

The Effect of WeChat on Parental Care Burden, Anxiety, and Depression in Children after CHD Surgery during COVID-19 Pandemic

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Abstract

Objectives This study aimed to explore the effect of applying WeChat in the follow-up and health education of children after congenital heart disease (CHD) surgery during the coronavirus disease 2019 (COVID-19) epidemic.

Methods Data from 135 children were retrospectively analyzed. The care burden, anxiety, depression, and satisfaction of the parents of patients at home were analyzed and compared.

Results One month after discharge, the Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), Zarit Burden Interview (ZBI), and Patient Satisfaction Questionnaire-18 scores of the WeChat follow-up group were significantly better than those of the outpatient follow-up group ($p < 0.05$). Compared with the discharge time, the SAS, SDS, and ZBI scores were significantly improved in the WeChat follow-up group but not in the outpatient follow-up group ($p < 0.05$).

Conclusion During the COVID-19 epidemic, the application of WeChat to the follow-up management of children after CHD surgery can effectively reduce care burden and relieve anxiety and depression in parents at home. It can also improve the satisfaction of parents with medical treatment.

Keywords

- ▶ care burden
- ▶ psychological state
- ▶ COVID-19 epidemic
- ▶ WeChat

Introduction

Congenital heart disease (CHD) is one of the most common and severe congenital birth defects, and surgery is the main method to treat it.^{1,2} Following CHD surgery, children need to go through a convalescence period after discharge, and during this period, it is easy to become sick. Therefore, after CHD surgery, children still need careful care and close follow-

up after discharge to reduce the occurrence of complications and provide timely treatment for complications.

The outbreak of coronavirus disease 2019 (COVID-19) has been designated by the World Health Organization as a “public health emergency of international concern.”^{3,4} The isolation measures of minimizing social activities and outings effectively prevent and control the epidemic.⁵ It is difficult to go out for medical treatment in this environment, and there is also the risk of COVID-19 infection when going out. Telemedicine with the use of social software could provide health care advice and

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allowed long-distance patient and clinician contact, care, advice, reminders, education, monitoring, and remote admissions.⁶ Telemedicine approaches have begun to transform the way in which patients and health care professionals interact, and helped patients to take a more active role in managing their illnesses via remote consultations and disease monitoring.^{7–11} Telemedicine has been widely used in the COVID-19 epidemic and has achieved good clinical effects.^{12–14}

WeChat (a platform for information conversations) is the most widely used social software in China, with more than 1 billion people using WeChat at least once a day.¹⁵ It has been reported that WeChat can be used as a telemedicine model for the monitoring, prevention, and health management of diseases, such as infertility, chronic diseases, and infectious diseases.^{16–18} During the outbreak of COVID-19, we used WeChat to follow up children after CHD surgery. This study summarizes our experience and the clinical effect of using WeChat in the postoperative follow-up management of children with CHD during the COVID-19 epidemic.

Methods

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of our hospital and strictly adhered to the tenets of the Declaration of Helsinki (code of ethical approval: 2020KY039). In addition, all patients' guardians signed an informed consent form before the study.

Patients

The data (deriving from electronic health records, surveys, and medical records from the hospital) of 150 children who were followed up after CHD surgery in our hospital from December 2019 to September 2020 were retrospectively analyzed. Among them, the parents of 135 children completed all the questionnaires, while the parents of the remaining 15 children only completed part of the questionnaires. The response rate was 90%. Due to incomplete data, 18 children were not included in the study. Of the 132 children included in this study, 70 cases were followed up through WeChat (WeChat follow-up group) and 65 cases were followed up through outpatient (outpatient follow-up group).

The parents of all patients completed the Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), and Zarit Burden Interview (ZBI) before discharge, and they completed the ZBI, SAS, SDS, and Patient Satisfaction Questionnaire-18 (PSQ-18) 1 month after discharge. Clinical data and family data of the two groups were collected and analyzed. The inclusion criteria were as follows: children after CHD surgery were followed up in our hospital during the outbreak of COVID-19. The following exclusion criteria were used: (1) complicated with other serious diseases, (2) incomplete data, and (3) parental refusal to participate in the study.

WeChat (Tencent Ltd., Shenzhen, China) is a smartphone-based social media application like Facebook, Twitter, and WhatsApp. WeChat is the most popular mobile social media application in China. WeChat is a convenient and intuitive method of information exchange, and it integrates functions

such as graphics, text, audio, and video to maximize information coverage.¹⁵

Follow-Up Methods

WeChat Follow-Up

- When the children were discharged from hospital, we gave routine discharge guidance to the parents of the children, including precautions, medication methods after discharge, and follow-up time (1 month, 3 months, and 1 year after operation).
- We instructed the parents to join the WeChat group and taught them to master its use.
- We instructed the parents to read the health education content on WeChat and send the examination data through the WeChat, and asked questions in the WeChat group.
- The education module includes (1) basic knowledge of various CHD, including disease concepts, symptoms, signs and so on; (2) postoperative care and feeding knowledge and precautions; and (3) recognition and treatment of common postoperative complications. Parents could review and learn these materials at their convenience.
- In the answering and solving questions module, one medical staff member was available from 8:00 A.M. to 18:00 P.M. every day to answer parents' questions. The medical staff also encouraged the family members to actively discuss the care experience with each other in the WeChat group. If there was any problem, doctors could be consulted through WeChat at any time. Parents can choose the mode of information communicate according to their preferences.

Outpatient Follow-Up

- When the children were discharged from hospital, we gave routine discharge guidance to the parents of the children, including precautions, medication methods after discharge, and follow-up time (1 month, 3 months, and 1 year after operation).
- Parents of children were given health education manuals with the same information as those in the education module of WeChat.

Research Tool

- Zarit burden interview: This scale was developed by Zait. It has 22 items, including two dimensions of individual burden and role burden. Item 22 is the overall assessment of the caregiving burden of caregivers. Each item is graded according to a 5-point Likert scale: "no," "occasionally," "sometimes," "often," and "always" were recorded as 0, 1, 2, 3, and 4 points, respectively. The higher the score, the heavier the care burden, with a total score of 88. A total score of <19 points indicate a light burden, 20 to 39 points indicate a moderate burden, 40 to 59 points indicate a heavy burden, and >60 points indicate a severe burden.^{19,20}
- Self-rating anxiety scale: This scale included 15 items with negative words and five items with positive words. The response options for each item range from 1 to 4, with

higher scores indicating a higher frequency of symptoms (the items were reverse scored to assess the frequency of the positive symptoms). The total score was obtained by summing the scores of all items. The standardized score was obtained by multiplying the total score by 1.25 and rounding the result. The mean value of the standardized score is 50. Grade description: <50 indicates normal, 50 to 59 indicates mild anxiety, 60 to 69 indicates moderate anxiety, and ≥ 70 indicates severe anxiety.²¹

- Self-rating depression scale: This scale consists of 20 items, including 10 negative symptoms and 10 positive symptoms. The items assess the respondent's mood, body discomfort symptoms, spiritual movement, behavior, and psychological symptoms. The response options for each item range from 1 to 4, with higher scores indicating a higher frequency of symptoms (the items were reverse scored to assess the frequency of negative symptoms). The standardized score was obtained by multiplying the scores by 1.25 and rounding the result. Normally, the maximum score was 41 and the maximum standardized total score was 53. Higher scores indicate a trend toward more significant depression. Grade description: <50 indicates normal, 50 to 59 indicates mild depression, 60 to 69 indicates moderate depression, and ≥ 70 indicates severe depression.²²
- Patient satisfaction questionnaire-18: The validated PSQ-18 was used to assess parents' satisfaction. These 18 questions of the questionnaire consisted of several subscales, including general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with the physician, and accessibility and convenience. The questionnaires present scores reflecting the 5-point Likert scale from 1 to 5.²³

Statistical Analysis

Continuous data are presented as the mean \pm standard deviation and range. The normal distribution test was performed on all continuous data, and they followed a normal distribution. Clinical parameters between the two groups were compared with the independent samples *t*-test. The Chi-square or Fisher's test was used to categorize the variables. A *p*-value of <0.05 was defined as significant.

Results

General information about the patients and their parents is shown in **Table 1**. There was no statistically significant difference between the two groups ($p > 0.05$). The ZBI, SAS, and SDS scores of patients in the two groups at discharge were similar ($p > 0.05$). These results indicated that the data were homogeneous and comparable between the two groups.

All patients were followed up. In the WeChat follow-up group, all of the parents have used the answering/solving module, and 10 parents have not used the education module. In the outpatients follow-up group, seven parents have not read health education manuals in detail.

About 1 month after discharge, the ZBI, SAS, and SDS scores of the WeChat follow-up group were significantly

Table 1 Demographic characteristics of patients and their parents in two groups

	WeChat follow-up group	Outpatient follow-up group	<i>p</i> -Value
Age (mo)	15.2 \pm 12.6	17.7 \pm 14.1	0.242
Weight (kg)	9.8 \pm 7.1	11.2 \pm 8.8	0.315
Disease			
Atrial septal defect	6	5	0.856
Ventricular septal defect	38	39	
Patent ductus arteriosus	11	12	
Pulmonary stenosis	8	4	
Tetralogy of Fallot	2	2	
Endocardial cushion defect	1	1	
Total anomalous pulmonary venous connect	2	2	
Aortic arch interrupt	2	0	
Operation time (h)	3.5 \pm 1.3	3.4 \pm 1.2	0.695
Cardiopulmonary bypass time (h)	1.2 \pm 0.7	1.1 \pm 0.6	0.781
Counts for parents	126	102	
Age of parents (y)	28.3 \pm 7.6	29.7 \pm 9.1	0.436
Parents' education level			
Under high school	20	17	0.884
High school	36	33	
Junior college	52	37	
Bachelor degree or higher	18	15	
Family living condition			
Rural area	46	42	0.893
City	24	23	

better than those of the outpatient follow-up group ($p < 0.05$). Compared with discharge time, the ZBI, SAS, and SDS scores were significantly improved in the WeChat follow-up group ($p < 0.05$) but not in the outpatient follow-up group ($p > 0.05$; **Table 2**).

The results of the PSQ-18 showed that the scores on general satisfaction, interpersonal manner, communication, time spent with a physician, and accessibility and convenience of the WeChat group were significantly higher than those of the outpatient group ($p < 0.05$). There was no significant difference in technical quality or financial aspects between the two groups ($p > 0.05$; **Table 3**).

Discussion

Previous experience has shown that people experience anxiety, depression, and panic attacks in the face of highly

Table 2 Comparison of the Zarit burden interview score, self-rating anxiety scale score, and self-rating depression scale score between the two groups

	WeChat follow-up group	Outpatient follow-up group	p-Value
At the discharge time			
Score of SAS	66.1 ± 13.4	65.5 ± 15.7	0.611
Score of SDS	61.2 ± 12.5	63.2 ± 13.6	0.687
Score of ZBI	44.2 ± 9.2	42.9 ± 11.2	0.513
1 month after discharge			
Score of SAS	47.1 ± 9.1 ^a	61.2 ± 13.3	0.031
Score of SDS	49.3 ± 11.2 ^a	60.6 ± 12.4	0.026
Score of ZBI	22.5 ± 7.1 ^a	40.1 ± 9.8	0.023

Abbreviations: SAS, self-rating anxiety scale; SDS, self-rating depression scale; ZBI, Zarit burden interview.

^aShowed that compared with the score of each corresponding item at the discharge time $p < 0.05$.

Table 3 Comparison of the score of Patient Satisfaction Questionnaire-18 between the two groups

	WeChat follow-up group	Outpatient follow-up group	p-Value
General satisfaction	4.3 ± 0.7	3.0 ± 1.1	0.031
Technical quality	4.1 ± 0.6	3.9 ± 0.7	0.821
Interpersonal manner	4.4 ± 0.8	2.7 ± 1.0	0.029
Communication	4.5 ± 1.0	2.5 ± 1.2	0.023
Financial aspects	3.7 ± 0.8	3.8 ± 0.6	0.892
Time spent with doctor	4.5 ± 0.7	2.6 ± 1.2	0.026
Accessibility and convenience	4.4 ± 0.9	2.3 ± 1.3	0.021

contagious diseases.²⁴ A study of avian flu in France reported that 39.0% of participants expressed anxiety about the disease.²⁵ In the initial phase of the COVID-19 outbreak, a study showed that 53.8% of participants were psychologically affected, 28.8% of them reported moderate to severe anxiety symptoms, and 8.1% of them reported moderate to severe anxiety levels.²⁶ During the outbreak of COVID-19, the life and psychological state of many people were adversely affected, as they showed anxiety, tension, and fear.²⁷ During this period, people and families with disease were more prone to adverse psychological moods due to the inconvenience of traveling for medical treatment and the risk of being infected with COVID-19.

Children after CHD surgery need professional medical support, meticulous care, and nursing as well as strict follow-up to reduce the occurrence of complications. Studies have shown that parents of children with CHD have higher

levels of stress, anxiety, and depression than the general population.²⁸ In China, children with CHD mainly live in rural areas, and their family members generally have a low educational level; as a result, they cannot grasp care knowledge during hospitalization. Due to the poor level of basic medical care, if they have problems after discharge, they usually have to go to provincial hospitals in large cities to resolve them. During the epidemic, travel is inconvenient and there is a risk of infection when travelling, especially in crowded areas, such as hospitals. During this epidemic, after CHD surgery, the parents feel more pressure to take care of their children, and there is a heavy burden of care, anxiety, and depression because of the lack of care knowledge and inconvenience in traveling for medical treatment. Telemedicine has been widely used to solve the problem of insufficient medical support for patients.^{29,30} This study summarizes our experience and the clinical effect of using WeChat (a platform for information conversations) in the postoperative follow-up management of children with CHD during the COVID-19 epidemic.

WeChat is the most popular mobile social media app in China, with 1.12 billion users.¹⁵ Many studies have shown that health education based on WeChat was very effective in shortening time consumption, reducing economic costs, improving treatment compliance, reducing complications, increasing the follow-up rate, and improving patients' condition.^{16–18,31,32} During the special period of COVID-19, we provided follow-up management and health services for children after CHD surgery via WeChat. Parents can learn from the education module of WeChat anytime and anywhere according to their own needs. When they have problems, they can consult medical staff through WeChat anytime and anywhere, obtain timely and effective answers, and acquire professional knowledge support. In this way, the parents of children after CHD surgery can obtain medical support from professional doctors without going out of the house, which alleviated the problems of inconvenient medical treatment and insufficient medical support during the outbreak of COVID-19. As a result, the care burden, depression, and anxiety of parents were alleviated. In this study, the parents' care burden, anxiety, and depression in the WeChat follow-up group were significantly lower than those in the outpatient follow-up group.

The satisfaction of patients and their families is also an important index to evaluate the effect of medical treatment. Through WeChat, parents can contact the medical staff very conveniently so that problems can be solved in time without increasing medical treatment costs. It can greatly improve parents' satisfaction with medical services. As a result, in this study, the general satisfaction, technical quality, interpersonal manner, communication, time spent with the doctor, accessibility, and convenience scores and the total score of the WeChat follow-up group were significantly higher than those of the outpatient follow-up group.

As a new medical Internet tool can be a useful assistant in outpatient follow-up, but it is not a substitute for outpatient follow-up. We can obtain information through the continuous dynamic monitoring of WeChat, which is very valuable

for follow-up. Telemedicine approaches helped patients to take a more active role in managing illnesses via remote consultations and disease monitoring, which is well suited to the management of any chronic disease in any period. It is even more useful during pandemics because of traveling inconvenience. However, the information obtained by such remote follow-up is not as rich and accurate as that obtained by outpatient follow-up. In the face of any vague or suspicious information or patients with serious symptoms, we need to carefully inquire about the situation of the patients. When necessary, patients should be called to the hospital for a clinical or medical examination to avoid a misdiagnosis or missed diagnosis.

There are some limitations in this study. First, this was a single-center retrospective study with a small number of cases. Second, this was a study during a particular period (the outbreak of COVID-19). Third, some patients in remote rural areas of China could not be included due to the poor internet. In this study, four patients in the outpatient follow-up group did not have internet access.

Conclusion

During the COVID-19 epidemic, the application of WeChat to the follow-up management of children after CHD surgery can extend high-quality professional medical services to the family and continuously provide professional medical support for parents. It can effectively reduce care burden, relieve anxiety and depression of parents at home, and improve the satisfaction of parents with medical treatment.

Clinical Relevance Statement

Applying WeChat to perform follow-up and health education was convenient, economical, and continuous. At the same time, it can reduce the travel of patients, which helps to prevent and control COVID-19.

Multiple Choice Questions

1. Telemedicine is applied to:
 - a. The monitoring of disease
 - b. The prevention of disease
 - c. The health management
 - d. All of the above

Correct Answer: The correct answer is option d, all of the above. It has been reported that WeChat can be used as a telemedicine model for the monitoring, prevention, and health management of diseases, such as infertility, chronic diseases, and infectious diseases.

2. Advantages of telemedicine
 - a. Convenient
 - b. Economical
 - c. Continuous
 - d. All of the above

Correct Answer: The correct answer is option d, all of the above. Applying WeChat to perform follow-up and health education on children after congenital heart disease surgery was convenient, economical, and continuous.

Protection of Human and Animal Subjects

The project was deemed not human subjects research and received exempt approval by the ethics committee of our hospital.

Note

This study was approved by the ethics committee of our hospital and strictly adhered to the tenets of the Declaration of Helsinki (code of ethical approval for scientific research project: 2019 ethical scientific research approval no. 2020KY039). In addition, all patients' guardians signed an informed consent form before the study. The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

Z.Q.L., C.Q., and C.H. designed the study, collected the clinical data, performed the data analysis, drafted the manuscript, and revised the article. L.J.F. and X.W.P. collected the clinical data and drafted the manuscript. All authors read and approved the final manuscript.

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Conflict of Interest

None declared.

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