ORIGINAL ARTICLE

A Randomized Controlled Study of Improving Patient Satisfaction With Community Health Services Through Health Promotion Interventions in Xian, China

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ABSTRACT

Introduction: This study examines the effectiveness of health promotion in improving patient satisfaction with community health services. **Methods:** We conducted a single-blind randomized controlled trial on the patients from the Community Health Service Centres of Xi'an, China, from June to August 2022. The participants were randomly assigned to either an intervention group or a placebo group. Both groups received 3-week WeChat education, with the intervention group receiving online intervention education including 9 items, such as about community health service, the rights and welfare of patients, the basic workflow of staff, routine medical examination items for patients, common medical knowledge, nutrition during COVID-19 pandemic, doctor-patient communication skill and medical advice and discussion, while the placebo group received related information about health care and health. Data were collected before and after the intervention, and the results were measured using a social demographic questionnaire and the Patient Satisfaction Questionnaire (PSQ-18), which were analysed using SPSS 23.0 version. **Results:** In the study, 312 patients were enrolled, with 156 assigned to the intervention group and 156 assigned to the placebo group. The Patient Satisfaction Questionnaire (PSQ-18) revealed that the general satisfaction domain showed the most improvement, increasing from Mean (SD)=3.474 (0.060) to Mean (SD)=3.994 (0.045) before the intervention. Results from the two-way repeated measures ANOVA show that time has a significant effect on patient satisfaction particularly the general satisfaction, technical quality, communication, financial aspect, and time spent. **Conclusions:** The intervention significantly improved patient satisfaction in the intervention group compared to the placebo group, particularly in the areas of general satisfaction, technical quality, communication, and time spent (test within subjects). Statistically significant differences were observed in mean values before and after the intervention. *Malaysian Journal of Medicine and Health Sciences* (2023) 19(SUPP17):1-8. doi:10.47836/mjmhs.19.s17.1

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INTRODUCTION

Primary health care is a fundamental health service available to individuals and families in the community (1), which is essential to improve the physical, mental, and social well-being of community residents. It is the most inclusive and equitable approach to achieve this goal and is the cornerstone of every country's health system (2,3). It is also emphasized that primary health care is crucial for achieving universal health coverage and the Sustainable Development Goals outlined in the 2030 Agenda for Sustainable Development (4).

Patient satisfaction is an important indicator of the quality of community health services and reflects the satisfaction of community residents with the medical and health services provided (5,6). Community health service satisfaction evaluation is a critical standard for assessing the acceptance and participation of people in community health services (7,8).

Health promotion is a science that helps people change their unhealthy behaviors and achieve optimal health (9). It involves coordinating various relevant sectors, communities, families, and individuals to encourage

them to maintain and improve their health. Health promotion is an essential component of primary health care, which plays a crucial role in promoting health literacy and improving the quality of health for all (10,11).

The purpose of this study was to improve patients' understanding and trust in community health services by conducting a health promotion intervention that targeted nine different aspects. The study aimed to evaluate the effectiveness of these interventions in improving patients' satisfaction with primary health care services and to provide practical recommendations for the development of such services. Additionally, the study aimed to offer reliable insights and useful experience for future health promotion education research.

MATERIALS AND METHODS

Design, Setting, and Participants

A single-blinded randomized control trial was conducted to the patients attending community health centres in Xi 'an Shaanxi Province, China. There were 121 community health service centres in the main urban area of Xi 'an, Shaanxi Province, China. Multi-stage sampling was used to recruit the participants. Firstly, 12 community health service centres were randomly selected from 121 community health service centres by using the Excel random sampling function. Then, the research investigators were assigned to for data collection. The first 30 patients, who met the inclusion criteria and gave consent to participate in the study were selected. The ranking numbers were assigned to randomly selected patients and, the patients with an odd ranking were enrolled into the intervention group, and the patients with an even ranking were enrolled into the placebo group. PSQ-18 questionnaires were used to explore the patient's satisfaction. Total 156 patients in the intervention group and 156 patients in the placebo group, a total of 312 patients were recruited from the twelve community health service centres.

The study used the PSQ-18 questionnaire to measure patient satisfaction before and after the intervention. All patients were blinded to their group allocation to ensure single blinding. (Fig. 1)

Inclusion and exclusion criteria

Patients aged 18 years or above who could read and write Chinese, communicate effectively, comprehend the questionnaire correctly, and use WeChat on smartphones to view pictures, videos, and documents were enrolled. Patients who were unstable upon arrival at the clinic, had mental disorders, cognitive disorders, and those unable to cooperate with the study were excluded from the study.

Sample size calculation

Sample size was calculated by using sample size calculation for Randomized Controlled Trial by Zhong,

2009 by using calculation equivalent design formula for two comparison groups and both groups have the same size of the subjects (28).

The sample size calculation method is still as follows:

$$N = 2 \times \left(\frac{z_{1-\frac{\alpha}{2}} + z_{1-\beta}}{\delta_0} \right)^2 \times p \times (1-p)$$

$Z_{1-\alpha/2}$ =1.96 for 95% confident Interval
$Z_{1-\beta}$ = 0.845
D = 0.20   P=0.4 (Prevalence of patient satisfaction= 40%) (He et al, 2018)

$$N = \frac{2(1.96+0.84)^2 \times 0.4(0.6)}{(0.2)^2}$$

= 94 (+ 40% attrition) = 157 = 157 in each group.

Study Instruments

The study questionnaires consists of two parts: a sociodemographic questionnaire and the Patient Satisfaction Questionnaire (PSQ-18). The PSQ-18 consisted of 18 items across seven dimensions, including general satisfaction (2 items), technical quality (4 items), interpersonal manner (2 items), communication (2 items), financial aspects (2 items), time spent with doctors (2 items), and access and convenience (4 items) (13,14). The evaluation of patient experiences on health service satisfaction involved rating items on a five-point Likert scale, ranging from strongly agree to strongly disagree. To calculate the overall satisfaction score, the scores of negatively worded items were reversed. A higher score indicated higher satisfaction with medical care. The subscale scores were obtained by averaging the items within each subscale (13). The Chinese version of PSQ-18 was used and according to the study by Hu JL (2017), the reliability of Chinese version of PSQ-18 was Cronbach's α of 0.791 (14).

Data collection

Four medical students with survey experience were recruited as surveyors and received standardized survey training. They conducted an anonymous survey using a uniform questionnaire and followed a standardized guideline.

Each of the respondents were informed that participation in the investigation was voluntary and that their personal information would be kept strictly confidential. To ensure the accuracy and reliability of the research data, we implemented strict quality placebo at each stage of the research.

Health promotion intervention

Following our preliminary research, we thoroughly analysed the research results and relevant literature to identify the. Specifically, we focused on determining

promoting which factors could be effectively enhanced through health education promotion targeted at patients. Through extensive collaborative analysis and in-depth discussions involving our research team members and experts, a comprehensive set of nine items of intervention measures were formulated (Table I). These measures have the specific goal of promoting overall health among patients. These measures include:

1.   Information on primary health service centres, including their role, important medical services provided, department settings, and status in China's medical system.

2.   Information on policies and advantages of seeking treatment in community health service centres.

3.   Details on the basic workflow of community health workers, including the tasks and hours of work of doctors, nurses, technicians, and other personnel.

4.   Information on routine physical examination items, including the effect of various common examinations, required time, cost, and other relevant details.

5.   Popular science information on common diseases and clinical knowledge.

6.   Guidance on protection and nutrition during the COVID-19 pandemic.

7.   Strategies for improving doctor-patient communication skills.

8.   Information on medical consultations.

9.   Discussion on various related topics. (13-15)

The details of the health intervention measures are shown in Table I.

Table 1: Health Promotion Intervention Measures Table

Measures	Examples of intervention data
Overview of Community Health Services in Xi'an	What are the community health service centres, the important medical services they provide, the department Settings, their status in China's medical system, etc.
The Rights and welfare of patients	What benefits did you enjoy when you visited the community health service centre? Relevant national policy rapid treatment measures how to seek help
The basic workflow of staff	Work tasks and hours of doctors, nurses, technicians, etc
Introduction of routine physical examination items for patients	The results of various common tests require time and cost, etc
Popularizing common medical knowledge	Common diseases and medical tips
Protection and nutrition during COVID-19	Social distancing, hand hygiene, protein eating, etc
Doctor-patient communication skills	Perspective-taking uses positive words, etc
Medical advice	Improve medical consultation services and the accessibility of medical consultation services
Discussion about primary health care services	Patients can freely discuss with patients and staff about primary health services.

During the intervention period, the intervention group received the 9 health promotion intervention measures via WeChat, with each measure sent every week (Table II). The staff provided clear explanations to the patients and promptly addressed any doubts or concerns they had, maintaining good interaction to ensure the successful completion of the intervention. Meanwhile, The placebo group received general health-related information at regular intervals. The study staff maintained daily contact with the placebo patients via WeChat. The health promotion intervention lasted three months from June to August 2022, with questionnaires collected before and after the intervention period. The researchers underwent uniform training according to specific guidelines to ensure consistent explanations were given to patients for all questionnaire questions. To ensure research data accuracy and reliability, strict quality placebo measures were implemented throughout each stage of the research (16,17).

Table II: Intervention Protocol of health promotion intervention

Time	Group	Content
First week of intervention	Intervention group	About Community Health Services The basic workflow of the staff The rights or welfare of the patients
	Placebo group	A healthy diet and, healthy body!
Second week of intervention	Intervention group	Introduction of routine medical examination items Popularization of science Protection and nutrition during COVID-19
	Placebo group	Information on Healthy bones and prevention of Osteoporosis
Third week of intervention	Intervention group	Doctor-patient communication skills Medical advice to improve medical consultation services and the accessibility of medical consultation services Discussion about primary health care services whereby the patients can freely discuss with patients and staff about primary health service.
	Placebo group	Disease Prevention How to prevent "heat Stroke"

Data management and analysis

Statistical analysis was performed using IBM SPSS version 28 with a significance threshold set at $p < 0.05$. The chi-square test was used to analyse categorical data. Two-factor repeated measures ANOVA, on the other hand, was used to analyse continuous data with multiple variables (18,19).

Ethical approval

Before data collection, ethical approval was obtained from the Scientific Research and Ethics Committee of Universiti Tunku Abdul Rahman University (U/SERC/02/2021). The study has been registered at ClinicalTrials.gov (Identifier: NCT05383638

RESULTS

Sociodemographic characteristics

Table III shows that at baseline there is no statistically

Table III: Baseline characteristics of the participants in Placebo and Intervention Groups

Characteristics	Groups n (%)		p-value
	placebo n=156	Intervention n= 156	
Age (years)			0.392
18-47 year	70(48.6%)	74(51.4%)	
48-64 year	45(46.9%)	51(53.1%)	
65 and above	41(56.9%)	31(43.1%)	
Gender			0.817
Male	63 (50.8%)	61(49.2%)	
Female	93(49.5%)	95(50.5%)	
Highest education level			0.992
Primary/never been to school	23(50.0%)	23(50.0%)	
Junior/senior high school	63(49.6%)	64(50.4%)	
Junior college/higher	70(50.4%)	69(49.6%)	
Marital status			0.794
Married	132(50.4%)	130(49.6%)	
Single	7(38.9%)	11(61.1%)	
Divorced	8(53.3%)	7(46.7%0	
Widow/widower	9(52.9%)	8(47.1%)	
The number of households			0.208
3 people and less	95(53.1%)	84(46.9%)	
More than three	61(45.9%)	72(54.1%)	
Occupation			0.853
Blue collar	32(46.4%)	37(53.6%)	
Retired	52(52.5%)	47(47.5%)	
White collar	58(50.9%)	56(49.1%)	
Unemployed	14(46.7%)	16(53.3%)	
Percapita annual income (RMB)			0.337
More than 150,000 yuan a year	14(63.6%)	8(36.4%)	
60,000-150,000 yuan a year	59(48.4%)	63(51.6%)	
24,000-60,000 yuan a year	52(46.0%)	61(54.0%)	
Less than 24,000 yuan a year	31(56.4%)	24(43.6%)	
Health Insurance			0.204
Perfect health insurance	27(60.0%)	18(40.0%)	
General health insurance	128(48.1%)	138(51.9%)	
No health insurance	1(100%)	0(0.0%)	
Patient's Perception of their Mental Health			0.274
Very good	31(40.8%)	45(59.2%)	
Good	87(52.4%)	79(47.6%)	
General	33(55.9%)	26(44.1%)	
No good	5(45.5%)	6(54.5%)	
Patient's Perception of Their Physical Health			0.622
Very healthy	54(49.5%)	55(50.5%)	
Healthy	50(46.7%)	57(53.3%)	
General	28(52.8%)	25(47.2%)	
Bad	22(59.5%)	15(40.5%)	
Very bad	2(33.3%)	4(66.7%)	

Yuan is equivalent to * 0.66MYR and 0.33 USD at the time of study
The chi-square test was used to determine the p-value

significant difference between the intervention group and the placebo group in the overall socio-demographic of the study population, implying that both groups have been appropriately matched in terms of their general characteristics.

The satisfaction domains of patients in the placebo group and intervention group before and after the intervention. After the health education intervention, there were increased in patient satisfaction scores in domains of PSQ-18 questionnaires such as General Satisfaction, Technical Quality, Interpersonal manner, Communication, Time spent and Accessibility Convenience. The patient satisfaction scores of General Satisfaction Domain, increased the most among all the domains. (Mean (SD) from 3.474 (0.060) to 3.994 (0.045)). However, there was no changes in patient satisfaction scores in the financial aspect's domain. Conversely, the placebo group did not experience any noteworthy changes in the seven satisfaction domains of PSQ-18 either before or after the trial (Table IV).

The two-way repeated measures ANOVA was conducted to find out the impact of the intervention on patients' satisfaction. There were no outliers as assessed by the boxplot. The data were normally distributed, and variances were homogeneous as assessed by Levene's test of homogeneity of variance. Mauchly's test of sphericity indicated that the assumption of sphericity was met for the two-way interaction. Since the measurements were only within subjects and at two levels (pre-test and post-test), it was not necessary to evaluate the posthoc test (20,21).

The two-way repeated measures ANOVA test was conducted to investigate the effect of time spent domain and groups (placebo and intervention) on the primary care patients' satisfaction for all 7 domains of the PSQ-18, the results are summarized in Table V. The findings show that time spent domain has a significant effect on

Table IV: The level of patients' satisfactions in all domains for both control and intervention groups before and after trial

PSQ-18 DOMAINS	Before Trial n=156		After Trial n=156*	
	placebo Mean (SD)	Intervention Mean (SD)	placebo Mean (SD)	Intervention Mean (SD)
General Satisfaction	3.580 (0.057)	3.474 (0.060)	3.561 (0.056)	3.994 (0.045)
Technical Quality	3.631 (0.048)	3.582 (0.045)	3.621 (0.047)	3.811 (0.039)
Interpersonal manner	4.013 (0.051)	4.045 (0.050)	3.919 (0.051)	4.174 (0.043)
Communication	3.564 (0.060)	3.577 (0.057)	3.539 (0.055)	3.797 (0.490)
Financial aspects	3.603 (0.064)	3.626 (0.060)	3.565 (0.060)	3.671 (0.057)
Time spent	3.471 (0.062)	3.436 (0.063)	3.436 (0.058)	3.623 (0.056)
Accessibility Convenience	3.625 (0.043)	3.587 (0.045)	3.558 (0.040)	3.671 (0.041)

*Data of 1 patient is missing from the intervention group after the trial on communication domain
Data of 1 patient is missing from the intervention group after the trial on Time Spent domain
Data of 1 patient is missing from the placebo group after the trial on accessibility domain

Table V: The effect of time spent domain and groups (placebo and intervention) on the primary care patients satisfaction for all 7 domains of the PSQ-18

Variables		df	F	p
Time spent	General Satisfaction	(1, 310)	50.571	<0.001*
	Technical Quality	(1, 310)	72.976	<0.001*
(Test of within-sub-jects)	Interpersonal manner	(1, 310)	2.781	0.096
	Communication	(1, 309)	34.418	<0.001*
	Financial aspects	(1, 310)	0.819	0.366
	Time spent	(1, 309)	14.107	<0.001*
	Accessibility Convenience	(1, 309)	1.528	0.217
Groups	General Satisfaction	(1, 310)	57.143	<0.001*
	Technical Quality	(1, 310)	79.365	<0.001*
(Test of between subjects)	Interpersonal manner	(1, 310)	53.224	<0.001*
	Communication	(1, 309)	45.928	<0.001*
	Financial aspects	(1, 310)	8.652	0.004*
	Time spent	(1, 309)	31.109	<0.001*
	Accessibility Convenience	(1, 309)	45.284	<0.001*

patient satisfaction particularly the general satisfaction, technical quality, communication, financial aspect and time spent domain. However, The effect of the intervention (between subjects) on patients' satisfaction was more dominant for the different patients' satisfaction domains, the results were as follows; general satisfaction F(1,310) = 54.143, p = <0.001, technical quality F(1,310) = 79.365, p = <0.001, interpersonal manner F(1,310) = 53.224, p = <0.001, communication F(1,309) = 45.928, P = <0.001, financial aspects F(1,310) = 8.652, p = 0.004, time spent F(1,309) = 31.109, p = <0.001, accessibility convenience F(1,309) = 45.284, p = <0.001 (Table V).

DISCUSSION

The satisfaction domains of patients in the placebo group and intervention group before and after the intervention

After the intervention, the General Satisfaction domain of the intervention group showed the highest improvement. This may be attributed to the fact that community health service centres started relatively late in China, and patients are more accustomed to seeking medical care at large hospitals. Consequently, patients lack understanding and trust in community health service centres (22). However, the nine items of the intervention implemented in this study aimed to increase patients' awareness of community health service centres. For instance, the first measure introduced the community health service centre, its important medical services, department setting, and status in China's medical system. Through this intervention, patients could understand that community health service centres are the gatekeepers of the health system and a national service organization that protects people's basic medical care. The second measure introduced the policies and advantages of community health service centres, helping patients comprehend the benefits and rights they can enjoy. This approach aimed to increase patients' interest and favorable rating of community health service centres. Additionally, introducing the basic workflow of community medical workers, routine physical examination items, science popularization,

doctor-patient communication skills, medical advice, and the free discussion helped patients gain better insight into community health services and receive the required assistance more efficiently.

The Technical Quality domain showed a significant improvement in patient satisfaction after the intervention. This could be attributed to the fact that before the intervention, patients may have unconsciously compared community health service centers to large hospitals, perceiving them as having less advanced equipment and less experienced medical staff (23). However, after the intervention, patients gained a better understanding of the role of community hospitals and their place within the medical system, which led to more realistic expectations and evaluations. Consequently, patients were able to make more objective assessments of the technical quality of care provided by community health service centres.

Although there was an increase in patient satisfaction in the Interpersonal Manner domain, the improvement was not statistically significant. The analysis of this outcome can be attributed to two main factors. Firstly, the initial interpersonal manner scores were already relatively high, leaving limited room for further improvement. Secondly, the level of patient satisfaction in this domain may be influenced by various factors such as the attitude of the medical staff, their workload, and the specific circumstances at the time of interaction. Only one-way intervention for patients, the effect is not obvious (24).

The intervention had a positive impact on the Communication domain, as patients demonstrated improved comprehension of community health services and developed a better rapport with the medical staff. Through the intervention, patients gained a deeper understanding of the nature of the medical staff's work and experienced more seamless doctor-patient communication. This finding aligns with a study conducted in 2017, which highlighted how educational interventions delivered through the social media platform WeChat contributed to optimizing communication between patients and healthcare professionals (25).

In this study, the Financial Aspects domain did not show significant improvement due to a few reasons. Community health service centres have some financial policies that are only applicable to targeted diseases and are not covered for all diseases. Patients with poor economic conditions, still must deal with setbacks financially in treatment (23).

The Time Spent domain showed noticeable improvement in patient satisfaction, although not as substantial as in the General Satisfaction, Technical Quality, and Communication domains. The intervention played a key role in helping patients better comprehend the operations and actions of the medical staff. As a result of the

intervention, patients gained a clear understanding that the duration of doctor consultations was dependent on the specific condition of their illness. This understanding contributed to the relatively noticeable improvement observed in the Time Spent domain (14).

The intervention did not lead to a significant improvement in the Accessibility Convenience domain, mainly because our study did not examine factors such as the distance between patients' residences and community health service centres, transportation to these centres, and other related issues. Additionally, even though community health service centres also provide specialized clinics, it is uncertain whether they fully meet the needs of patients. Our intervention only focused on improving patients' perspectives, such as appointment and waiting times, but other factors that influence accessibility and convenience were not addressed (24).

Benefits of Health Promotion Intervention via WeChat
A 2-week health promotion intervention was performed on the patients in community health service centres through WeChat, and the bidirectional repeated measurement ANOVA was used for data analysis to explore the effects of time spent domain and groups (placebo group and intervention group) on patient satisfaction. It was found that time (before and after intervention) had a significant impact on patient satisfaction, especially general satisfaction, technical quality, communication, financial aspects, and time spent. A study conducted in 2021 demonstrated the feasibility and effectiveness of using WeChat as an educational intervention for patients. The study found that the intervention significantly improved patients' depression, communication level, health-related quality of life, and other clinical indicators, suggesting that WeChat is a convenient, timely, and cost-effective method for educating patients (25). Another study showed that adding a short educational program to mental health treatment significantly improved patient satisfaction and treatment participation, as well as increased patients' motivation to receive treatment in community mental health care facilities. The intervention was found to have a greater effect on different domains of patient satisfaction (between subjects) (26). Finally, a study on health promotion protocol design and efficacy found that health promotion interventions had a significant impact on the general health, depression, mental health, physical health, and vitality of the intervention group, according to a systematic literature review and meta-analysis (27).

Strength of study
The advantage of this study was that it is the first randomized controled study on community health service satisfaction in Xian, China so far. This study summarized effective health education intervention measures and provided practical suggestions for the development of primary health care services and provides useful and reliable experience for future health promotion education research.

Study limitations
Firstly, the study was only conducted in one region, and the results may not apply to other regions due to differences in geographical location and other factors. Secondly, there may have been concealment and blindness issues in the distribution sequence during the sampling process. Lastly, there is a possibility of intervention information being disclosed to patients in the placebo group due to the potential social connections between patients in different groups, but this was unavoidable. Future studies should aim to increase the sample size and diversity of research fields to improve the reliability of the research findings.

Implication
This study serves to consolidate effective health education interventions and offer practical suggestions provide information for enhancing primary health care services. The finding of this study also will help to furnish valuable and dependable insights for future research on health promotion education.

Further research with mix method were recommended to assess patient satisfaction regarding the Community Health Service (CHS) by finding out the underlying reason for the items which had less patients satisfaction score.

CONCLUSION

The health promotion measures employed in this study were effective in improving patient satisfaction with community health service centres, especially in the domains of General Satisfaction, Technical Quality, Interpersonal manner, and Communication. To improve patient satisfaction with primary health care service, multi-party cooperation is needed, including health education for medical workers, community participation, and national policy orientation. This study provides practical recommendations for the development of primary health care services and adds to the body of research on health promotion education. Additionally, this study is the first of its kind in China.

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