RESEARCH ARTICLE

A comparative study of family centered nursing mode and routine clinical nursing mode on postoperative nursing of children with congenital heart disease

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Abstract

Objective: To explore the family-centred postoperative care of congenital heart disease (CHD) patients.

Methods: A total of 200 child patients with Congenital Heart Disease and their families were selected as the research objects in the study. All the research objects were divided into intervention group and control group, with 100 of them in each group. Based on the current development of the family-centred postoperative care, the paper employed the Delphi Method to construct the contents of family-centred postoperative care and educated the parents with the contents. Later by assessing the left ventricular ejection fraction (LVEF), the oxygen saturation, and the New York Heart Association (NYHA) functional classification of the child patients, it was seen that the postoperative pain of patients in the intervention group was more effectively relieved along with a faster recovery of cardiac functions compared to the control group.

Results: The results showed that the absence of parental care was the major stressor for the child patients. For the parents, the lack of knowledge on CHD and its therapy was the source of anxiety.

Conclusions: Family-centred postoperative care promoted the communications between doctors and parents of child patients, relieved the postoperative pain of the patients and the psychological trauma of their families. The child patients were provided with a better medical environment, which helped in a faster recovery.

Keywords: congenital heart disease, postoperative care, family-centered. (JPMA 70: 16 [Special Issue]; 2020)

Introduction

Congenital heart disease (CHD) is a malformation caused by the developmental disorders of the heart and major blood vessels during the foetal stage. The incidence of CHD has been ranked as the first birth defect in three consecutive years and it is the major cause of death among children aged 0 to 5 years in the urban areas of China.[1] It is estimated that about 160~180 thousand CHD infants are born annually. If some of the infant patients with serious and complicated vessel malformations do not receive immediate treatment, it could prove to be fatal and the death rate reaches 40%.[2,3] CHD has thus become a major public health issue which threatens both psychological and physical health along with the quality of life in children, causing a large economic burden and pressure on the society and families.[4] Cardiac surgery is the necessary treatment for CHD child patients for survival.[5] The recent surgical methods are not only a source for survival for CHD patients, but they further diminish the postoperative complications, improve the long-term therapeutic effects, and reduce the burdens on families. However, most cardiac surgeries are thoracotomies with a large surgical trauma and placed as a high risk. The early stage of postoperative recovery, can have multiple variations.[6] These include atelectasis, low-output syndrome, arrhythmia and heart failure. In addition, CHD patients are in a serious condition with poor development and low body mass index (BMI), which can cause delay in postoperative recovery.[7] Post-operative pain is also a serious aftermath of cardiac surgery and has been ranked as the highest level compared to other surgeries. Other additional invasive procedures which can also lead to a series of complicated physiological and psychological reactions, which can prolong the period of postoperative recovery.[8] Moreover, the postoperative nutritional status of child patients can be poor due to feeding difficulties and they suffer from malnutrition. In the post-operative phase due to high stress leading to increased energy consumption the malnutrition can be aggravated. The postoperative malnutrition can lead to a series of serious complications, including acute renal failure, chylothorax and developmental disorders of neural functions. This leads to a prolonged hospital stay and an increased fatality rate. Being affected by a series of factors including the surgical traumas, the unfamiliar postoperative environment, and the separation from parents, children who return from intensive care units (ICU) to the normal wards show varying degrees of negative emotions such as anxiety, fear and depression. These are displayed as crying,

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irritability, anger, and unwilling to talk or play. Some patients develop urinary incontinence.[9] These emotional disorders could lead to post-traumatic stress disorder (PTSD) after discharge and even the entire adolescent period of child patients.[10-15] Multiple studies have shown that families can play an important role in the rehabilitation process of CHD patients. If the parents of these patients are supported with effective information and involved in the postoperative care process of their children, the status of both the patients and their parents would be effectively improved, which is conducive to the recovery of the patients.[16-20] The objective of this study was to explore the family-centered postoperative care of congenital heart disease (CHD) patients.

Patients and Methods

From September 2018 to August 2019, child patients aged 1 month to 5 years who had undergone CHD surgery in the Children's Hospital Affiliated to Zhengzhou University and their family members were selected as the research subjects. In accordance with the principle of random sampling, a total of 200 child patients who had agreed for CHD surgery were randomly divided into the intervention group and the control group, with 100 patients in each group. Inclusion criteria were, a first experience of a child patient to undergo CHD surgery, with the parents of patients volunteering to participate in the study and having signed the informed consent form. Exclusion criteria were the CHD child patients with chromosomal abnormalities and other serious diseases; those with the child patients with severe complications in the perioperative period; the child patients who were having second or the third surgeries; the child patients whose parents suffered from mental diseases or cognitive function impairment; those who came from single-parent families or whose parents were not involved in the process of postoperative care. Informed consent was signed by all patients' parents or their families and this study was approved by the Ethics Committee of Children's Hospital Affiliated to Zhengzhou University.

Estimation of sample size: According to the results of 10 pre-test cases, the difference of LVEF between the intervention group and the control group before an operation, 1 month after intervention and 3 months after intervention was 4.026, 5.337 and 8.379, respectively with the smallest difference of 4.026. Based on the results of 60.256±9.336 in the literature,[21] the population standard deviation of 9.336 was selected. The estimation formula for the sample sizes of the two groups of measurement data was as follows:

$$n_1 = n_2 = 2[(z_\alpha + z_\beta)^2 \sigma^2 / \delta^2]$$

In the formula, $\alpha = 0.05$, $\beta = 0.1$, $z_\alpha = 1.6449$, $z_\beta = 1.2816$, $\sigma = 9.339$, $\delta = 4.026$. After calculation, n_1 and n_2 were 92. Each group was sampled for 100 cases due to the need to eliminate approximately 10% of the estimated cases. The intervention of nursing care.

Control group: The current clinical nursing mode was adopted, and routine nursing and health education were given. It was necessary to do a good job in family communication. Children's diet should be light. It was necessary to keep respiratory tract unobstructed and strengthen lung care. According to the recovery of the disease, the children were instructed to carry out activities. Before discharge, the family members were instructed to limit the amount of activity of the children in the early postoperative period, strengthen nutrition, and recover physical and mental functions as soon as possible.

Intervention group: On the basis of the control group, the family centered postoperative nursing method was adopted. After admission, the parents of the intervention group were first explained the condition of their child, were made familiar with the hospital environment, issued the relevant health education pamphlets and explained the precautions after admission. Before surgery, the model of the heart and the animation of the surgical process were displayed to the children and their parents. After the comprehensive psychological counselling, the parents were suggested to encourage the children to establish a sense of intimacy and trust between the parents and the children. After the operation, the process and the result of the operation were explained to the parents in order to relieve their stress. The diet, nursing, and medication that should be paid attention to after the operation were also explained to the parents. At the time of discharge, the parents were explained the care of the wound at home, the permitted activities of the child, medication and return visits as well as other aspects of family care. Nurses were responsible for communicating with the parents before and after admission as well as before and after surgery. Besides, nurses had to conduct educational and support activities once a day to guide and encourage the family members to participate in the perioperative care. A special communication channel was set up for consultation between doctors and patients to help and timely guide parents in the care of children.

Delphi Method: Based on the analysis and collation of the interview data, the preliminary draft of "family-centred postoperative care content for child patients with congenital heart diseases" was initially revised and made into the first round of expert letter inquiry form. The study selected 23 experts who satisfied the inclusion criteria, which were mainly experts in the fields of clinical care, clinical care management, care administration, and care management research.

The Delphi Method included two enquiries; the first round of letter enquiry was completed after 1 month; the second round of enquiry was completed after 2 months. The time interval between the two rounds of letter enquiry was 4 weeks. After completing the first round of letter enquiry, the results were collected and analysed to modify the questionnaire for the second round. The study expert letter enquiry questionnaires were sent to the investigators via mails or in-person issuance. The opinions of experts in each round were collected to calculate the concentration and coordination of expert opinions on each content. After two rounds of enquiries, the opinions of experts were basically consistent, thus, the letter enquiry was terminated.

The health condition evaluation of child patients: Indicators of the evaluation were: left ventricular ejection fraction (LVEF), oxygen saturation (SPO2), and New York Heart Association functional classification (NYHA).[22] The Colour Doppler Ultrasound diagnosis instrument was applied for the detection of LVEF, the Mindray Pulse Oxygen Monitor was applied to detect and assay the SPO2, and the New York Heart Association functional classification was applied to classify the cardiac functions of the child patients.

Statistics Analysis: The data collected were analysed and processed with the SPSS 17.0 statistics software. The measurement data obtained before and after the experiment was expressed as x±s and compared by the T-test. While the count data was represented by the composition ratio and tested by the Chi-square test. In terms of the test results, the bilateral $P<0.05$ was considered statistically significant.

Results

Results of the Delphi Method The first round of letter enquiry had issued 23 copies of the questionnaire in total, in which 23 of them were returned. The positive coefficient of the experts was 100% in the first round of letter enquiry, in which 18 experts had put forward constructional opinions (18/23=78.26%). The second round of letter enquiry had issued 23 copies of the questionnaire in total and 23 of them were returned. The positive coefficient of the experts was 100%. In the second round of letter inquiry, 3 experts had put forward constructional opinions (3.23=13.04%) and the participation was satisfied. The experts who accepted the two rounds of letter enquiries were mainly experts in the fields of clinical care management, care administration, clinical care, and care research. The average length of service of experts who accepted the two rounds of letter inquiries was 19.5±7.2 years, all service years were more than 10 years. A total of 16 experts were of intermediate titles and above. All experts had extensive experiences in clinical treatment and care of congenital heart diseases. After two rounds of letter inquiries, the opinions of experts had basically reached an agreement, thus, the inquiry was terminated. The final draft of "family-centered postoperative care content for child patients with congenital heart diseases" included four first-level indicators, namely respect and dignity (providing a good medical environments, humanistic concerns throughout the communication and social support), participation in family-centred ward round system, daily care, professional care, parental companion during invasive operations, information support (postoperative hospital stay, continuous care), and cooperation, 9 secondary indicators, 107 third-level indicators, and 120 items in total. The technical route map is demonstrated in Figure 1.

Comparing the basic information between research objects it was observed that among the 100 cases in the intervention group and 100 cases in the control group, boys were the majority, with 59 (59%) in the former group and 53 (53%) in the latter. The majority of child patients were between 2 and 25 months age, and the proportion of child patients aged 2 to 25 months in the intervention group was 58%, compared with 55% in the control group. Most of the families came from rural areas, in the intervention group accounting for 66% whereas the control group had 65%. In terms of the patient's siblings, 85% of the child patients in the intervention group were only children, while 87% of the children in the control group were only children. The comparisons were demonstrated in Figure-2. The basic information of the two groups: the comparisons of age, gender, siblings and residence were analysed by the Chi-square test. The results showed no statistical significance between indicators of basic information between the two groups. ($p>0.05$).

The LVEF values, SPO2 values, and NYHA classes of child patients in the intervention group and the control group at each time point before and after the intervention were compared in Figure-3. The repeated-measures ANOVA was applied to analyse the LVEF values of child patients. For the intervention group, values obtained between 1 month and 3 months after surgery were compared, with an F value of 70.05 at each time point and $P <0.05$ was considered statistically significant. For the control group,

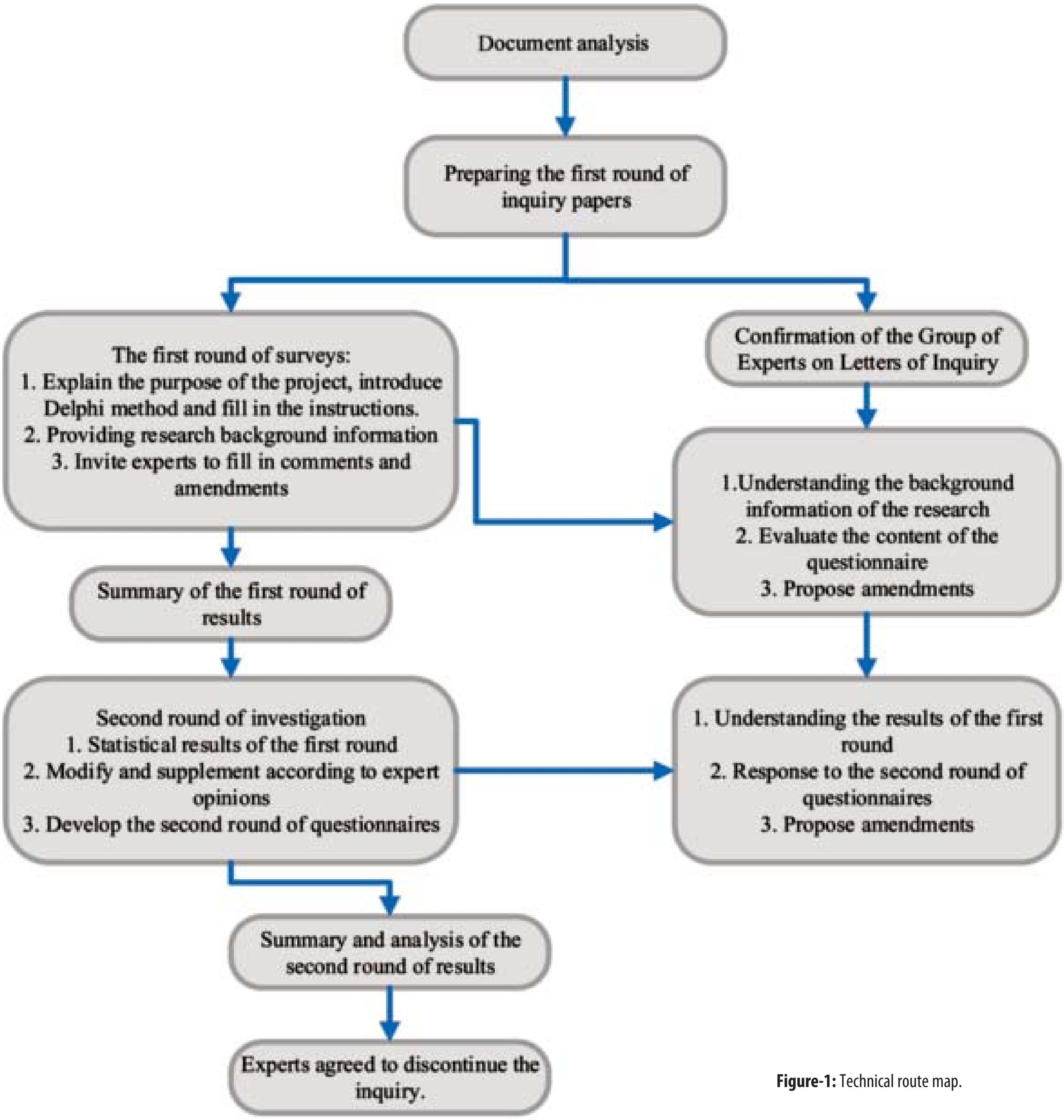

Figure-1: Technical route map.

the values obtained between 1 month and 3 months after surgery were also compared and the F value was 35.41. The comparison was made at each time point and $P < 0.05$ was considered statistically significant. The repeated-measures ANOVA was applied to analyse the SPO2 values of child patients. For the intervention group, the values obtained at 1 month and 3 months after surgery were compared, with a F value of 51.2 and $P < 0.01$ indicating statistical significance at each time point. For the control group, the values obtained before surgery and 1 month after surgery were compared, $P < 0.01$ was considered statistically significant. In the comparison between the values obtained at 1 month and 3 months after surgery, $P > 0.05$ indicated no statistical significance. The

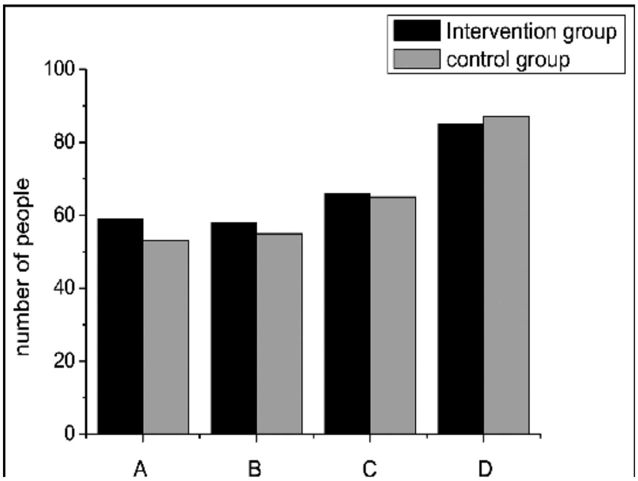

Figure-2: The comparisons of basic information between child patients in the two groups (A: the proportion of boys; B: the proportion of patients aged 2~25 months; C: the proportion of families came from rural areas; D: the cases of the only child).

preoperative NYHA of child patients indicated no statistical significance (P>0.05). The NYHA classes of child patients obtained 1 month after the surgeries indicated the statistical significance of the comparison between the two groups (P<0.05).

Discussion

As children with complex congenital heart disease survive after the first operation, more patients survive to late childhood or early adulthood with heart failure. The prevalence of congenital heart disease is 8-10 per 1000 new-borns.[23] Due to the progress made in cardiac surgery, medical treatment and cardiac intervention, the high mortality rate of related congenital heart disease has decreased from 80% to 20%.[24] At present, more than 80% of children with congenital heart disease have reached adulthood. In addition to PDA and ASD, which can be operated on in early childhood, all other congenital heart

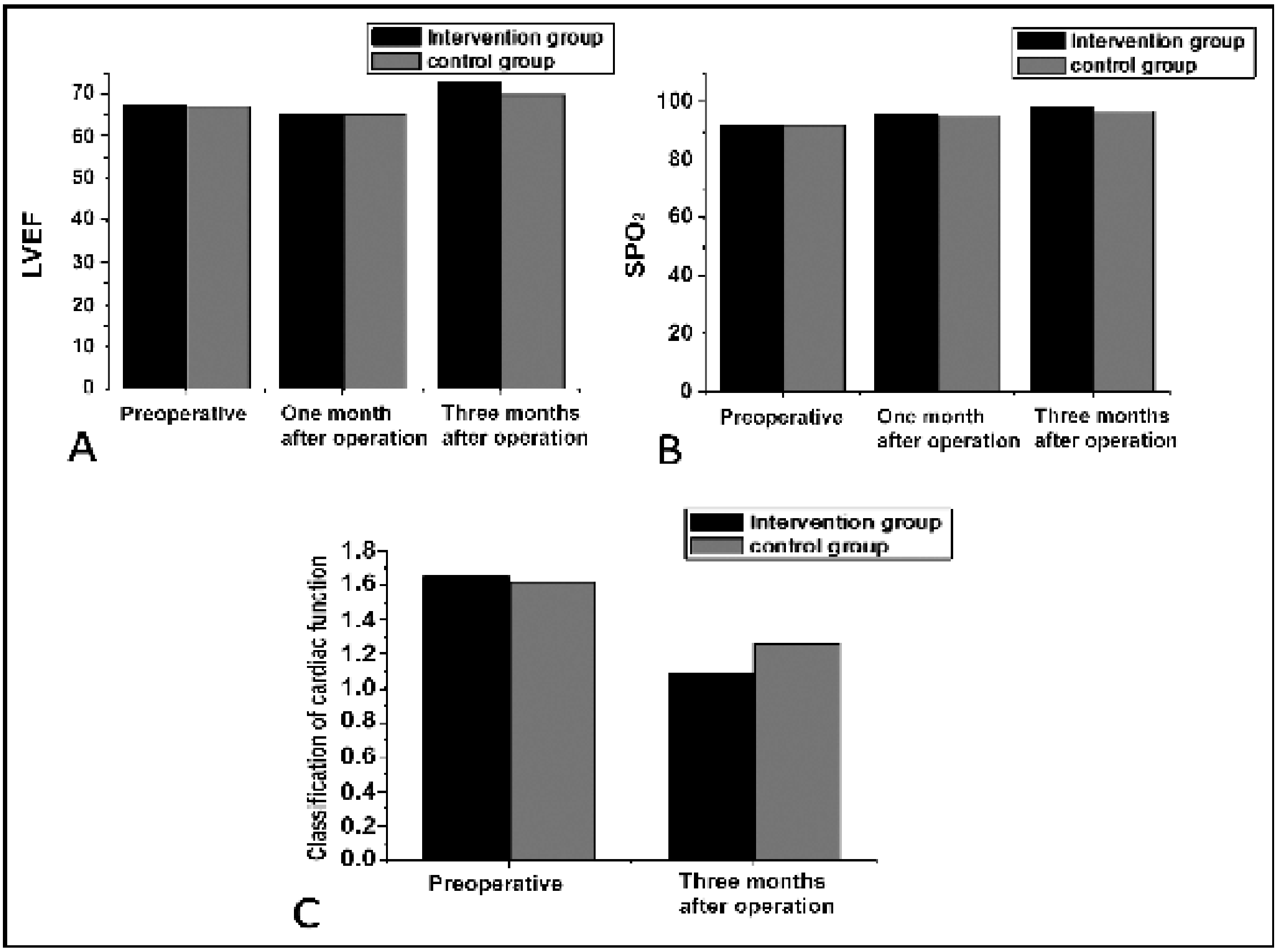

Figure-3: The comparisons of health indicators before and after the surgeries between the intervention group and the control group (A: the comparison of LVEF values; B: the comparison of SPO2 values; C: the comparison of NYHA classes.).

diseases should be checked regularly, because even after successful primary intervention or surgery, there can be significant residual or sequelae. The best care for these patients begins with home care in childhood and must continue into adulthood. Almost all patients need careful follow-up in order to identify residual or sequelae and timely treatment. Because of the complexity of many congenital heart defects, the importance of home care has become increasingly prominent.

The traditional nursing model could only meet the general nursing needs in the process of disease treatment and could only provide targeted care for children, while ignoring the role and impact of family and environment on the disease of children. In addition, nurses, children, and their families were relatively independent and lack active communication as well as cooperation. The family-centered care model highlighted the important role of the family in the disease treatment and rehabilitation process of children, encouraged parents to actively participate in the children rehabilitation nursing process and emphasized the communication, the establishment of communication, cooperation and mutual relationship, which effectively improved and enhanced the service quality of childcare.[25] Relevant research found that the development of children's mental health and the quality of life related to health after discharge can be improved by developing strategies to improve family mental health. If we can determine the appropriate long-term home care and monitor the functional indicators in real time after the surgical treatment of complex congenital heart disease, we can improve the prognosis.[26]

When conducting research under Delphi method, the experts should be professionals with more than 10 years of relevant work experience and rich knowledge in the field. There were 23 experts selected from clinical nursing management, clinical nursing and other fields who had been working for about 15 years, so they could provide practical and effective advice for the study. When the return rate of the letter of enquiry questionnaire was greater than 50%, it could be used for statistical analysis. When it was greater than 70%, it could be considered that the survey standard was better.[27] The recovery rate of the 2 rounds in this study was 100%, indicating that the experts were highly motivated to participate in this study and a total of 22 experts put forward constructive opinions. Through the analysis of the general information of the children in the control group and the intervention group in this study, the results showed that there was no significant difference in the age, gender, siblings and place of residence of the children, between the two groups ($P>0.05$). However, the influence of environmental factors such as external residence for the follow-up study were excluded and hence become the objective of this study. LEVF is the ejection fraction of the left ventricle, which can sensitively reflect the function of the patient's left heart. The results of this study indicated that the LEVF of the children in the control group and the intervention group was more than 50% before surgery, 1 month after treatment and 3 months after treatment, indicating that the heart function of the children in the two groups was sound. After 3 months of treatment, LEVF in the intervention group was significantly higher than that of the control group. The stronger the myocardial contractility, the greater the blood output per pulse, the higher the corresponding ejection fraction, indicating that the myocardial contractility of the intervention group was significantly stronger than that of the control group.[28] The results of this study showed that SPO2 in both the control group and the intervention group was more than 90% before surgery, 1 month after treatment and 3 months after treatment. Furthermore, the SPO2 in the intervention group was higher than the control group at 3 months after treatment. SPO2 is blood oxygen saturation, which can reflect the respiratory function of children and a certain degree of arterial oxygen changes.[28] When SPO2 is below 90%, the patient is considered hypoxaemic. While NYHA is the classification standard for heart failure, the higher the grade, the more severe the heart failure of the children.[29] The results of this study showed that NYHA 3 months after treatment was lower than that before surgery in both groups, indicating that NYHA could effectively improve the degree of heart failure in children.[30] The NYHA of children in the intervention group at 3 months after treatment was significantly lower than that of the control group, indicating that family-centred nursing intervention could improve the heart failure of children more effectively than routine care.

Similarly, research on congenital heart disease in children is ongoing. It has been reported that a hierarchical management algorithm for children based on identified risk factors has been designed. Formal, regular development and medical assessments are recommended for those who are considered to have a high risk of developmental impairment or disability or retardation. A CHD algorithm for monitoring, screening, evaluation, re-evaluation and management of developmental diseases or disabilities is constructed. The proposed algorithm is designed to be implemented in a medical home environment. This scientific statement is prepared for medical providers who care for patients in the medical institution.[31] It should be noted that the complete cure of children's congenital heart disease is an exception, and most adult patients still have residual problems and sequelae.[32] Further surgical or catheter intervention may be required. Potential late complications include arrhythmias, heart failure, pulmonary hypertension, endocarditis, and thromboembolic events. The management of these patients during pregnancy or noncardiac surgery remains a challenge.[33] If this ever-changing group of patients is to receive the best possible care, the best communication between all relevant doctors is essential.

Conclusion

It was observed that after receiving the knowledge on family-centred postoperative care, the parents of child patients were more agreeable to participate in the postoperative care processes of child patients. After 3 months, it was obvious that the participation of parents could effectively reduce the postoperative pain of child patients as well as accelerate the cardiac function recovery of the patients. In the past, considering the potential risks of infection and the emotional trauma of parents, many medical institutions only allowed short visits during hospital stays. However, more and more studies have discovered that the lack of parental care was the biggest stressor of child patients. The family-centred postoperative care allowed parents to participate in the medical care of their children after receiving professional education, which could enable better communication between doctors and patients. Allowing parents to accompany their children during invasive operations could not only alleviate the pain of the child but also reduce the anxiety of the parents.

Disclaimer: I hereby declare that this research paper is my own and autonomous work. All sources and aids used have been indicated as such. All texts either quoted directly or paraphrased have been indicated by in-text citations. Full bibliographic details are given in the reference list which also contains internet sources. This work has not been submitted to any other journal for consideration.

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