Crit.*[12] Degree of TIA was identified using $ABCD_2$ scoring criteria (mild, 0–3; moderate, 4–7; severe, 8–10). Recurrent ischemic events in patients were defined as new TIA diagnosis with clear temporal separation from the index event. QI score of patients with TIA was accessed using the National Quality Measure Clearinghouse.[13] A total of 24-month follow-up was performed in this study. Physical function assessment was analyzed using The World Health Organization's *International Classification of Functioning, Disability and Health*.[14] Satisfaction of patients in different groups was defined as program acceptability based on content, complexity, or comfort as reported previously.[15]

2.7. Data analysis

Data are expressed as mean ± SD or n (%) and analyzed using SAS Release 9.1 (SAS Institute, Cary, NC). The *P* values were calculated via independent sample *t* test for continuous variables and chi-square test for categorical variables. Significance differences of National Institute of Health Stroke Scale in groups were assessed using a nonparametric Mood median test. Differences in continuous and ordinal data were analyzed using Mann–Whitney *U* test. Differences in n (%) change between 2 groups were analyzed using the Kruskal–Wallis test. A *P* value of <0.05 was considered significant.

3. Results

3.1. Characteristics of TIA patients

Patients with TIA were divided into mild (n = 438), moderate (n = 420), and severe group (n = 430) accessed by $ABCD_2$ score. Figure 1 showed participant flow from recruitment to follow-up for patients with TIA. Characteristics of patients with TIA were summarized in Table 1. Patients with TIA were received transitional care (n = 643) or usual care (n = 645) group. No significant differences of baseline characteristics of TIA patients were observed between 2 groups ($P > .05$).

3.2. Analysis the effect of transitional care and usual care on parameters in patients with TIA

Patient reach, implementation using hospital quality measures, hospital-level sustainability physical function, ischemic neurological score, and composite QI score in patients with TIA were compared between transitional care and usual care group. As shown in Table 2, a better physical function and QI score, and lower ischemic neurological score were observed in patients in mild ($P < .05$), moderate ($P < .01$), and severe ($P < .01$) in transitional care group compared to those who received usual care group. Results revealed that mild, moderate, and severe TIA patients receiving transitional care had a shorter hospital stay than patients in usual care group ($P < .05$).

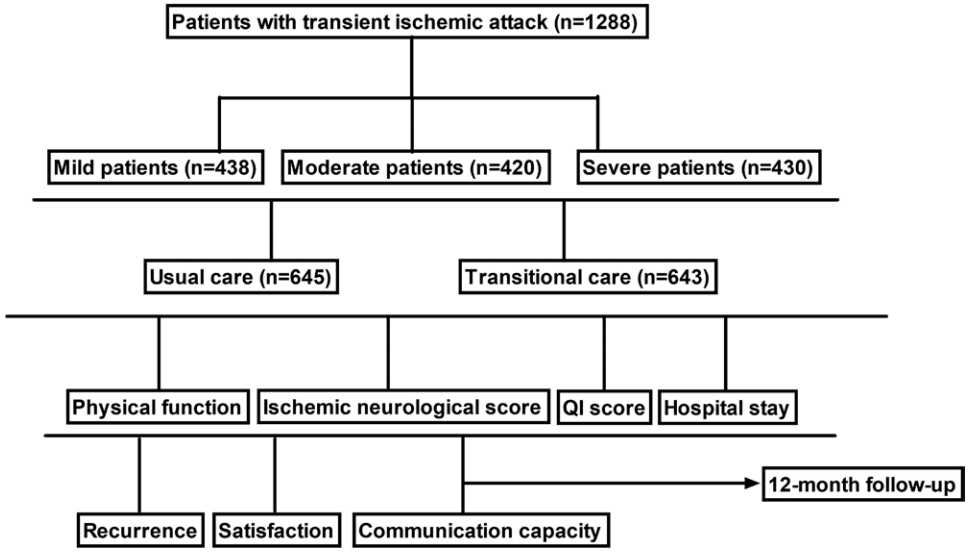

Figure 1. Study design flow of patients with transient ischemic attack.

Table 1

Characteristics of patients with transient ischemic attack.

	Transitional care	Usual care	*P* value
Age (yr-old)	54.5 ± 7.5	52.5 ± 8.0	.84
Male	310 (24.1%)	300 (23.2%)	.92
Female	333 (25.9%)	345 (26.8%)	.76
Mild	218 (16.9%)	220 (17.1%)	.88
Moderate	215 (16.7%)	205 (15.9%)	.85
Severe	210 (16.3%)	220 (17.1%)	.81
Hypertension, n (%)	432 (33.5%)	425 (33.0%)	.96
Hypercholesterolemia, n (%)	115 (8.9%)	120 (9.3%)	.95
Heart failure, n (%)	98 (7.6%)	102 (7.9%)	.70
Atrial fibrillation, n (%)	105 (8.2%)	110 (8.5%)	.93
Coronary artery disease, n (%)	120 (9.3%)	116 (9.0%)	.87
Body mass index (kg/m^2)	24.5 ± 2.5	25.0 ± 3.0	.89

Data are expressed as mean ± SD or n (%). The *P* values were analyzed using independent sample *t* test or Kruskal–Wallis test.

Table 2

Analysis the effect of transitional care and usual care on parameters in patients with transient ischemic attack.

	Usual care	Transitional care	*P* value
Physical function			
Mild	43 ± 5	56 ± 6	.028*
Moderate	36 ± 8	45 ± 5	.006**
Severe	25 ± 6	37 ± 6	.002**
QI score			
Mild	20 ± 4	25 ± 4	.046*
Moderate	16 ± 3	20 ± 3	.004**
Severe	8 ± 2	14 ± 3	.002**
Ischemic neurological score			
Mild	6 ± 2	3 ± 1	.040*
Moderate	9 ± 2	5 ± 2	.005**
Severe	12 ± 3	8 ± 2	.004**
Hospital stay			
Mild	8 ± 2	6 ± 2	.012*
Moderate	14 ± 3	11 ± 3	.036*
Severe	18 ± 4	15 ± 3	.038*

Data are expressed as mean ± SD. The *P* values were analyzed using independent sample *t* test.

*$P < .05$.

**$P < .01$.

3.3. Comparing the effect of transitional care on recurrence of TIA

Recurrence of TIA was compared in TIA patients between transitional care and usual care group (Table 3). Outcomes showed that patients in transitional care group decreased recurrence of TIA in moderate and severe groups ($P < .01$). Data found that there was no significant difference of recurrence rate in patients with mild TIA between transitional care and usual care groups ($P > .05$).

3.4. Satisfaction with care quality of patients with TIA after discharge to home

The satisfaction with care quality was reported in patients with TIA after discharge to home between 2 groups. No significant differences of death rate were found between transitional care and usual care during hospitalization. Satisfaction of patients with moderate and severe TIA after discharge to home in transitional care group was higher than those patients in usual care group ($P < .05$). Transitional care markedly improved the communication capacity of patients with moderate and severe TIA compared to patients in usual care group ($P < .05$). There were no significant differences of satisfaction and communication capacity in mild TIA patient's transitional care and usual care groups ($P > .05$). Data also found that transitional care significantly increased physical function of mild ($P < .05$), moderate ($P < .01$), and severe ($P < .01$) patients with TIA after discharge to home compared to patients in usual care group (Table 4).

4. Discussion

A previous study showed that the transitional care significantly improves QoL in adult patients with systemic lupus erythematosus compared with the usual care group.[16] Multifaceted transitional care interventions across hospital and community settings are beneficial, with lower hospital readmission rates observed in those receiving more transitional intervention components.[17] Outcomes in this study showed that transitional care significantly improved physical function, QI score, ischemic neurological score, and hospital stay for patients with TIA compared with patients in usual care group.

Transitional care reduces readmissions and improves QoL for patients with end-stage heart failure after hospital discharge.[18] Results in this study demonstrated that transitional care significantly improved the patients' satisfaction compared to patients in usual care group. A study showed that effective transitional care requires excellent communication between acute and primary care providers, which has implications for integration and organization of care across settings and nursing competence.[19] Findings also indicated that transitional care intervention reduces all-cause readmission and mortality in patients with heart failure.[20] In this study, we observed that transitional care ameliorated patient reach, hospital-level sustainability physical function, ischemic neurological score, and composite QI. These data suggest routine use of transitional care would change the clinical symptoms and improve secondary prevention after TIA. In addition, Verhaegh *et al*[21] showed that transitional care intervention improves care transitions from hospital to home and reduces short-term readmissions. Furthermore, clinicians caring for patients with TIA should seek approach to improve physical function by nursing intervention.[22] The result was supported by previous research which suggested that lack of transitional care, follow-up arrangements, and poor communication contribute to frequent readmission and lower ischemic neurological score.

Patients with TIA have a relative high risk of recurrence and reasonable care of patients in the hospital is important to deliver efficacious ways for the prevention of recurrence of TIA.[23] Duncan *et al*[24] reported that patients with TIA who receive

Table 3

Analysis the effect of transitional care and usual care on of recurrence transient ischemic attack.

	Usual care	Transitional care	*P* value
Recurrence			
Mild	12 (5.5%)	10 (4.5%)	.074
Moderate	34 (15.8%)	17 (8.3%)	.005**
Severe	45 (21.4%)	22 (10%)	.004**

Data are expressed as n (%). The *P* values were analyzed using Kruskal–Wallis test.
**$P < .01$.

Table 4

Analysis the effect of transitional care and usual care on satisfaction communication capacity and physical function of transient ischemic attack after discharge to home.

	Transitional care	Usual care	*P* value
Satisfaction			
Mild	24 ± 4	26 ± 5	.068
Moderate	20 ± 5	25 ± 5	.040*
Severe	18 ± 6	26 ± 4	.036*
Communication capacity			
Mild	6 ± 2	7 ± 2	.508
Moderate	4 ± 2	6 ± 2	.042*
Severe	3 ± 1	5 ± 2	.030*
Physical function			
Mild	84 ± 10	89 ± 8	.040*
Moderate	72 ± 12	80 ± 7	.037*
Severe	57 ± 9	72 ± 10	.007**

Data are expressed as mean ± SD. A total of 12-month follow up was performed in this study. The *P* values were analyzed using independent sample *t* test, Mann–Whitney *U* test or chi-square test.
*$P < .05$.
**$P < .01$.

the comprehensive transitional care compared with those who receive no comprehensive transitional care may benefit in improving functional status, mortality, disability, and recurrence rate. Data in this study demonstrated that transitional care decreased recurrence of patients with TIA. Patients received transitional care not only provided implementation using hospital quality measures, hospital-level sustainability physical function, but also presented higher physical function and QI score. In comparison, significant changes in satisfaction and communication capacity in patients with TIA were observed, who received transitional care. Importantly, transitional care increased physical function of patients with TIA after discharge to home.

There are several limitations in this study. First, the investigation was conducted at a single center and only performed experiments in a local area in China. Second, medicine interventions of TIA patients were not summarized during investigation. Third, we did not collect the data on cost between transitional care and usual care intervention in all patients with TIA. Thus, further study with cost data should investigate between transitional care and usual care in multiple centers in different area in China.

5. Conclusion

In conclusion, data in this study demonstrated the benefits of transitional care in improving hospital quality measures, hospital-level sustainability physical function, ischemic neurological score, composite QI, recurrence of TIA, and satisfaction of patients with TIA, which is essential for the recovery of patients with TIA. This study showed that transitional care is an effective approach to improve QoL and physical function in patients with TIA and to reduce recurrence. Data in this study provided support for future research in this area. However, further studies are needed to identify the effects of transitional care in other type's patients.

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Author contributions

YXM, MJ, and YM contributed to the manuscript with substantial contributions to the conception and design of the work. LJJ and YJY made substantial contributions to the conception and design of the work and interpretation of the data. XWW designed this study and wrote manuscript.
Conceptualization: Jing Lin, Meiling Jiang.
Data curation: Jing Lin, Lan Yao, Meiling Jiang.
Formal analysis: Jing Lin.
Investigation: Jinmiao Liu, Meiling Jiang.
Methodology: Jinmiao Liu, Lan Yao, Meiling Jiang.
Project administration: Jinmiao Liu.
Resources: Jing Lin, Jinmiao Liu, Lan Yao.
Software: Jing Lin, Lan Yao.
Supervision: Jing Lin, Jinmiao Liu, Lan Yao, Meiling Jiang.
Writing – original draft: Jing Lin, Lan Yao.
Writing – review & editing: Lan Yao.

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