ORIGINAL ARTICLE

The effect of continuous care on self-management and disease activity of patients with ankylosing spondylitis after discharge

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Abstract

Objective: To examine the impact of continuous care post-discharge on self-management and disease activity in patients with ankylosing spondylitis.

Method: The study was conducted at Drum Tower Hospital, Nanjing, China, from January 2021 to August 2023, and comprised ankylosing spondylitis who were divided into control group A receiving routine care, and experimental group B receiving continuous care. Data on demographics, outpatient follow-up visits, self-management, and exercise compliance were collected and compared between the groups. Data was analysed using SPSS 25.

Results: Of the 78 patients, 39(50%) were in group A; 21(53.8%) males and 18(46.2%) females with mean age 37.36±9.48 years. There were 39(50%) patients in group B; 20(51.3%) males and 19(48.7%) females with mean age 39.56±12.04 years (p>0.05). Post-intervention self-management and quality of life scores were significantly better for group B compared to group A (p<0.05) The intergroup difference in terms of medication adherence at 8 weeks after discharge was significant (p<0.05).

Conclusion: Continuous care positively impacted outpatient follow-up frequency, self-management, medication compliance, exercise compliance, and quality of life.

Keywords: Continuing care, AS, Self-management, Disease activity, Quality of life. (JPMA 75: S-39 [Suppl. 02]; 2025)

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Introduction

Ankylosing spondylitis (AS) is a chronic, progressive inflammatory joint disease that seriously threatens the quality of life (QOL) and functionality of patients.[1] After discharge, AS patients need to practise self-management to control disease activity and alleviate symptoms, but due to AS particularities and complexity, they face many challenges in this regard.[2] AS is a chronic joint disease characterised by inflammation and ankylosis of the spine and pelvis.[3] This disease can cause stiffness and pain in the spine, seriously affecting patients' daily life and work abilities.[4] Therefore, self-management is crucial for AS patients. However, self-management of AS takes a lot of doing.[5] Firstly, AS is a complex disease, and its aetiology and pathogenesis are not fully understood, making treatment and management more difficult. Secondly, the symptoms and manifestations of AS vary. There are differences among different patients.[3,6] The self-management of AS includes medication therapy, physical therapy, exercise, and lifestyle adjustments. Drug therapy is the key to controlling disease activity and alleviating symptoms.[7,8] However, AS patients require long-term medication use.[9] Different drug combinations need to be tried to find the most suitable treatment plan. In addition, physical therapy and exercise are also necessary means of self-management.[10] Appropriate physical therapy can help improve joint flexibility and function and reduce pain and inflammation.[11] Exercise can enhance muscle strength and bone health, improving QOL.[12]

Continuous care is a nursing model that helps patients manage diseases and promote recovery by providing continuous care services.[13] This nursing model is critical in treating AS patients who require long-term care and management. Continuing care can provide comprehensive nursing support, including education, rehabilitation training, medication management, and psychological support.[14,15] Through education, patients can understand the condition and treatment methods of AS, learn how to use medication and rehabilitation training correctly, and how to cope with the impact of the disease on mental health. Rehabilitation training can help patients improve muscle strength and reduce pain and inflammation.[16,17] Drug management is an essential component of AS treatment. Continuing care can ensure that patients take medication on time and monitor the efficacy and side-effects. Psychological support can help patients cope with the physical and psychological challenges brought about by the disease and improve their QOL.[18] However, there currently needs to be more systematic research on the impact of continuous care on self-management and

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disease activity of AS patients after discharge.[19]

Continuous care has shown significant benefits for AS patients, particularly regarding self-management and disease activity after discharge.[20] Various studies have highlighted the importance of ongoing support and education in helping patients manage their condition more effectively, like, for instance, digital health tools and telehealth interventions.[21] These tools provide patients with easy access to information and support, which helps them maintain lower disease activity levels and improve their overall QOL.[22]

Moreover, nurse-led care programmes and educational interventions, such as those delivered through platforms like WeChat, have substantially improved patients' self-efficacy and self-care abilities.[23] These programmes not only reduce depressive symptoms, but also enhance health-related QOL (HRQOL) by empowering patients to take an active role in their care. The continuous care model fosters a supportive environment where patients feel more confident managing their symptoms, leading to fewer hospital readmissions and better long-term outcomes.[24]

Patient education plays a crucial role in this process. Well-informed patients are better equipped to handle the challenges of their condition, resulting in more effective self-management and reduced disease activity. The long-term effects of continuous care are particularly noteworthy, as sustained support helps patients maintain these improvements over time. Overall,[25] the integration of continuous care models, whether through digital tools, remote care, or nurse-led programmes, significantly enhances the ability of AS patients to manage their disease and improve their QOL.[26]

The current study was planned to examine the impact of continuous care post-discharge on self-management and disease activity in AS patients.

Patients and methods

The study was conducted at Drum Tower Hospital, Nanjing, China, from January 2021 to August 2023 and included patients with ankylosing spondylitis (AS). The study protocol was approved by the Ethical Review Committee (ERC) under number 2020-121-03 of Drum Tower Hospital, Nanjing, China. Patients were divided into two groups: control group A, which received routine care, and experimental group B, which received continuous care. The patients were included only if they met the AS New York diagnostic criteria[27] did not have significant organ diseases, had the ability to communicate and complete the experimental procedures, had no history of drug allergies, and were willing to participate. Patients aged >60 years, those with mental illnesses affecting communication, patients with other serious complications, and those unable to maintain communication with medical staff for particular reasons were excluded. After obtaining written informed consent from the patients, they were divided into the two groups based on availability.

Those in group A were provided routine treatment, including medication and non-medication therapies. Educational material provided information on disease knowledge, treatment plans, and psychological care to reduce anxiety and to improve treatment effectiveness. The patients were guided on diet rich in plant proteins and trace elements, such as soybeans, to aid muscle, bone, joint and tendon metabolism. Pain evaluation was conducted, and medication was dispensed as per the prescription. Posture correction and joint function exercises were emphasised to prevent joint deformities and contractures. The patients were also guided on appropriate sleep positions, smoking cessation, and avoiding disease triggers while adhering to functional exercises to promote recovery, and following a standardised medication regimen.

In group B, routine care was combined with additional education via a WeChat public platform. This platform regularly provides disease development information, medication guidance, dietary recommendations, and life management tips. The WeChat platform also provided video demonstrations of muscular column function exercises, with patients encouraged to engage in these exercises daily during remission periods. Follow-up calls were made on the second, fourth, sixth and eighth weeks after discharge to assess the patients' physical condition, medication adherence, completion of functional exercises, and overall recovery. Questions from patients were recorded and answered, and targetted solutions were provided.

The sample size was determined through power analysis[28] based on a medium effect size of 0.5, power 80%, and a significance level of 0.05. The sample was raised using convenience sampling technique.[29]

Data collected for each patient included age, gender, marital status, education, duration of illness, living conditions and body mass index (BMI) at the time of admission. Post-discharge follow-up visits were documented, and self-management behaviours, including emotional, daily life, medication, and exercise management domains, were assessed using a total score.[30] Medication adherence was assessed using the Morisky Medication Adherence Scale (MMAS),[31] with scores ranging 5-20, where higher scores indicated better adherence. Exercise compliance was evaluated using the Functional Exercise

Compliance Scale (FECS),[32] with scores ranging 14-56, where higher scores reflected better compliance. The Bath Ankylosing Spondylitis Functional Index (BASFI) was used to measure functional impairment, with score ranging 0-100, where higher scores indicated more severe impairment.[33] The disease activity was assessed using the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), with score ranging 0-10 for each of the five items. QOL was evaluated using a self-designed questionnaire with eight questions, each scored 0-10. Higher scores indicated a poorer QOL.

Data was analysed using SPSS 25. Qualitative data was described using frequencies and percentages, while quantitative data were presented as means ± standard deviation. Chi-square test was used for categorical data, while t-test was used for normally distributed quantitative data, and the rank sum test was used for median values with interquartile range (IQR). P<0.05 was considered statistically significant.

Results

Of the 78 patients, 39(50%) were in group A; 21(53.8%) males and 18(46.2%) females with mean age 37.36±9.48 years. There were 39(50%) patients in group B; 20(51.3%) males and 19(48.7%) females with mean age 39.56±12.04 years (p>0.05) (Table 1).

The number of OPD follow-up visits in group B significantly exceeded those in group A (Figure 1).

Self-management scores at baseline and post-intervention in group B showed no significant difference at baseline (p>0.05), but significant improvements were observed post-intervention (p<0.05) (Figure 2).

Self-management scores were not significantly different between the groups (p>0.05), but post-intervention scores were significantly better for group B compared to group A (Table 3).

Table-1: Patient characteristics.

Project	Experimental group (n=39)	Control group(n=39)	Statistical value	*p*-value
Gender				
Male	20	21	0.242	0.615
Female	19	18		
Mean Age(years)	39.56±12.04	37.36±9.48	0.403	0.346
Marital status				
Unmarried	1	2	0.346	0.856
Married	34	33		
Divorce	2	1		
Widow	2	3		
Education level				
Junior high school and below	13	9	0.215	0.648
High school or technical secondary school	9	11		
College degree or above	17	19		
Mean Time of illness(years)	7.23±3.45	8.01±3.45	0.229	0.895
Residence method				
Living Alone	3	2	0.223	0.645
Not living alone	36	37		
Mean BMI(kg/m^2)	22.06±4.23	23.16±5.12	2.165	0.623

BMI: Body mass index.

Table-2: Self-management scores at baseline and post-intervention in the experimental group.

Project	Before the experiment	After the experiment	*t*-test	*p*-value
Emotional management	10.05±4.45	10.06±4.65	0.001	0.998
Daily life management	15.70±4.78	15.89±4.69	-0.193	0.848
Medical management	15.66±4.82	14.81±4.73	-0.168	0.869
Sports Management	12.24±7.02	12.43±6.75	-0.135	0.896
Total score	54.12±15.67	56.61±15.21	-0.148	0.882

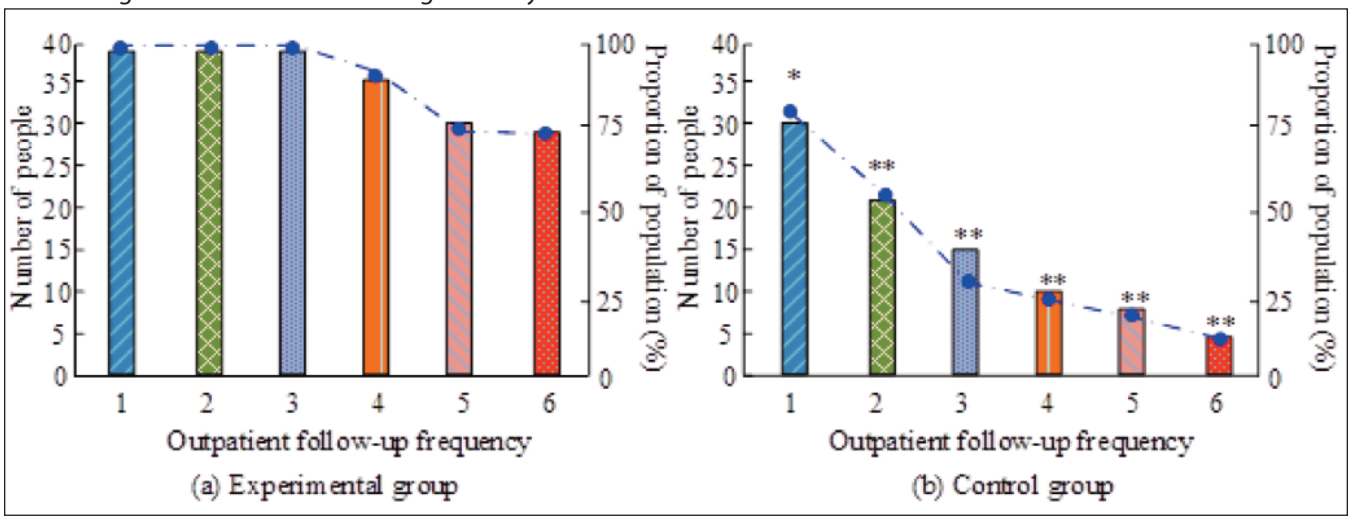

Figure-1: Intergroup comparison of the number of outpatient department (OPD) follow-up visits.
*The columns represent the number of follow-up visits, while the broken line indicates the follow-up ratio. *p<0.05, **p<0.001.*

The medication adherence score in group B decreased from 18.01±1.56 to 15.89±1.83, while in the group A, it decreased from 17.95±1.59 to 13.49±2.01 (p>0.05), but significant differences emerged post-intervention (p<0.05) (Figure 3).

Exercise compliance increased within both the groups, but after 8 weeks, exercise compliance in group B was better than in group A (Figure 4).

The BASFI score of group B decreased from 3.58±0.67 to 2.86±0.59, while that of group A decreased from 3.65±0.66 to 3.39±0.63 (p>0.05), but a significant difference emerged after 8 weeks (p<0.05) (Figure 5).

Disease activity in AS patients is evaluated using the BASDAI scoring tool. Table 4 presents the BASDAI scores of the two groups at discharge and 8 weeks after discharge. The CG's BASDAI (Table 4) and QOL (Table 5) scores showed significant intergroup differences (p<0.05).

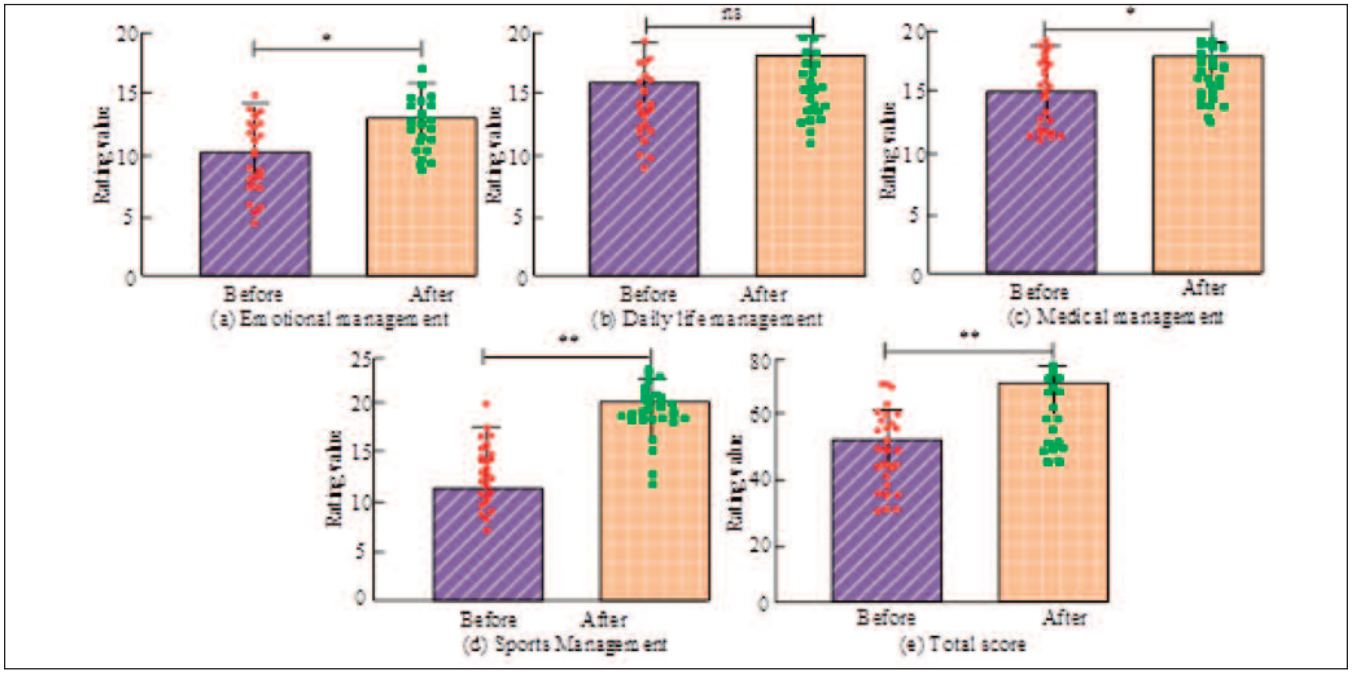

Figure-2: Group A comparison of self-management scores before and after the intervention.

*NS: Not significant, *p<0.05, **p<0.001.*

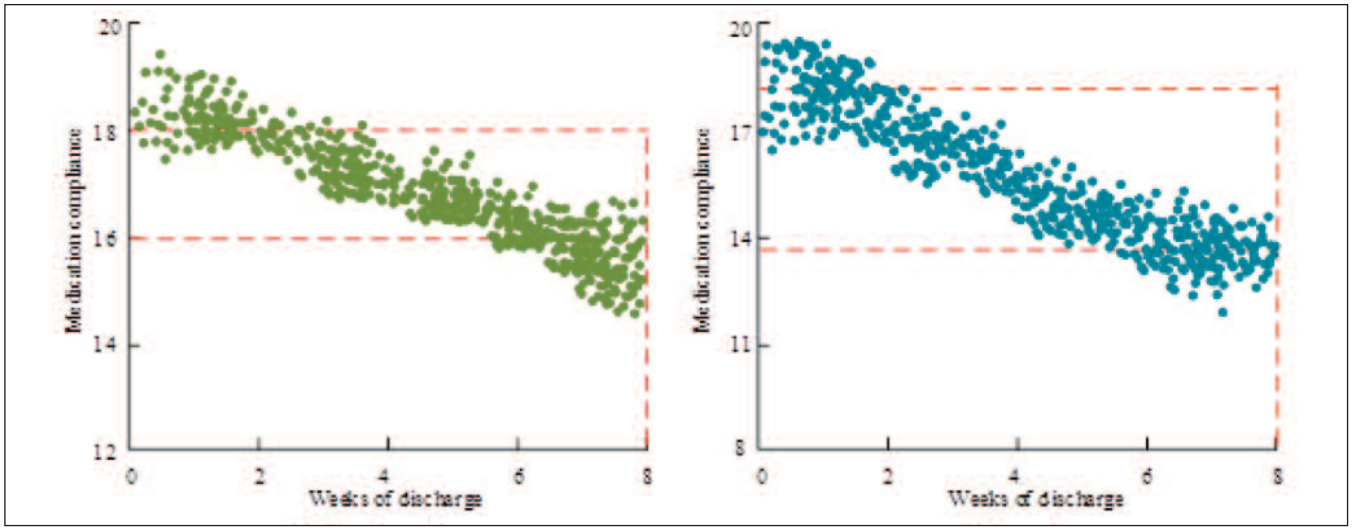

Figure-3: Intergroup comparison of compliance with medication from discharge to 8 weeks post-discharge.

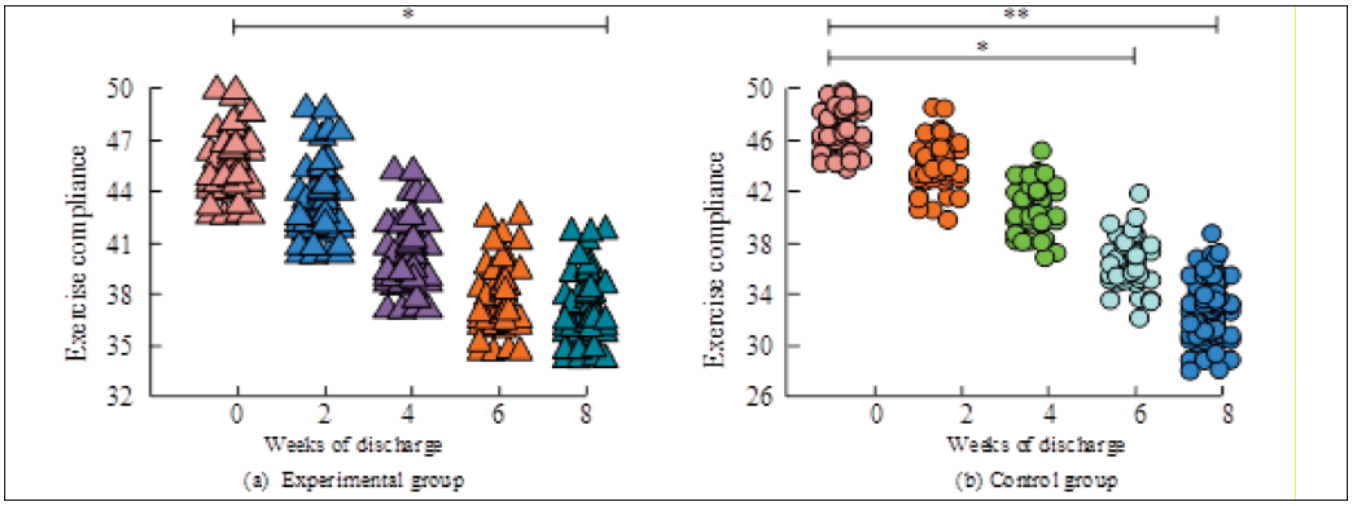

Figure-4: Intergroup comparison of compliance with exercise from discharge to 8 weeks post-discharge.

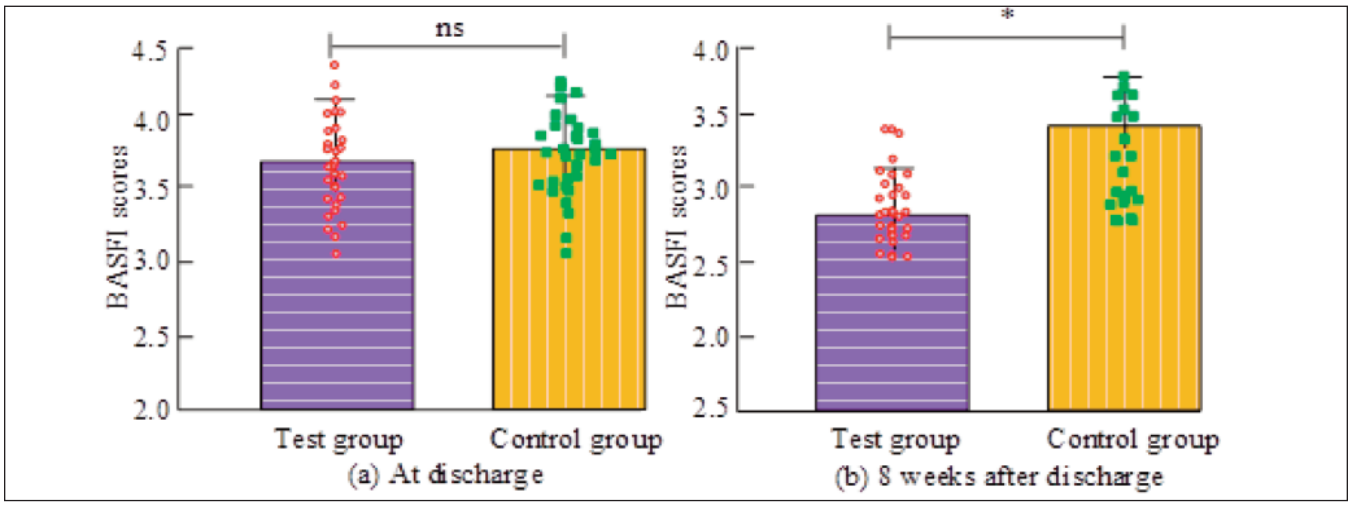

Figure-5: Intergroup comparison of Bath ankylosing spondylitis disease activity index scores from discharge to 8 weeks post-discharge.

Table-3: Intergroup comparison of self-management scores at baseline and post-intevention.

Stage	Experimental group (n=39)	Control group (n=39)	*t*-test	*p*-value
Before the experiment				
Emotional management	10.69±4.53	10.05±4.45	1.203	0.835
Daily life management	16.69±4.99	15.70±4.78	1.875	0.245
Medical management	14.91±5.67	15.66±4.82	1.035	0.841
Sports Management	12.09±5.88	12.24±7.02	1.075	0.889
Total score	54.38±17.06	54.12±15.67	1.058	0.953
After the experiment				
Emotional management	15.89±4.11	10.06±4.65	-3.549	<0.001
Daily life management	18.18±4.59	15.89±4.69	-2.479	0.014
Medical management	18.62±4.73	14.81±4.73	-4.035	<0.001
Sports Management	19.53±4.82	12.43±6.75	-6.178	<0.001
Total score	70.01±10.29	56.61±15.21	-5.132	<0.001

Table-5: Intergroup comparison of quality of life scores after the intervention.

Dimension	Experimental group (n=39)	Control group(n=39)	*t*-test	*p*-value
Physical activity	8.16±7.903	9.86±8.648	-1.039	0.035
Daily life behaviour	6.68±5.631	7.77±6.183	-0.915	0.364
Mental health	6.54±4.976	9.41±6.182	-2.498	<0.001
A sense of humiliation	2.84±2.631	4.05±3.271	-2.023	<0.001
Social support	2.23±2.227	3.01±2.694	-1.634	0.113
Cognition	4.93±2.974	6.48±3.176	-2.548	0.014
Exchange	1.69±2.026	2.13±2.236	-1.034	0.306
Physical discomfort	3.15±2.021	4.19±2.617	-2.225	0.027
Total score	36.15±22.612	46.85±24.246	-2.218	0.026

Table-4: Intergroup comparison of Bath ankylosing spondylitis disease activity index at discharge and 8 weeks post-discharge.

Group	n	At discharge	8 weeks after discharge	*z*-score	*p*-value
Control group	39	4.69±0.72	4.46±0.73	-2.364	0.603
Experimental group	39	4.73±0.67	4.05±0.76	-5.032	0.021
t-test	/	-0.567	-5.323	/	/
p-value	/	0.562	0.021	/	/

Discussion

AS is a chronic inflammatory joint disease affecting the sacroiliac and spine. Pain and stiffness in the lower back may gradually spread upwards, affecting the neck and chest.[34] Common symptoms include eye inflammation, valvulitis, lung lesions, and intestinal inflammation. Treatment includes medication and physical therapy, such as non-steroidal anti-inflammatory drugs (NSAIDs) and biologics, as well as physical exercise, physical therapy and rehabilitation training. Early diagnosis and treatment are crucial for controlling disease progression and improving QOL.[35] Studies have shown that if AS patients do not take medication on time, exercise regularly, and undergo regular outpatient follow-up after discharge, the disease will progress again, and lead to hospitalisation.[36] By taking proper medication and rehabilitation exercises, patients can improve their QOL and return to everyday life as soon as possible.[37,38] However, guiding AS patients to perform functional exercise is the weak link. Patients often fail to understand and execute functional exercises for a long time, leading to disease progression. Continuing care can solve this problem. By carrying out continuous care, nurses can effectively implement discharge guidance, including medication, functional exercise, psychology, diet and other aspects. Continuing care management helps AS patients receive complete and continuous rehabilitation education and guidance.[39,40] The continuity of care model can improve the self-management ability of chronic disease patients, enhance the nursing ability of their family caregivers, reduce the readmission rate, and effectively prevent the occurrence of adverse outcomes after discharge. Receiving continuing care can improve patients' satisfaction with nursing work, facilitate cooperation between nurses and patients, and thus improve patient compliance.[41] Research has shown that AS patients significantly improved their functions and disease activity after receiving continuous care.[42] Continuing care is a workg model that embodies humanised care, with the nursing staff providing education services for them even after discharge from hospital[43,44] Continuing care has essential implications for AS patients' compliance with medication and functional exercise, which can slow down the development of the disease and improve the QOL.[45,46]

To improve medication compliance, doctors and pharmacists can provide precise and clear medication instructions, answer questions, remind the patients to take medication, and use auxiliary means, such as medicine box segmentation devices, mobile applications, etc. When patients actively participate and take medication as per the prescription, drugs can play their best role and achieve better therapeutic effects. Therefore, continuous care has an essential impact on the self-management and disease activity of AS patients after discharge, which can improve the QOL and slow down disease development. The continuing nursing work system is worth promoting in managing all chronic disease patients.[47-49]

In line with the studies cited above, the current study also showed that AS patients receiving continuous care significantly improved their self-management and QOL scores.

Conclusion

Continuing care plan positively influenced outpatient follow-up frequency, self-management, medication compliance, exercise compliance, activity and dysfunction levels, disease activity levels, and QOL in AS patients.

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References

1. Bagcivan G, Cinar FI, Cinar M, Oflaz F, Uzun S, Pay S. Living with pain in ankylosing spondylitis: a qualitative study. Contemp Nurse 2015;51:135-47. doi: 10.1080/10376178.2016.1157028
2. Bemidinezhad A, Radmehr S, Moosaei N, Efati Z, Kesharwani P, Sahebkar A. Enhancing radiotherapy for melanoma: the promise of high-Z metal nanoparticles in radiosensitization. Nanomedicine (Lond) 2024;19:2391-41. doi: 10.1080/17435889.2024.2403325
3. Gao H, Li R, Shen J, Yang H. Children's gender and parents' long-term care arrangements: evidence from China. Applied Economics 2025;57:1510-25. Doi: 10.1080/00036846.2024.2313594
4. Lagzian A, Askari M, Haeri MS, Sheikhi N, Banihashemi S, Nabi-Afjadi M, et al. Increased V-ATPase activity can lead to chemo-resistance in oral squamous cell carcinoma via autophagy induction: new insights. Med Oncol 2024;41:108. doi: 10.1007/s12032-024-02313-9
5. Motavaselian M, Farrokhi M, Jafari Khouzani P, Moghadam Fard A, Daeizadeh F, Pourrahimi M, et al. Diagnostic Performance of Ultrasonography for Identification of Small Bowel Obstruction; a Systematic Review and Meta-analysis. Arch Acad Emerg Med 2024;12:e33. doi: 10.22037/aaem.v12i1.2265
6. Pedersen SJ, Maksymowych WP. The Pathogenesis of Ankylosing Spondylitis: an Update. Curr Rheumatol Rep 2019;21:58. doi: 10.1007/s11926-019-0856-3
7. Radmehr S, Dehghani F, Bai Y, Yang X, Li J. The impact of intermittent and continuous training on the levels of CIDE and Perilipin-1 proteins and their effect on the size of lipid droplets in the visceral adipose tissue of obese male rats. Eur J Hum Mov 2024;52:43-53. DOI: 10.21134/eurjhm.2024.52.4
8. Efati Z, Shahangian SS, Darroudi M, Amiri H, Hashemy SI, Aghamaali MR. Green chemistry synthesized zinc oxide nanoparticles in Lepidium sativum L. seed extract and evaluation of their anticancer activity in human colorectal cancer cells. Ceram Int 2023;49:32568-76. doi: 10.1016/j.ceramint.2023.07.221.
9. Khazaei M, Khabiri M, Mohseni Tabrizi A. Qualitative study of effective biomedical factors in tendency of retired elite wrestlers to drug abuse. A grounded theory study. Sport Sciences and Health Research 2020;12:235-44. doi: 10.32598/JESM.12.2.12.
10. Thundiyil S, Shalamzari SS, Picone J, McKenzie S. Transformers for Modeling Long-Term Dependencies in Time Series Data: A Review.

In: 2023 IEEE Signal Processing in Medicine and Biology Symposium (SPMB). Philadelphia, PA: IEEE, 2023; pp 1-5. DOI: 10.1109/SPMB59478.2023.10372632.

11. Khazaei M, Marszalek J, Aminzadeh R, Dehghani E, Azizi B. Benefits of Pilates exercises on functional fitness and quality of life in older men: A quasi-experimental study. Balt J Health Phys Act 2024;16:2-11. doi: 10.29359/BJHPA.16.1.03.
12. Khazaei, M., Dehghani, E., Mehri, S., Basatnia, R. Assessment of the Brain Cortical Activity of Professional Cavers. Journal of Exercise and Health Science (JEHS) 2024. doi: 10.22089/jehs.2023.13610.1052. [Ahead of print]
13. Asadiof F, Safarpour B, Barabadi S, Karkargh FK, Janbozorgi A, Khayayi R, et al. Exploring the comparative efficacy of reality and paradox therapy in treating post-traumatic stress disorder in traumatized adolescents: an analytical review. Contemp Readings L Soc Just 2024;16:645-52. doi: 10.52783/crlsj.157
14. Perrotta FM, Scriffignano S, Ciccia F, Lubrano E. Therapeutic Targets for Ankylosing Spondylitis - Recent Insights and Future Prospects. Open Access Rheumatol 2022;14:57-66. doi: 10.2147/OARRR.S295033
15. Hao X, Jiang B, Wu J, Xiang D, Xiong Z, Li C, et al. Nanomaterials for bone metastasis. J Control Release 2024;373:640-51. doi: 10.1016/j.jconrel.2024.07.067
16. Zhao J, Huang C, Huang H, Pan JK, Zeng LF, Luo MH, et al. Prevalence of ankylosing spondylitis in a Chinese population: a systematic review and meta-analysis. Rheumatol Int 2020;40:859-72. doi: 10.1007/s00296-020-04537-0
17. Moradi Y, Atyabi SA, Ghiassadin A, Bakhshi H, Irani S, Atyabi SM, et al. Cold Atmosphere Plasma Modification on Beta-Carotene-Loaded Nanofibers to Enhance Osteogenic Differentiation. Fibers Polym 2022;23:18–27. doi.org/10.1007/s12221-021-0033-y
18. Rotherham M, Moradi Y, Nahar T, Mosses D, Telling N, El Haj AJ. Magnetic activation of TREK1 triggers stress signalling and regulates neuronal branching in SH-SY5Y cells. Front Med Technol 2022;4:981421. doi: 10.3389/fmedt.2022.981421
19. Farrokhi M, Taheri F, Farrokhi M, Heydari Z, Darbani R, Salbi M, et al. Advancements and innovations in cancer management: a comprehensive perspective. Kindle 2024;4:1–161. doi: 10.5281/zenodo.11108886.
20. Monemi M, Naji T, Kheradmand A. Propranolol and prazosin have a positive effect on the sexual performance of female three-spot gourami. J Kerman Univ Med Sci 2024;31:330-7.
21. Shalamzari S, Bagritsevich M, Melles A, Obeid I, Picone J, Connolly D, et al. Big data resources for digital pathology. In: 2023 IEEE Signal Processing in Medicine and Biology Symposium (SPMB). New York, NY: IEEE, 2023; pp 1-6. doi: 10.1109/SPMB57696.2023.10372264.
22. Ebrahimi A, Pourkargar DB. Distributed estimation and model predictive control of integrated nonlinear process systems using an adaptive community detection approach. In: 2023 AIChE Annual Meeting. New York, NY: AIChE; 2023.
23. Jafari S, Faraji AR, Gil A, Ashouri F. A synergistic adsorption-catalysis with co-doped Fe/Mn porous PET waste for simultaneous and ambient remediation of hazardous pharmaceutical drugs and dye in multi-component systems by enhancing singlet oxygen. J Water Process Eng 2024;66:106012. doi: 10.1016/j.jwpe.2024.106012.
24. Akbarzadeh I, Poor AS, Khodarahmi M, Abdihaji M, Moammeri A, Jafari S, et al. Gingerol/letrozole-loaded mesoporous silica nanoparticles for breast cancer therapy: In-silico and in-vitro studies. Micropor Mesopor Mater 2022;337:111919. doi: 10.1016/j.micromeso.2022.111919.
25. Faraji AR, Farahani AR, Khoramdareh NB, Gil A, Jafari S, Hekmatian Z, et al. Cu-Fe nanoparticles decorated rice hull/chitosan@ FeAl2O4 to boosted peroxidase-like activity for catalytic degradation of antibiotics: Kinetics and mechanistic insights. J Environ Chem Eng 2023;11:111348. doi: 10.1016/j.jece.2023.111348.
26. Yari A, Fasih P, Hosseini Hooshiar M, Goodarzi A, Fattahi SF. Detection and classification of mandibular fractures in panoramic radiography using artificial intelligence. Dentomaxillofac Radiol 2024;53:363-71. doi: 10.1093/dmfr/twae018
27. Goie The HS, Steven MM, van der Linden SM, Cats A. Evaluation of diagnostic criteria for ankylosing spondylitis: a comparison of the Rome, New York and modified New York criteria in patients with a positive clinical history screening test for ankylosing spondylitis. Br J Rheumatol 1985;24:242-9. doi: 10.1093/rheumatology/24.3.242
28. Ryan TP. Sample size determination and power, 1st ed. Hoboken, New Jersey: John Wiley & Sons, Inc; 2013. DOI: 10.1002/9781118439241
29. Golzar J, Noor S, Tajik O. Convenience Sampling. Int J Educ Lang Stud 2022;1:72-7. doi: 10.22034/ijels.2022.162981.
30. Tomlinson J. From hospital to home: A mixed methods exploration of post-discharge medicines management for older people living with long-term conditions. [Online] 2020 [Cited 2025 September 10]. Available from URL: https://bradscholars.brad.ac.uk/entities/publication/1f54d339-27f5-42cc-99f6-cc281fda4b50
31. Tan X, Patel I, Chang J. Review of the four item Morisky medication adherence scale (MMAS-4) and eight item Morisky medication adherence scale (MMAS-8). Innov Pharm 2014;5:165. doi: 10.24926/iip.v5i3.347.
32. Yates SM, Dunnagan TA. Evaluating the effectiveness of a home-based fall risk reduction program for rural community-dwelling older adults. J Gerontol A Biol Sci Med Sci 2001;56:M226-30. doi: 10.1093/gerona/56.4.m226
33. Chilton-Mitchell L, Martindale J, Hart A, Goodacre L. Normative values for the Bath Ankylosing Spondylitis Metrology Index in a UK population. Rheumatology (Oxford) 2013;52:2086-90. doi: 10.1093/rheumatology/ket272
34. Gharpure R, Guo A, Bishnoi CK, Patel U, Gifford D, Tippins A, et al. Early COVID-19 First-Dose Vaccination Coverage Among Residents and Staff Members of Skilled Nursing Facilities Participating in the Pharmacy Partnership for Long-Term Care Program - United States, December 2020-January 2021. MMWR Morb Mortal Wkly Rep 2021;70:178-82. doi: 10.15585/mmwr.mm7005e2
35. Doner NH, Oksel E, Tureyen A. Wiedenbach's Nursing Theory: Management of Ankylosing Spondylitis with the Helping Art of Clinical Nursing. Int J Caring Sci. 2022;15:539-45.
36. Carrillo I, López-Pineda A, García-Díaz S, López A, Valencia Muntalà L, Juanola X, et al. Proposals for the incorporation of the nursing role in the certification of axial spondyloarthritis units. Literature review and expert consensus. Reumatol Clin (Engl Ed) 2022;18:580-6. doi: 10.1016/j.reumae.2021.09.004.
37. Doğan SD, Tosunöz İK. Investigation of nursing theses evaluating the effects of mobile health applications on patient care outcomes in Turkey: a systematic review. Uluborlu Mesleki Bilimler Dergisi 2022;5:107-19.
38. Ahmadabady S, Hosseini M, Shafei MN, Marefati N, Salmani H, Amirahmadi S, et al. The effects of curcumin in learning and memory impairment associated with hypothyroidism in juvenile rats: the role of nitric oxide, oxidative stress, and brain-derived neurotrophic factor. Behav Pharmacol 2022;33:466-81. doi: 10.1097/FBP.0000000000000694
39. Li Z, Wu X, Leo PJ, De Guzman E, Akkoc N, Breban M, et al. Polygenic Risk Scores have high diagnostic capacity in ankylosing spondylitis. Ann Rheum Dis 2021;80:1168-74. doi: 10.1136/annrheumdis-2020-219446
40. Ward MM, Deodhar A, Gensler LS, Dubreuil M, Yu D, Khan MA, et al.

2019 Update of the American College of Rheumatology/Spondylitis Association of America/Spondyloarthritis Research and Treatment Network Recommendations for the Treatment of Ankylosing Spondylitis and Nonradiographic Axial Spondyloarthritis. Arthritis Rheumatol 2019;71:1599-613. doi: 10.1002/art.41042

41. Liao KF, Kuo YH, Lai SW. Diabetes mellitus in ankylosing spondylitis. Ann Rheum Dis 2021;80:e134. doi: 10.1136/annrheumdis-2019-216221.
42. Guggino G, Mauro D, Rizzo A, Alessandro R, Raimondo S, Bergot AS, et al. Inflammasome Activation in Ankylosing Spondylitis Is Associated With Gut Dysbiosis. Arthritis Rheumatol 2021;73:1189-9. doi: 10.1002/art.41644
43. de Miguel E, Fernández-Carballido C, Gratacós J, Pablos JL, Juanola X, Ariza R, et al. Disease control in patients with ankylosing spondylitis in real clinical practice in Spain: Results of the MIDAS study. Reumatol Clin (Engl Ed) 2023;19:99-10. doi: 10.1016/j.reumae.2022.01.004
44. Assaran AH, Akbarian M, Amirahmadi S, Salmani H, Shirzad S, Hosseini M, et al. Ellagic Acid Prevents Oxidative Stress and Memory Deficits in a Rat Model of Scopolamine-induced Alzheimer's Disease. Cent Nerv Syst Agents Med Chem 2022;22:214-27. doi: 10.2174/1871524923666221027100949
45. Mady MA, Shabaan ZM, Elsergany MA, Abdelhay SA. Effect of Therapeutic Exercises Intervention on the Functional Status for Patients with Ankylosing Spondylitis. Tanta Sci Nurs J 2023;30:109-26.
46. Tsur AM, David P, Watad A, Nissan D, Cohen AD, Amital H. Ankylosing Spondylitis and the Risk of Hip Fractures: a Matched Cohort Study. J Gen Intern Med 2022;37:3283-8. doi: 10.1007/s11606-021-07241-2
47. Lavoie-Tremblay M, Gélinas C, Aubé T, Tchouaket E, Tremblay D, Gagnon MP, et al. Influence of caring for COVID-19 patients on nurse's turnover, work satisfaction and quality of care. J Nurs Manag 2022;30:33-4. doi: 10.1111/jonm.13462
48. Hanson K, Brikci N, Erlangga D, Alebachew A, De Allegri M, Balabanova D, et al. The Lancet Global Health Commission on financing primary health care: putting people at the centre. Lancet Glob Health 2022;10:e715-72. doi: 10.1016/S2214-109X(22)00005-5
49. Forqani MA, Akbarian M, Amirahmadi S, Soukhtanloo M, Hosseini M, Forouzanfar F. Carvacrol improved learning and memory and attenuated the brain tissue oxidative damage in aged male rats. Int J Neurosci 2024;134:1242-9. doi: 10.1080/00207454.2023.2257877