



Research Article

Effects of Multidisciplinary Team-Based Nurse-led Transitional Care on Clinical Outcomes and Quality of Life in Patients With Ankylosing Spondylitis

Limin Liang,¹ Yinghua Pan,² Danchun Wu,² Yongli Pang,¹ Yuanyuan Xie,² Hengying Fang^{1,*}

¹ Department of Nursing, The Third Affiliated Hospital of Sun Yat-sen University, Guangzhou, China

² Department of Immunology and Rheumatology, The Third Affiliated Hospital of Sun Yat-sen University, Guangzhou, China

ARTICLE INFO

Article history:

Received 22 August 2018

Received in revised form

21 February 2019

Accepted 22 February 2019

Keywords:

nurses

patient care team

quality of life

spondylitis, ankylosing

transitional care

ABSTRACT

Purpose: The purpose of this study is to investigate the impact of transitional care by a nurse-led multidisciplinary team (MDT) on clinical outcomes and quality of life of patients with ankylosing spondylitis.

Methods: A randomized control study design was used. Subjects were allocated randomly to an experimental group and a control group. The experimental group received intensive transitional care by a nurse-led MDT, whereas the control group received routine nursing care. Disease activity, spinal mobility, comprehensive function, health service utilization, and quality of life were assessed at the baseline and at six months with the Bath Ankylosing Spondylitis Metrology Index, the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), the Bath Ankylosing Spondylitis Functional Index (BASFI), a health service utilization questionnaire and version 2 of the Short Form-36 health survey.

Results: Compared with the baseline, the BASDAI, BASFI, emergency visits, hospitalizations, hospitalization days, and bodily pain, vitality, mental health, total score, and average score of version 2 of the Short Form-36 health survey were improved in the experimental group ($p < .05$), whereas only bodily pain, vitality, and role-emotional were improved in the control group ($p < .05$). At six months, the experimental group exhibited significantly more improvement on the BASDAI, BASFI, hospitalizations, all domains except Role-physical as well as total score and average score ($p < .05$) compared with the control group.

Conclusion: A MDT-based nurse-led transitional care improves clinical outcomes and quality of life of patients with ankylosing spondylitis. Future research should be carried out on modes of follow-up and family support.

© 2019 Korean Society of Nursing Science, Published by Elsevier Korea LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Ankylosing spondylitis (AS) is a chronic, progressive rheumatic disease characterized by ankylosis and inflammation of the axial skeleton, especially sacroiliitis [1]. The main clinical features are inflammatory back pain, joint stiffness, fatigue, and as a

consequence, poor health-related quality of life [2]. The prevalence of the world has been reported to be 0.21% to 1.9% [3], and the prevalence of 0.2% to 0.3% in China [4].

The best management of AS not only needs in-hospital care but also needs to be expanded to community and family. In-hospital care can alleviate severe pain and stiffness and slow down the progression of the disease but can not completely cure the disease. After the AS patients are discharged from hospital and return to their families, a series of problems in therapies and nursing may arise simultaneously, mainly involving diet, medication use, exercise, and emotional support; thus, persistent management is still needed. Compared with the in-hospital care, the transitional care after discharge may be even more important to patients with AS. Transitional care refers to a set of actions designed to ensure the

Limin Liang: <https://orcid.org/0000-0001-5895-1819>; Yinghua Pan: <https://orcid.org/0000-0003-0326-7432>; Danchun Wu: <https://orcid.org/0000-0002-2108-0041>; Yongli Pang: <https://orcid.org/0000-0001-6665-6772>; Yuanyuan Xie: <https://orcid.org/0000-0003-1499-204X>; Hengying Fang: <https://orcid.org/0000-0002-7835-6918>

* Correspondence to: Hengying Fang, Department of Nursing, the Third Affiliated Hospital of SunYat-sen University, 600 Tianhe Road, Guangzhou, 510630, China.

E-mail address: 1254866971@qq.com

<https://doi.org/10.1016/j.anr.2019.02.004>

p1976-1317 e2093-7482/© 2019 Korean Society of Nursing Science, Published by Elsevier Korea LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

coordination and continuity of health care as patients are transferred from hospital to home [5]. Plenty of studies have shown that transitional care is of great importance in promoting health status, reducing rehospitalization, and improving living quality of patients with chronic diseases [6–9]. However, most transitional care was mainly provided by nurses in mainland China, which showed a lack of teamwork, poor accessibility, and limited effect [10,11].

The multidisciplinary team (MDT) is a newly proposed medical model in recent years, which aims to provide the most effective and well-rounded care for patients through a group-coordinated decision-making from experts in related disciplines [12]. Currently, MDT model has been implemented for tumor-standardized treatments in Europe and America and has shown good results [13–15]. Positive results have also been reported in transitional care based on collaborations of MDTs [1]. But the effectiveness of MDT is influenced by the leader, the organization, the implementation, and the culture of the team [16], in which the leader is particularly of great importance.

Assessment in AS (ASAS)/European League against Rheumatism recommends pharmacological management and non-pharmacological management as two basic treatments of AS, in which nonpharmacological treatment mainly includes electrotherapy, manual therapy, spa therapy, and exercise therapy [17]. Thus, an effective management for AS involves the collaboration of doctors, nurses, therapists, and psychologists, and an MDT is quite necessary in transitional care of AS. Theoretically, the physical therapists and occupational therapists may play a crucial role in the continuous rehabilitation of patients with AS and may be the best candidates for the leading role. However, there is currently basically no occupational setting for professional therapists in China, and there are hardly any hospitals that have a full-time physical therapist. As a result, nurses tend to act as the organizers, planners, and implementers in the rehabilitation of patients. Some studies suggested that a nurse-led MDT may be able to guarantee a fixed leader, enhance the tightness of the team, and play a coordinating role in the transitional care process of standardization and implementation [18,19]. Therefore, this study intended to develop a nurse-led MDT model in AS transitional care and to assess its effects on clinical outcomes and quality of life.

Methods

Study design

The purpose of this study is to investigate the impact of transitional care by a nurse-led MDT on clinical outcomes and quality of life of patients with ankylosing spondylitis using a randomized control study design.

Setting and sample

The patients were recruited from the rheumatology department of a hospital in Guangzhou, China, between January 2015 and December 2017. With regards to our previous clinical trial [20], this study excluded patients who participated in the previous one of this study. The sample size for the participant selection was calculated by using the formula: $n = 2[(u_{\alpha} + u_{\beta})/(\delta/\sigma)]^2 + u_{\alpha}^2/4$. The minimum sample size required for a two-sided test with $\alpha = .05$, power $\beta = 80\%$, and $\delta/\sigma = 0.6$ [20] was 45 patients in both groups. Considering a dropout, we planned to recruit 50 patients in each group.

All patients met the following inclusion criteria: (1) AS was confirmed according to the New York criteria revised in 1984 [21]; (2) aged 16–60 years; (3) got at least a partial improvement judged by a doctor according to Assessment in Ankylosing Spondylitis

Working Group's improvement criteria [17] during in-hospital care; (4) have some ability to read and understand and can communicate with the researchers effectively. The Assessment in Ankylosing Spondylitis Working Group's improvement criteria are a commonly used assessment of curative effect. They contain the BASFI, spinal pain, overall assessment, and inflammatory activity; each item is improved but less than 20% means partial improvement; three of them improved more than 20% and the other one got no deterioration means ASAS20 improvement and so on [17]. Exclusion criteria were as follows: (1) the patients with heart failure, multiple sclerosis, severe chronic obstructive pulmonary disease, recurrent infection, lymphoma or other malignancies; (2) fibromyalgia, local pain caused by the lumbar or cervical spine oppression, accompanied with moderate to severe pain of nerve root or other parts that possibly confuse the AS-related pain assessment or self-assessment; (3) mental disorder or incompetence; (4) the patients cannot regularly participate in related course learning or go to the clinic for the scheduled visits that may cause the interruption of the study; (5) patients who declined to consent to the study.

They were allocated to the experimental group and the control group randomly. Numbers and the groups were generated randomly by a computer for random allocation. The study was approved by the Institutional Review Board of the hospital (Approval no. 200740), and all patients signed the informed consent.

Procedure

All patients were treated with drugs, and there were no restrictions with regard to the type of nonpharmacological intervention or to dose, duration, or route of administration.

Routine nursing was provided to the control group, which included the following: (1) at the time of each patient's visit, doctors or nurses provided relevant health education and answered the patient's questions. The health education mainly contained knowledge about disease, drug, and home-based rehabilitation; (2) provide written materials to the patient for health education; (3) once a month, a doctor-led rheumatology health education lecture was organized for the patients to participate in if they wanted.

The nurse-led MDT transitional care that was provided to the experimental group included the following: (1) establishing an MDT composed of rheumatological nurses, rheumatological doctors, psychology specialists, rehabilitation specialists, and volunteer patients. Nurses were responsible for the arrangement of the follow-up, health education, online communication, and referrals among MDT members. The main tasks of rheumatological doctors were disease assessment, drug adjustment, and some of health education and online communication. If patients had any psychological problem or rehabilitation needs, psychology specialists or rehabilitation specialists would take part in the follow-ups. Volunteer patients would exchange their experiences in the certain health educational lectures. (2) Assessing the patient's symptoms and signs, knowledge of medications and rehabilitation regimens, and recovery demands at discharge. (3) One week after discharge, outpatient visits, telephone interviews, or home visits were started, the first month, once a week, the second month, once every two weeks, and once a month thereafter, for a total of 6 months. The preferred method was educational outpatient clinic visits, if permitted; if the patient—although living in Guangzhou—could not visit the hospital because of mobility reasons, the home visit was conducted; for a patient living out of Guangzhou and with an inconvenient transportation, telephone interview was used. All the follow-ups were arranged by the nurse, and in case of different conditions, the patient was referred to rheumatologists, specialized nurses, psychiatric specialist or rehabilitation specialist to accept health education, psychological support or intervention,

and rehabilitation guidance. (4) Attending ankylosing spondylitis health education lectures once a month, for a total of six months. The six lectures included disease knowledge, joint protection methods, development and implementation of exercise programs, drug treatment programs, nutrition, how to control pain, how to improve communication skills and relaxation techniques, and how to solve health-related problems. The whole course was cotaught by doctors, nurses, and volunteering patients. To facilitate the participation, each lecture was held four times a month and provided in each week of the month. Patients could choose any of the date to ensure that they could participate in the whole course. Printed materials in agreement with the course were provided to the patient simultaneously. (5) Accessing the medical staff-patient communication platform 'Ankylosing Spondylitis Care Network' which provided real-time online communication and timely responses to patients. Patients could log into the platform at any time to ask disease-related questions. The nurses assigned a team member to be on online duty for answering the questions every day. Questions that could not be explained accurately for the time being should be recorded, and other members of the MDT should reply to the patients after obtaining accurate answers.

For example, a 28-year-old man patient diagnosed with AS due to repeated low back pain for more than 2 years was recruited to the experimental group. He exhibited a worse spinal mobility, disease activity, and comprehensive function at discharge. The doctor prescribed him nonsteroidal anti-inflammatory drugs and disease-modifying antirheumatic drugs. He accepted outpatient visits mainly for rehabilitation guidance for 6 months because of living in Guangzhou, once a week for the first month, once every two weeks for the second month, and once a month for the next 4 months. He also attended the health education lectures once a month for 6 months. During the intervention, he consulted about medication and follow-up appointment through the online platform.

Measurements

Clinical outcomes and quality of life were evaluated at the baseline and after 6 months (end of study). Clinical outcomes were assessed by disease-specific indexes and health service utilization. Disease-specific indexes included the Bath Ankylosing Spondylitis Metrology Index (BASMI), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), and Bath Ankylosing Spondylitis Functional Index (BASFI) which were most commonly used disease assessment indexes recommended by ASAS/European League against Rheumatism [17]. Assessments were insisted of questionnaires and physical examination. Personal characteristics, patient's feeling, experience, and medication were self-reported in a questionnaire. All physical measures were recorded by an experienced rheumatologist.

Disease-specific indexes

The BASMI [21] was used to evaluate spinal mobility of patients with AS; it includes five indicators which are ear wall distance, neck rotation, lumbar scoliosis, lumbar flexion, and intermalleolar distance. According to the measured values, each indicator is scored as 0, 1, and 2 points. The total score is the sum of the five indicators' scores and can range from 0 and 10 points. The lower the score is, the better the spinal mobility is.

The BASDAI [22] reflects disease activity in AS, including fatigue, axial and peripheral joint pain, morning stiffness, and tendon pain, with six questions. The questions were answered by the patients to evaluate their symptoms in the last week. The former five questions are assessed with the 10-cm visual analog scale method, and the maximum score is 10 points. The last question is scored based on the

duration of morning stiffness, which is divided into 0, 30, 60, 90, and 120 minutes, respectively, and the scores are 0, 2.5, 5, 7.5, and 10 points accordingly. The total score is 0 to 10 points calculated with a formula. The higher the score is, the more active the disease is.

The BASFI [23] was used for evaluating the comprehensive functional status of patients with AS. A total of 10 questions were answered, and the 10-cm visual analog scale method is used for recording. The score of each question is 0 to 10 points, and the total score is the average score of each question. The higher the total score is, the worse the function is.

Health service utilization

Health services utilization was determined with a questionnaire developed by the Stanford University School of Medicine [24]. The questionnaire consists of four indicators: outpatient visits, emergency visits, hospitalizations, and hospitalization days. The test-retest reliability of the questionnaire was .76–.97.

Quality of life

The quality of life was measured by the Chinese version 2 of Short Form-36 health survey (SF-36v2) from QualityMetric Incorporated. This scale has been tested in the Chinese population and was verified to have a good reliability and the Cronbach's α of the total SF-36v2 was .92 [25,26]. It includes thirty-six items with one item evaluating the reported health transition and the other thirty-five items measuring eight dimensions: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH). The score of each dimension is calculated according to the scoring rule of the scale. The higher the score of each dimension is, the better the quality of life is.

Data analysis

Statistical analyses were conducted using Statistical Package for the Social Sciences, SPSS version 16.0 (IBM Corp., Armonk, NY, USA). For the descriptive analysis of all variables, mean and standard deviation of measured scores were used for quantitative variables in accordance with normal distribution, median and quartile were used for quantitative variables consistent with non-normal distribution, and percentage was adopted to describe qualitative variables. Baseline demographics and disease features were compared between two groups. *t* test was carried out for quantitative data, whereas Chi-square test was carried out for qualitative data. *t* test was performed on quantitative variables in accordance with normal distribution between two groups at baseline and before and after intervention in each group, whereas Mann-Whitney U test was for quantitative variables consistent with non-normal distribution. Analysis of Covariance was performed with the baseline scores as covariables and the scores of them after treatment as dependent variables. For the variables not consistent with normal distribution, the independent two-sample *t* test was conducted on score improvement difference between groups. Cohen's *d* or partial eta-squared was calculated as effect size (ES). Two-tailed tests and a 5% significance level were used in all analyses.

Results

Demographics

A total of 100 patients were enrolled and randomized, 49 in the experimental group and 51 in the control group. Five patients from the control group dropped out during the intervention period because of not participating in the follow-up on time. So, 95 patients completed the study (49 in the experimental group, 46 in the

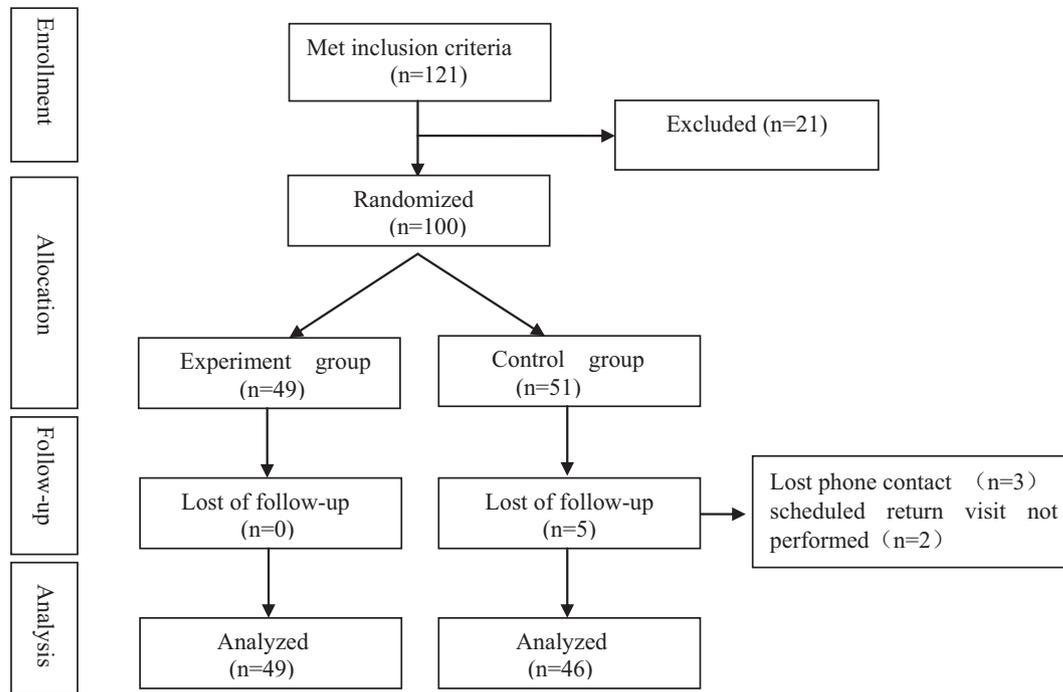


Figure 1. Flowchart of participants in the study.

control group) (Figure 1). No statistical difference in gender, age, education level, family history, disease duration, or NSAIDs usage and DMARDs usage existed between the two groups (Table 1). Therefore, the two groups were considered homogenous.

Implementation of the transitional care

In the experimental group, patients received 490 follow-ups; of which, 73.5% were telephone interviews and 26.5% were outpatient visits, whereas patients in the control group performed 47 outpatient visits. Only 22.1% of patients in the experimental group completed the monthly lectures. Four nonrheumatological experts participated in the intervention of the experimental group during the study. The online platform exchanged 1,395 online answers to the total number of 558 questions. Patients in the experimental group adhered to medication with good compliance, while exercise compliance was slightly lower than medication compliance, with a gradual downward trend (Figure 2).

Effect of the MDT-based nurse-led transitional care on clinical outcomes and quality of life

Compared with baseline values, the scores of the BASDAI ($t = 4.40, p < .001$); BASFI ($Z = -2.07, p = .039$), emergency visits ($Z = -2.15, p = .032$), hospitalizations ($Z = -4.41, p < .001$), hospitalization days ($Z = -3.87, p < .001$) and BP ($t = -5.07, p < .001$), VT ($t = -3.85, p < .001$), MH ($t = -4.18, p < .001$), total score ($t = -3.18, p < .001$), and average score ($t = -3.74, p < .001$) of SF-36v2 were improved in the experimental group (Table 2). However, only BP ($t = -2.37, p = .022$), VT ($t = -2.08, p = .044$) and RE ($Z = -2.15, p = .032$) of SF-36v2 were improved in the control group (Table 2).

At the baseline, there were no significant differences in the BASMI, outpatient visits, emergency visits and RP, VT, SF, RE, MH, total score and average score of SF-36v2 between two groups. After 6 months, eliminating the influence of baselines, the experimental group exhibited significant score improvement in the BASDAI

($F = 13.76, p < .001, ES = .18$), BASFI ($t = -2.33, p = .022, ES = .05$), hospitalizations ($t = -2.51, p = .014, ES = .06$), and PF ($t = 2.13, p = .036, ES = .05$), BP ($F = 10.70, p = .002, ES = .18$), GH ($F = 7.59, p = .007, ES = .17$), VT ($F = 7.62, p = .007, ES = .10$), SF ($F = 4.31, p = .041, ES = .05$), RE ($t = 1.34, p = .011, ES = .07$), MH ($F = 19.16, p < .001, ES = .17$), total score ($F = 14.82, p < .001, ES = .14$) and average score ($F = 14.92, p < .001, ES = .15$) of SF36v2 compared with control group (Table 3).

Table 1 Baseline Characteristics of the Experiment Group and Control Group (N = 95).

Variable	Experiment group (n = 49)	Control group (n = 46)	χ^2 or t	p
	Mean \pm SD or n(%)	Mean \pm SD or n(%)		
Age (yrs)	29.22 \pm 8.30	31.07 \pm 11.05	-0.90	.370
Gender			0.44	.508
Man	40 (82.0)	35 (76.0)		
Woman	9 (18.0)	11 (24.0)		
Highest education			2.99	.560
University or above	20 (40.8)	15 (32.6)		
Senior high school	11 (22.4)	11 (23.9)		
Junior high school	16 (32.7)	17 (37.0)		
Primary school	0 (0.0)	2 (4.5)		
Other	2 (4.1)	1 (2.0)		
Family history			1.67	.197
None	35 (71.4)	38 (82.6)		
Yes	14 (28.6)	8 (17.4)		
Mean disease duration (yrs)	5.46 \pm 4.86	7.14 \pm 6.05	-1.50	.138
Drug usage			2.37	.306
NSAIDs	45 (91.3)	46 (100.0)		.118*
DMARDs	34 (69.6)	30 (64.7)	0.19	.665
Biologics	23 (47.8)	35 (76.5)	8.48	.004

Note. DMARDs = disease-modifying antirheumatic drugs; NSAIDs = nonsteroidal anti-inflammatory drugs; SD = standard deviation; yrs = years.

* Fisher exact test.

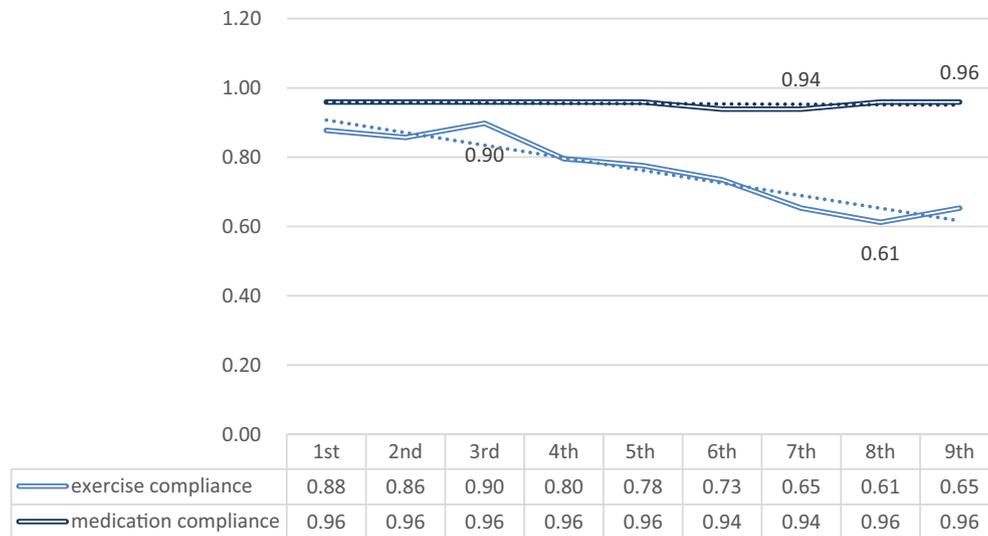


Figure 2. Tendency of exercise and medication compliance in the experiment group.

Discussion

This study developed a 6-month, nurse-led MDT transitional care for adults with AS in which an MDT composed of rheumatological nurses, rheumatologists, psychology specialists, rehabilitation specialists, and volunteering patients was established. On the basis of the MDT, nurses arranged follow-ups for patients including outpatient visits, telephone interviews, or home visits. The follow-up may be carried out by rheumatologists, specialized nurses, psychiatric specialists, or rehabilitation specialists depending on patients' condition. Patients can get health education, psychological support, and rehabilitation guidance through the follow-up. In addition, monthly health education lectures and online communication platform provided patients more opportunities for health-related knowledge learning and problem solving. Hu et al [10]

carried out a WeChat-based transitional care mainly including online follow-up and health education for patients with AS. Nurse specialists or community nurses also played an important role in continuing care for other patients with chronic conditions by providing relevant nursing interventions [6,12]; some researchers even used nurse-supervised exercise or nurse-led telephone follow-up to carry out continuing care in some studies [19,27]. Overall, positive results have been presented in these studies. Thus, compared with routine care, the nurse-led MDT transitional care for patients with AS in this study would make the in-hospital care extend to family, by which patients could get more beneficial interventions from medical personnel and achieve a better outcome.

The nurse-led MDT transitional care may improve disease activity and comprehensive function of patients with AS. The results of the study show that compared with the baseline values, the scores

Table 2 Comparison of the Baseline and 6 Months for the Experiment Group and Control Group (N = 95).

Variable	Experiment group (n = 49)				Control group (n = 46)			
	Baseline	6 months	t or Z	p	Baseline	6 months	t or Z	p
	Mean ± SD or M (QR)	Mean ± SD or M (QR)			Mean ± SD or M (QR)	Mean ± SD or M (QR)		
BASMI	1.00 (1.00)	1.00 (1.00)	-0.81	.417	2.00 (4.00)	2.00 (3.25)	-0.10	.918
BASDAI	2.38 ± 1.49	1.50 ± 1.37	4.40 ^a	<.001	3.23 ± 1.72	3.03 ± 1.88	1.24 ^a	.221
BASFI	0.68 (2.30)	0.16 (1.25)	-2.07	.039	1.80 (3.40)	1.62 (3.14)	-0.31	.755
Outpatient visits (time)	2.00 (3.00)	2.00 (3.00)	-0.25	.803	1.50 (3.25)	1.00 (3.00)	-0.88	.379
Emergency visits (time)	0.00 (0.00)	0.00 (0.00)	-2.15	.032	0.00 (0.00)	0.00 (0.00)	-0.48	.633
Hospitalizations (time)	0.00 (0.00)	0.00 (0.00)	-4.41	<.001	0.00 (0.00)	0.00 (0.00)	-1.41	.160
Hospitalization days (d)	0.00 (4.00)	0.00 (0.00)	-3.87	<.001	0.00 (0.00)	0.00 (0.00)	-1.52	.128
SF36 v2								
PF	85.00 (35.00)	90.00 (15.00)	-1.40	.161	75.00 (27.50)	75.00 (36.25)	-0.26	.796
RP	0.00 (62.50)	25.00 (75.00)	-0.76	.448	0.00 (25.00)	0.00 (25.00)	-1.19	.233
BP	54.76 ± 21.60	65.67 ± 16.26	-5.07 ^a	<.001	42.98 ± 17.66	49.09 ± 19.65	-2.37 ^a	.022
GH	56.41 ± 24.45	60.49 ± 18.50	-1.73 ^a	.091	41.50 ± 21.54	44.72 ± 17.28	-1.43 ^a	.159
VT	57.76 ± 16.83	64.69 ± 13.56	-3.85 ^a	<.001	52.07 ± 15.26	55.65 ± 13.61	-2.08 ^a	.044
SF	68.63 ± 24.03	73.04 ± 18.09	-1.65 ^a	.106	68.24 ± 21.16	66.35 ± 19.34	0.65 ^a	.518
RE	0.00 (100.00)	33.00 (66.00)	-0.39	.695	0.00 (66.00)	0.00 (33.00)	-2.15	.032
MH	60.33 ± 18.72	68.24 ± 14.32	-4.18 ^a	<.001	65.67 ± 15.37	62.87 ± 11.70	1.84 ^a	.073
Total score	103.92 ± 19.36	110.92 ± 15.45	-3.18 ^a	<.001	97.80 ± 15.51	98.57 ± 15.49	-0.47 ^a	.644
Average score	2.90 ± 0.54	3.10 ± 0.44	-3.74 ^a	<.001	2.72 ± 0.43	2.75 ± 0.43	-0.51 ^a	.611

Note. BASDAI = Bath Ankylosing Spondylitis Disease Activity Index; BASFI = Bath Ankylosing Spondylitis Functional Index; BASMI = Bath Ankylosing Spondylitis Metrology Index; BP= bodily pain; d = day; GH = general health; M = median; MH = mental health; PF= physical functioning; QR = quartile; RE = role-emotional; RP = role-physical; SD = standard deviation; SF=social functioning; SF36v2 = The Medical Outcomes Survey 36-item short-form survey version 2; VT= vitality.

^a Paired t test.

Table 3 The Effect of Nurse-Led MDT Intervention on Disease Specificity Index, Health Service Utilization, and Quality of Life (N = 95).

Variable	Experiment group		t or Z	p	6 months		Control group	F or t	p	ES	
	Mean ± SD or M (QR)	Baseline			Mean ± SD or M (QR)	Experiment group					Mean ± SD or M (QR)
		Control group									
BASMI	1.00 (1.00)	2.00 (4.00)	-1.81	.071	1.00 (1.00)	2.00 (3.25)	-1.45	.149	.02		
BASDAI	2.38 ± 1.49	3.23 ± 1.72	-2.57 ^a	.012	1.50 ± 1.37	3.03 ± 1.88	13.76	<.001	.18		
BASFI	0.68 (2.30)	1.80 (3.40)	-2.56	.010	0.16 (1.25)	1.62 (3.14)	-2.33	.022	.05		
Outpatient visits (time)	2.00 (3.00)	1.50 (3.25)	-0.51	.612	2.00 (3.00)	1.00 (3.00)	1.58	.119	.03		
Emergency visits (time)	0.00 (0.00)	0.00 (0.00)	-1.64	.100	0.00 (0.00)	0.00 (0.00)	-1.68	.097	.03		
Hospitalizations (time)	0.00 (0.00)	0.00 (0.00)	-2.75	.006	0.00 (0.00)	0.00 (0.00)	-2.51	.014	.06		
Hospitalization days(d)	0.00 (4.00)	0.00 (0.00)	-1.99	.046	0.00 (0.00)	0.00 (0.00)	-0.96	.341	.01		
SF36 v2											
PF	85.00 (35.00)	75.00 (27.50)	-2.13	.033	90.00 (15.00)	75.00 (36.25)	2.13	.036	.05		
RP	0.00 (62.50)	0.00 (25.00)	-0.86	.391	25.00 (75.00)	0.00 (25.00)	1.85	.068	.04		
BP	54.76 ± 21.60	42.98 ± 17.66	2.90 ^a	.005	65.67 ± 16.26	49.09 ± 19.65	10.70	.002	.18		
GH	56.41 ± 24.45	41.50 ± 21.54	3.15 ^a	.002	60.49 ± 18.50	44.72 ± 17.28	7.59	.007	.17		
VT	57.76 ± 16.83	52.07 ± 15.26	1.72 ^a	.088	64.69 ± 13.56	55.65 ± 13.61	7.62	.007	.10		
SF	68.63 ± 24.03	68.24 ± 21.16	0.08 ^a	.933	73.04 ± 18.09	66.35 ± 19.34	4.31	.041	.05		
RE	0.00 (100.00)	0.00 (66.00)	-0.29	.773	33.00 (66.00)	0.00 (33.00)	1.34	.011	.07		
MH	60.33 ± 18.72	65.67 ± 15.37	-1.52 ^a	.133	68.24 ± 14.32	62.87 ± 11.70	19.16	<.001	.17		
Total score	103.92 ± 19.36	97.80 ± 15.51	1.69 ^a	.094	110.92 ± 15.45	98.57 ± 15.49	14.82	<.001	.14		
Average score	2.90 ± 0.54	2.72 ± 0.43	1.78 ^a	.078	3.10 ± 0.44	2.75 ± 0.43	14.92	<.001	.15		

Note. BASDAI = Bath Ankylosing Spondylitis Disease Activity Index; BASFI = Bath Ankylosing Spondylitis Functional Index; BASMI = Bath Ankylosing Spondylitis Metrology Index; BP= bodily pain; d = day; ES = effect size; GH = general health; M = median; MDT = multidisciplinary team; MH = mental health; PF= physical functioning; QR = quartile; RE = role-emotional; RP = role-physical; SD = standard deviation; SF = social functioning; SF36v2 = The Medical Outcomes Survey 36-item short-form survey, version 2; VT= vitality.

^a Independent two-sample t test.

on the BASDAI and BASFI after the six months' intervention significantly were improved in the experimental group but not for the control group. Also, when comparing between the groups, eliminating the impact of baseline values, the scores on the BASDAI and BASFI were much more improved in the experimental group after the intervention than in the control group with a large effect size on the BASDAI. In addition, patients in the intervention group showed a high medication and exercise compliance in the study. It demonstrates that the nurse-led MDT approach of transitional care outperforms the regular approach and has a positive effect on the mental feelings of patients and effectively relieves fatigue; waist, neck, and hip pain; and morning stiffness severity. This finding is consistent with other research on transitional care for AS by the groups of Hu et al [10] and Xiao et al [11]. Our study finds that the BASMI scores of the patients in both groups were, however, not improved. The BASMI is an objective index assessing the spine movement and also provides an objective assessment of the effectiveness of exercise, whereas the BASDAI and BASFI scores reflect more on the patients' subjective feeling. The lack of improvement of the BASMI scores may be attributed to low compliance or low effectiveness of patients' exercise or both. The exercise compliance of the experimental group in the study was 61%–90%, slightly lower than that of medication, and had a gradual decline over time. It implies that there remains room for improvement in exercise compliance. Besides, on the existing basis of exercise compliance, the exercise effectiveness should also be improved. During the transitional care in this study, most patients exercised at home without supervision of rehabilitation specialists; they only reported to the nurses whether they had exercised by word of mouth. The quality of the exercise was not evaluated scientifically. In future studies, it may be necessary to increase the guidance for effective rehabilitation exercise in the transitional care.

The nurse-led MDT transitional care may also improve the quality of life of patients with AS. The study results show that compared with the baseline values, the improvements on the total score, average score, and three domains (BP, VT, and MH) of quality of life were significantly improved in the experimental group after the six months' intervention. In the control group, only the scores

on the BP, VT, and RE of quality of life were improved. For the between-group comparisons, the score improvements on all domains except RP as well as total score and average score were higher in the experimental group than that in the control group with a large effect size on BP, GH, MH, total score, and average score. SF36 is a generic instrument of measuring health-related quality of life. It summarizes the patients' life quality from eight aspects including physical function, role limitations due to physical problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health. Studies have shown that exercise, disease knowledge education, self-management, and rehabilitation guidance can improve SF36 scores of AS or neurosurgical patients [7,20]. In this study, we provided patients with follow-up, medication education, rehabilitation, and psychological guidance through nurse-led MDT transitional care. Rehabilitation mainly focused on the flexibility exercise of the spine, including flexion and rotation of the cervical and lumbar vertebrae, as well as stretching exercise of the thorax, which would relieve bodily pain, improve spinal mobility, and physical vitality. Psychology specialists could help patients express their psychological experience and teach them how to deal with anxiety and depression. Health education could provide patients with knowledge of diseases, drugs, and rehabilitation, which is conducive to patients' self-management. Overall, the nurse-led MDT transitional care could improve not only physical-related function but also mental and social function; thus, the patients' life quality presented a better score.

The study measured the use of health services to assess the effectiveness of the continuous nursing of patients with AS. Compared with the baseline values, emergency visits, hospitalizations, and hospitalization days after six months of intervention were significantly reduced in the experimental group. Also, when comparing between the groups, the reduction of hospitalizations was significantly more in the experimental group than that in the control group. The results indicated that the nurse-led MDT model of continuous care was superior to the routine model in decreasing patients' need of hospitalizations due to its improvement on clinical outcomes and quality of life. This finding is consistent with

those reported by Counsell et al [28] and Fang et al [20]. Meanwhile, the study did not show a significant difference between the two groups in the number of outpatient and emergency treatments. This may be explained by the fact that AS is a chronic disease, for which there is generally only a low number of emergencies, which is the case for patients in both groups. In addition, AS is generally common in young adults, who are the main group of people working in the society. Their working status will cause relatively low subsequent outpatient visit rates. In addition, although outpatient visits were required for the patients according to doctors' orders, the experimental group still showed a low follow-up visit rate of the outpatient clinic (i.e., merely 26.5%) which may also lead to the small effect size on hospitalizations and indicates that the patients with AS may actually prefer telephone follow-ups. Some researchers have developed a telephone-based continuing care and have achieved good results [27,29,30]. Developing the likes of telephone follow-up may be a feasible way to carry out continuous nursing for patients with AS.

Undoubtedly, the study has some limitations. First, in terms of the forms of follow-up visits, the proportion of the telephone follow-up is 73.5% and that of outpatient follow-up is 26.5%, whereas in the control group all of the patients were required to come in for outpatient visits. It indicates that in future research on the continuous nursing of patients with AS, the percentage of telephone interviews and network versus outpatient visits should be similar to those in the experimental group to guarantee the effect and effectiveness of follow-ups. Second, the study did not involve family members into the MDT. For the continuous nursing, after the patients with AS are discharged and return to their family, it is necessary to motivate family members and explore their potential to assist in implementing the continuous nursing. Third, only 22.1% of patients in the experimental group completed the monthly lectures. Most patients are about 30-years-old and have a full-time work in this study, so it may be difficult for them to attend all the lectures considering off work and the remote distance. Therefore, whether the lectures are necessary or not and whether to develop online lectures or not need to be studied in the future.

Conclusion

This study developed a nurse-led transitional care model for patients with AS that combines telephone follow-up or outpatient follow-up, health education, and real-time communication through networking platform based on MDT. It tested the effects of this model on the clinical outcomes and quality of life. The study provides evidence that the MDT-based nurse-led transitional care improves disease activity, comprehensive function, and quality of life and reduces hospitalizations in patients with AS. This indicates that the nurse-led MDT has significant clinical benefits and should be applied in transitional care for patients with AS. The study also suggests that future research should be carried out on modes of follow-up and social support.

Acknowledgments

The authors of this study would like to thank all the people from the third affiliated hospital of Sun Yat-sen University who have provided them with support and help in this study and during the writing of this article.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.anr.2019.02.004>.

Conflicts of interest

No actual or potential conflicts of interests have been declared by the authors.

References

- Kjeken I, Bø I, Rønningen A, Spada C, Mowinckel P, Hagen KB, et al. A three-week multidisciplinary in-patient rehabilitation programme had positive long-term effects in patients with ankylosing spondylitis: a randomized controlled trial. *J Rehabil Med*. 2013;45(3):260–7. <https://doi.org/10.2340/16501977-1078>
- Leung YY, Lee W, Lui NL, Rouse M, McKenna SP, Thumboo J. Adaptation of Chinese and English versions of the ankylosing spondylitis quality of life (ASQoL) scale for use in Singapore. *BMC Musculoskelet Disord*. 2017;18:353. <https://doi.org/10.1186/s12891-017-1715-x>
- Stolwijk C, Boonen A, van Tubergen A, Reveille JD. Epidemiology of spondyloarthritis. *Rheum Dis Clin N Am*. 2012;38(3):441–76. <https://doi.org/10.1016/j.rdc.2012.09.003>
- Zhu TY, Tam LS, Lee VW, Hwang WW, Li TK, Lee KK, et al. Costs and quality of life of patients with ankylosing spondylitis in Hong Kong. *Rheumatology*. 2008;47(9):1422–5. <https://doi.org/10.1093/rheumatology/ken287>
- Son YJ, You MA. Transitional care for older adults with chronic illnesses as a vulnerable population: theoretical framework and future directions in nursing. *J Korean Acad Nurs*. 2015;45(6):919–27. <https://doi.org/10.4040/jkan.2015.45.6.919>
- Li P, Gong Y, Zeng G, Ruan L, Li G. A new mode of community continuing care service for COPD patients in China: participation of respiratory nurse specialists. *Int J Clin Exp Med*. 2015;8(9):15878–88.
- Alimohammadi N, Eslami M, Yousefi H, Tabesh H. The effect of continuing care on patient's quality-of-life after disc surgery in neurosurgery and very important person wards. *J Educ Health Promot*. 2015;4:106. <https://doi.org/10.4103/2277-9531.171820>
- Chen HM, Han TC, Chen CM. The effectiveness of continuing care models in patients with chronic diseases: a systematic review. *Hu Li Za Zhi*. 2014;61(2):74–83. <https://doi.org/10.6224/JN.61.2.74>. Chinese.
- Lenaerts E, Matheï C, Matthys F, Zeeuwus D, Pas L, Anderson P, et al. Continuing care for patients with alcohol use disorders: a systematic review. *Drug Alcohol Depend*. 2014;135:9–21. <https://doi.org/10.1016/j.drugalcdep.2013.10.030>
- Hu ZF, Wan CX, Xu L, Huang Y. The effectiveness of wechat-based transitional care in patients with ankylosing spondylitis. *Chin J Nurs*. 2015;50(2):175–8. Chinese.
- Xiao YY, Liu XM. Application research on interactive nursing model of three main body and double tracks in continuity of care of ankylosing spondylitis patients. *Chin Nurs Res*. 2016;30(12B):4449–51. Chinese.
- Wilkes L, Cioffi J, Cummings J, Warne B, Harrison K. Clients with chronic conditions: community nurse role in a multidisciplinary team. *J Clin Nurs*. 2014;23(5-6):844–55. <https://doi.org/10.1111/jocn.12245>
- Bonvento B, Wallace S, Lynch J, Coe B, McGrath BA. Role of the multidisciplinary team in the care of the tracheostomy patient. *J Multidiscip Healthc*. 2017;10:391–8. <https://doi.org/10.2147/JMDH.S118419>
- Ryan T, Harrison M, Gardiner C, Jones A. Challenges in building interpersonal care in organized hospital stroke units: the perspectives of stroke survivors, family caregivers and the multidisciplinary team. *J Adv Nurs*. 2017;73(10):2351–60. <https://doi.org/10.1111/jan.13313>
- Chan WX, Lin W, Wong RC. Transitional care to reduce heart failure readmission rates in South East Asia. *Card Fail Rev*. 2016;2(2):85–9. <https://doi.org/10.15420/cfr.2016.9.2>
- Munro AJ, Swartzman S. What is a virtual multidisciplinary team (vMDT)? *Br J Cancer*. 2013;108(12):2433–41. <https://doi.org/10.1038/bjc.2013.231>
- Braun J, van den Berg R, Baraliakos X, Boehm H, Burgos-Vargas R, Collantes-Estevez E, et al. 2010 update of the ASAS/EULAR recommendations for the management of ankylosing spondylitis. *Ann Rheum Dis*. 2011;70(6):896–904. <https://doi.org/10.1136/ard.2011.151027>
- Kielly J, Kelly DV, Asghari S, Burt K, Biggin J. Patient satisfaction with chronic HIV care provided through an innovative pharmacist/nurse-managed clinic and a multidisciplinary clinic. *Can Pharm J (Ott)*. 2017;150(6):397–406. <https://doi.org/10.1177/1715163517734236>
- Tao X, Chow SK, Wong FK. The effects of a nurse-supervised home exercise programme on improving patients' perceptions of the benefits and barriers to exercise: a randomised controlled trial. *J Clin Nurs*. 2017;26(17-18):2765–75. <https://doi.org/10.1111/jocn.13798>
- Fang H, Cai W, Pan Y, Wu D, Liang L. Six-month home-based exercise and supervised training in patients with ankylosing spondylitis. *Int J Clin Exp Med*. 2016;9(3):6635–41.
- Jenkinson TR, Mallorie PA, Whitelock HC, Kennedy LG, Garrett SL, Calin A. Defining spinal mobility in ankylosing spondylitis (AS). The Bath AS Metrology index. *J Rheumatol*. 1994;21(9):1694–8.
- Garrett S, Jenkinson T, Kennedy LG, Whitelock H, Gaisford P, Calin A. A new approach to defining disease status in ankylosing spondylitis: the Bath Ankylosing Spondylitis Disease Activity Index. *J Rheumatol*. 1994;21(12):2286–91.

23. Calin A, Garrett S, Whitelock H, Kennedy LG, O'Hea J, Mallorie P, et al. A new approach to defining functional ability in ankylosing spondylitis: the development of the Bath Ankylosing Spondylitis Functional Index. *J Rheumatol*. 1994;21(12):2281–5.
24. Self-Management Resource Center (SMRC). Health care utilization [Internet]. Palo Alto, CA: SMRC; 2017 [cited 2017 Feb 10]. Available from: https://www.selfmanagementresource.com/docs/pdfs/English_-_health_care_utilization.pdf
25. Zhou K, Zhang M, Wu Q, Ji ZH, Zhang XM, Zhuang GH. Reliability, validity and sensitivity of the Chinese (simple) Short Form 36 Health Survey version 2 (SF-36v2) in patients with chronic hepatitis B. *J Viral Hepat*. 2013;20(4):e47–55. <https://doi.org/10.1111/jvh.12030>
26. Zhao L, Liu Z, He Y, Li N, Liu D. Survey on the applicability of SF-36 version-2 (SF-36v2) in assessment quality of life among urban residents in Chengdu city. *Zhonghua Yufang Yixue Zazhi*. 2014;48(5):370–4. <https://doi.org/10.3760/cma.j.issn.0253-9624.2014.05.008>. Chinese.
27. Szöts K, Konradsen H, Solgaard S, Bogø S, Østergaard B. Nurse-led telephone follow-up after total knee arthroplasty: content and the patients' views. *J Clin Nurs*. 2015;24(19-20):2890–9. <https://doi.org/10.1111/jocn.12905>
28. Counsell SR, Callahan CM, Tu W, Stump TE, Arling GW. Cost analysis of the geriatric resources for assessment and care of elders care management intervention. *J Am Geriatr Soc*. 2009;57(8):1420–6. <https://doi.org/10.1111/j.1532-5415.2009.02383.x>
29. Proctor SL, Wainwright JL, Herschman PL, Kopak AM. AiRCare: a naturalistic evaluation of the effectiveness of a protracted telephone-based recovery assistance program on continuing care outcomes. *J Subst Abus Treat*. 2017;73:9–15. <https://doi.org/10.1016/j.jsat.2016.10.003>
30. Eisenberg D, Hwa K, Wren SM. Telephone follow-up by a midlevel provider after laparoscopic inguinal hernia repair instead of face-to-face clinic visit. *J Soc Laparoendosc Surg*. 2015;19(1):e2014.00205. <https://doi.org/10.4293/JLS.2014.00205>