DOI: 10.66069/ojspub.27451009

Effects of Solution-Focused Brief Therapy on Caregiver Burden and Treatment Outcomes in Children with Hypospadias

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Abstract: ***Objective:*** *To evaluate the effects of a Solution-Focused Brief Therapy (SFBT) nursing intervention on caregiver burden of children with hypospadias.* ***Methods:*** *A total of 90 caregivers of children with hypospadias hospitalized in the Department of Pediatric Surgery, Affiliated Hospital of Youjiang Medical University for Nationalities, from July 2023 to January 2026 were enrolled as study subjects. They were numbered according to admission order and randomly allocated into a control group and an intervention group (45 cases each) using a random number table. The control group received routine nursing care, while the intervention group received SFBT nursing intervention in addition to routine care. The two groups were compared in terms of scores on the Chinese version of the Depression-Anxiety-Stress Scale (DASS-21), the Pittsburgh Sleep Quality Index (PSQI), the Family Caregiver Task Inventory (FCTI), and the children's treatment outcomes.* ***Results:*** *After the intervention, the differences between the two groups in DASS-21, PSQI and FCTI, scores were all statistically significant (all P<0.001). Within the intervention group, the post-intervention scores of DASS-21, PSQI, and FCTI also showed statistically significant differences compared with pre-intervention(P<0.001). The difference in the incidence of postoperative complications between the two groups was statistically significant(P<0.05).* ***Conclusion:*** *SFBT-based nursing intervention can reduce the caregiving burden of caregivers of children with hypospadias and improve the children's treatment outcomes.*

Keywords: Hypospadias, Solution-Focused Brief Therapy, Caregiver, Care burden, Negative emotions.

1. Introduction

Hypospadias is a common congenital penile anomaly [1, 2], with an incidence of approximately 1 in 300 to 1 in 200 in China, and the rate has been rising year by year [3, 4]. Its main characteristics include an ectopic urethral meatus, ventral curvature of the penis, and dorsal hooded prepuce. If not treated in time, erectile dysfunction in adulthood may lead to difficulties in sexual intercourse, sexual dysfunction, and infertility [5, 6]. At present, surgery is the only effective treatment for hypospadias [7]. Surgical procedures for hypospadias are numerous and technically demanding, with a high rate of complications, and affected children lack the ability for self-care [8-10], Due to concerns about penile development, surgical risks, and treatment outcomes, caregivers often experience pronounced negative emotions [11]. Such caregiving burden, including inadequate caregiving capacity, financial strain, and physical and psychological burden, can undermine the quality of care and in turn affect patient recovery [12]. Therefore, paying attention to caregivers' caregiving ability as well as their physical and mental health is important for patient recovery.

The Solution-Focused Brief Therapy(SFBT) is a person-centered, goal-oriented short-term psychological intervention that respects and stimulates an individual's greatest potential and mobilizes strengths and resources to resolve problems [13, 14], Through five steps, namely describing the problem, constructing goals, exploring exceptions, giving feedback, and evaluating progress [15], SFBT helps individuals shift from a negative focus on the problem to attention on the resources and abilities for solving it [16]. Although SFBT has been widely applied at home and abroad, few studies have reported its use in hypospadias. This study aimed to empower parents through SFBT, break the vicious cycle of "anxiety - inadequate caregiving - complications," and verify its role in the chain of "improving parents' psychological state-enhancing caregiving ability- reducing complications in children," so as to provide a reference for clinical nursing practice.

2. Materials and Methods

2.1 General Information

This study was designed as a randomized controlled trial. The study subjects were caregivers of children with hypospadias admitted to the Department of Pediatric Surgery at the Affiliated Hospital of Youjiang Medical University between July 2023 and January 2026. Inclusion criteria: age ≥18 years; primary caregiver role with caregiving time ≥8 hours/day; absence of mental disorders or other relevant diseases; ability to engage in normal verbal communication; awareness of the patient's condition; voluntary participation in the study and signing of an informed consent form. Exclusion criteria: individuals from welfare institutions or paid caregivers; caregivers who frequently changed; individuals with severe cardiopulmonary or neurological diseases. Additional exclusion criteria: participants who withdrew from the study midway or who became lost to follow-up. This study was approved by the ethics committee (Ethics Approval No.: YYFY-LL-2023-032). Participants were numbered according to their admission sequence and then randomly assigned to groups using a random number table.

2.2 Methods

2.2.1 Control Group

Received routine nursing care, including admission education, condition assessment, health guidance, psychological counseling, and discharge follow-up.

2.2.2 Intervention Group

Received nursing interventions based on the focused problem-solving model.

(1) Describing the problem

Within 24 hours after admission, a research nurse conducted a semi-structured interview with the caregiver lasting 20–30 minutes per session, using empathic techniques to encourage the caregiver to release anxious feelings and to assess current concerns. During the child's hospitalization, the researcher communicated with the caregiver face to face at least twice a week for 30 minutes each time, and applied scaling questions, asking, "If 10 means you are very confident in caring for your child and 1 means you have no confidence at all, what score would you give yourself now? What could you do to increase your score by one point?"

(2) Constructing feasible goals

On the first day of admission, the researcher provided health education to the caregiver using the Health Education Brochure for Hypospadias. A psychological counselor guided the caregiver in mindfulness breathing training; after the caregiver mastered the technique, they were required to complete one 20–30minute session per day guided by audio instructions during the child's hospitalization. One day before surgery, the researcher used the Teach-Back method to instruct the caregiver on how to put perineal protective underwear on the child, with each session lasting 30 minutes. Within 48 hours before discharge, the researcher assessed discharge readiness and guided the child in urination training twice a day for 30 minutes each time. After discharge, the researcher followed up via WeChat once a week and reviewed videos of the child urinating. Caregivers were asked to keep a "success diary" to record one thing they did well each day.

(3) Exploring exceptions

Exception questions were used to ask the caregiver, "In the process of caring for your child, was there ever a time when things were very difficult but you still handled them relatively well? How did you manage that?" to identify the caregiver's existing successful experiences.

(4) Giving feedback

From the second day of admission until discharge, the researcher used a self-designed caregiving task checklist every day to evaluate the caregiver's understanding of hypospadias-related disease knowledge and treatment plans, preoperative preparation, perioperative caregiving skills, and the mastery and implementation of mindfulness breathing training. After discharge, the researcher reviewed urination videos once a week to assess the child's urination and the caregiver's mastery of home care. Praise was used to affirm every small improvement made by the caregiver.

(5) Evaluating progress

The PDCA(Plan-Do-Check-Act) cycle was applied for continuous improvement.

2.3 Observation Indicators and Evaluation Methods

Caregiver negative emotions were assessed using the Chinese version of the Depression Anxiety Stress Scales (DASS-21) [17]. The scale consists of three subscales, namely depression, anxiety, and stress, with 21 items in total. Each item was scored on a 4-point Likert scale from 0("does not apply at all") to 3("applies very much"). The score of each subscale ranged from 0 to 42, and higher scores indicated more intense negative emotional experiences.

Caregiver sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) [18, 19]. Each of the components is scored on a 4-point scale from 0 to 3, and the sum of the component scores yields the PSQI total score, which ranges from 0 to 21. A higher total score indicates poorer sleep quality.

The quality of care provided by caregivers was assessed using the Chinese version of the Family Caregiver Task Inventory (FCTI) [20]. The scale comprises 5 dimensions and 25 items. A 3-point Likert scale was used, with each item scored from 0 to 2, corresponding to "not difficult" to "extremely difficult", and the total score was 50 points. A lower total score indicates greater caregiving ability and better quality of care.

Patient Outcomes: Assess postoperative complications in pediatric patients

2.4 Statistical Analysis

Data were entered using EpiData 3.1 and analyzed with SPSS 25.0. For continuous data following a normal distribution, results were expressed as mean ± standard deviation($\bar{x}\pm s$) and compared between the two groups using the independent-samples t test (e.g., caregiver age). For continuous data not following a normal distribution, results were expressed as the median and interquartile range, and compared using the Mann-Whitney U test. A generalized estimating equation (GEE) model was used to analyze differences between the two groups across the three time points. Categorical data were expressed as frequencies and percentages, and compared using the chi-square test.

3. Results

3.1 Baseline Comparison of Demographic Characteristics Between the Pediatric Patient and Their Caregiver

A total of 90 patients were enrolled and completed the study in this research. No statistically significant differences were observed in the baseline characteristics of the pediatric patients and their caregivers between the two groups($P > 0.05$), as shown in Tables 1 and 2.

3.2 Comparison of Negative Emotions, Sleep Quality, and Care Quality Scores Between the Two Groups of Caregivers

Prior to intervention, there were no statistically significant differences in the DASS-21, PSQI, and FCTI scores between the two groups of caregivers ($P_{DASS-21}$=0.058, P_{PSQI}=0.198, P_{FCTI}=1.000, all P-values>0.05); On postoperative day 1 and at 2 months after discharge, statistically significant differences were observed between the two groups ((all P<0.001), Within the intervention group, intra-group comparisons of DASS-21, PSQI, and FCTI scores also showed statistically significant differences (all P<0.001); see Tables 3, 4, and 5.

Table 1: Comparison of baseline characteristics between the two groups of pediatric patientsn (%)

item	classification	control group (n=45)	Intervention group (n=45)	Z/χ^2	P
Age (years)		5.50(3.0, 9.05)	6.00(3.55, 9.00)	-0.121	0.903
Educational stage	pre-school age	25(55.55)	23(51.11)	4.885	0.087
	primary school	17(37.78)	22(48.89)		
	junior high school and above	3(6.67)	0(0.00)		
nation	Zhuang ethnic group	25(55.55)	27(60.00)	0.182	0.670
	other	20(44.45)	18(40.00)		
domicile	town	6(13.33)	8(17.78)	0.338	0.561
	village	39(86.67)	37(82.22)		

Table 2: Comparison of baseline characteristics between the two groups of caregiversn (%)

item	classification	control group (n=45)	Intervention group (n=45)	t/χ^2	P
Age(years)		33.80±4.73	35.66±5.29	-1.756	0.083
sexuality	male	20(44.45)	15(33.33)	1.169	0.280
	female	25(55.55)	30(66.67)		
Educational stage	Primary school and below	4(8.89)	7(15.56)	0.972	0.615
	Primary and secondary school	16(35.56)	14(31.11)		
	University education or higher	25(55.55)	24(53.33)		
occupation	staff	7(15.56)	13(28.89)	2.315	0.314
	the individual search for jobs	32(71.11)	27(60.00)		
	other	6(13.33)	5(11.11)		
Average monthly household income per capita	<3000	15(33.33)	16(35.56)	0.934	0.627
	3000~4500	23(51.11)	25(55.55)		
	~4500	7(15.56)	4(8.89)		
Primary caregiver	none	22(48.89)	25(55.55)	0.401	0.527
	have	23(51.11)	20(45.45)		
Daily care duration	8~12	27(60.00)	20(45.45)	2.182	0.140
	~12	18(40.00)	25(55.55)		
health condition	health	27(60.00)	26(57.78)	0.989	0.610
	good	14(31.11)	17(37.78)		
	general	4(8.89)	2(4.44)		

Table 3: Comparison of DASS-21 scores between the two groups of caregivers $M(P25,P75)$

group	Before intervention	Day 1 postoperatively	Months since discharge	$\beta_{time\ effect}$ value	$\beta_{Group\ effect}$value	$\beta_{interaction}$value
control group (n=45)	39.00 (34.00,42.50)	20.00 (19.00,22.00)[a]	4.00 (2.00,5.00)[b]			
Intervention group (n=45)	35.00 (31.00,40.00)	40.00 (36.00,43.50)	21.00 (13.00,27.00)	1417.072[c]	231.370[d]	397.067[e]
Z	16.467	34.978	3.733			
P	0.058	0.000	0.000			

Note: Analysis was performed using generalized estimating equations (GEE); the p-values for [a]P, [b]P, [c]P, [d]P, [e]P<0.001

Table 4: Comparison of PSQI scores between the two groups of caregivers $M(P25,P75)$

group	Before intervention	Day 1 postoperatively	Months since discharge	$\beta_{time\ effect}$ value	$\beta_{Group\ effect}$value	$\beta_{interaction}$value
control group(n=45)	11.00(9.00, 12.00)	7.00(6.00,8.00)[a]	2.00(1.00,3.00)[b]			
Intervention group(n=45)	11.00(8.00, 13.00)	12.00(11.00, 13.00)	7.00(5.00,8.00)	0.29[c]	1.66[d]	64[e]
Z	0.137	-5.56	-10.56			
P	0.198	< 0.001	< 0.001			

Note: Analysis was performed using generalized estimating equations (GEE); the p-values for [a]P, [b]P, [c]P<0.001, [c]P=0.222, [d]P=0.598

Table 5: Comparison of FCTI scores between the two groups of caregivers $M(P25,P75)$

group	Before intervention	Day 1 postoperatively	Months since discharge	$\beta_{time\ effect}$ value	$\beta_{Group\ effect}$value	$\beta_{interaction}$value
control group (n=45)	28.00(24.00, 31.00)	14.00(11.00, 19.00)[a]	2.00(0.00, 7.00)[b]			
Intervention group (n=45)	27.00(23.00, 30.50)	28.00(22.50, 32.50)	18.00(14.50, 22.00)	131.737[c]	358.795[d]	123.320[c]
Z	13.489	23.289	1.111			
P	1.000	0.000	0.000			

Note: Analysis was performed using generalized estimating equations (GEE); the p-values for [a]P, [b]P, [c]P, [d]P, [e]P <0.001

3.3 Comparison of Postoperative Outcomes Between the Two Groups of Pediatric Patients

The number of postoperative complications between the two groups of pediatric patients was significantly different (P<0.05), as shown in Table 6.

Table 6: Comparison of postoperative complications between the two groups of pediatric patients n(%)

group	have	none
control group(n=45)	6(13.33)	39(86.67)
Intervention group(n=45)	14(31.11)	31(68.89)
χ^2	4.114	
P	0.043	

4. Discussion

4.1 Effect of Solution-Focused Brief Therapy on Negative Emotions in Caregivers

Caregivers of children with hypospadias commonly experience psychological problems to varying degrees [9]. In the present study, caregivers in both groups showed varying degrees of negative emotions before the intervention. After the intervention, the scores of depression, anxiety, and stress on the Depression Anxiety Stress Scales (DASS-21) in the intervention group decreased significantly and were significantly lower than those in the control group at the same time point. These findings suggest that SFBT can effectively relieve negative emotions in caregivers of children with hypospadias. Traditional nursing interventions mostly focus on the problems and symptoms of caregivers, whereas SFBT emphasizes their strengths and resources. By guiding caregivers to attend to their own coping abilities and successful experiences, SFBT helps them reconstruct their cognition of the problem, thereby alleviating negative emotions. In addition, the process of SFBT is essentially a form of cognitive restructuring. It highlights the idea that "small changes lead to big changes," guiding caregivers facing seemingly unsolvable problems to identify feasible entry points and thus find ways to cope with and resolve the problems. Anxiety and depression in caregivers often stem from catastrophic thinking about the "unknown," such as surgical outcomes and the child's future. In this study, scaling questions (for example, "What needs to be done to move from 5 to 6?") shifted caregivers' attention from uncontrollable and overwhelming worries to concrete, controllable actions in the present, which enhanced their confidence in coping and reduced psychological pressure. Consistent with the philosophy of SFBT, this shift of attention and the restoration of a sense of control break the vicious cycle of "worry-anxiety-helplessness," which is a key psychological mechanism underlying the relief of negative emotions.

4.2 Effect of Solution-Focused Brief Therapy on Caregivers' Sleep Quality

The decline in caregivers' sleep quality has complex causes. On the one hand, caregivers may experience anxiety due to concerns about the child's condition and surgical outcomes [21], leading to difficulty falling asleep and difficulty maintaining sleep. On the other hand, children require nighttime care after surgery, such as observing the urinary catheter and preventing the child from pulling or scratching the wound, which results in fragmented sleep for caregivers. The results of this study showed that the PSQI scores of caregivers in the intervention group decreased significantly after the intervention and were significantly lower than those in the control group. Although the main effects of time and group were not significant, the group-by-time interaction was highly significant, indicating that the trajectories of change in sleep quality differed essentially between the two groups. This suggests that SFBT can improve sleep quality in caregivers of children with hypospadias. By enhancing caregivers' caregiving skills and boosting their confidence, SFBT enabled them to accompany their children more calmly and alleviated negative emotions, which in turn indirectly improved sleep quality. In addition, SFBT taught caregivers relaxation techniques such as mindfulness breathing training and problem-solving methods, helping them arrange rest time more effectively and thereby improving sleep quality.

4.3 Effect of Solution-Focused Brief Therapy on the Quality of Care Provided by Caregivers

The results of this study showed that the FCTI scores of caregivers in the intervention group on postoperative day 1 and two months after discharge were significantly lower than those in the control group, suggesting that SFBT could effectively stimulate caregivers' potential to acquire disease-related knowledge and improve their caregiving ability, thereby contributing to the health of the children. This is consistent with the program development approach of Yuan Qianjiao et al., who constructed a family-participatory nursing program based on SFBT for children with congenital hydronephrosis [22]. This finding is consistent with the study by Yuan Qianjiao et al in caregivers of children with congenital hydronephrosis. Unlike traditional health education, which relies heavily on the caregiver's educational level and theoretical understanding, SFBT emphasizes identifying strengths and specifying concrete tasks. By guiding caregivers to review their previous successful caregiving experiences, SFBT not only helps them recall these experiences but, more importantly, encourages them to actively analyze the controllable factors behind their success. This shift from passively receiving knowledge to actively analyzing and applying strategies is the core of improving the quality of care. In contrast to routine health education, in which caregivers passively accept information, SFBT helps parents realize that they are capable of solving problems. When facing complex postoperative tube care, caregivers with high self-efficacy are more inclined to try to solve the problem rather than fall into helplessness and anxiety, and therefore show better compliance and more standardized nursing care. The characteristic of SFBT, which emphasizes practice over theory, is well suited to caregivers' cognitive habits. In conclusion, SFBT is an effective intervention tool that can help overcome the "barrier of knowledge" and has important implications for promoting nursing quality.

4.4 Effect of Solution-Focused Brief Therapy on the Therapeutic Outcomes of Children

In the present study, children in the intervention group had a lower incidence of postoperative complications than those in the control group, suggesting that SFBT may help reduce complications such as urethrocutaneous fistula, meatal stenosis, and wound infection. This effect is unlikely to result from a direct impact on the surgery itself, but may be mediated through caregivers. By emphasizing caregivers' own resources and solution-oriented coping, SFBT may alleviate anxiety and depression, enhance caregiving self-efficacy, and encourage caregivers to actively master catheter care, dressing observation, wound cleaning, and fluid intake guidance. As a result, caregivers may recognize early warning signs such as dressing bleeding, catheter obstruction, fever, and local redness or swelling sooner and seek medical care promptly. In addition, stable emotions and positive communication may reduce crying, scratching of the wound, and sudden increases in abdominal pressure in children, indirectly lowering the risk of wound dehiscence, bleeding,

and infection. However, previous research has shown that complications after Snodgrass surgery are closely related to the child's age, hypospadias type, severity of preoperative chordee, and surgical technique [21]. Although there were no statistically significant differences in baseline characteristics between the two groups in this study, and although the interference from confounding factors was reduced to some extent, this study still cannot establish a definitive causal relationship between SFBT and the reduction in complications. Furthermore, Yuan Mengting et al. found that in children with precocious puberty, the combination of SFBT and family collaborative care could improve medication adherence and growth and development outcomes [23], suggesting that family involvement may be an important pathway influencing pediatric outcomes. While this finding aligns with the rationale of the present study, the study population and outcome measures differed from those of our investigation; therefore, these results cannot be directly regarded as validation of the same conclusion.

Against this background, the present study did not attempt to demonstrate that psychological intervention directly changes surgical outcomes. Instead, we focused on the family caregiving context and explored whether SFBT could interrupt the vicious cycle of caregiver anxiety, ineffective caregiving and pediatric complications. Recovery after hypospadias repair depends heavily on family care, because caregivers need to continuously monitor catheter patency, dressing bleeding, local redness and swelling, and body temperature, while also encouraging fluid intake and preventing the child from scratching the wound or crying excessively. When caregivers are overly worried about surgical safety, urinary function and long-term appearance, they may develop anxiety, insomnia and hesitation in decision-making. They may either miss early warning signs or adopt inappropriate behaviors, such as frequently touching the wound, adjusting the catheter without guidance, or delaying medical consultation, all of which may increase the risk of urethrocutaneous fistula, wound infection and meatal stenosis. As a solution-oriented approach, SFBT emphasizes existing family resources and successful experiences, and helps caregivers set specific and achievable goals by clarifying what they can do at the present moment, which may reduce helplessness and enhance caregiving self-efficacy. In this study, caregivers in the intervention group showed reduced negative emotions, better sleep quality and lower perceived caregiving difficulty, and their children had a lower incidence of postoperative complications than those in the control group. These findings provide preliminary support for the proposed pathway of improving caregiver psychological status, enhancing caregiving capacity and reducing pediatric complications. The results also suggest that perioperative nursing for hypospadias should not focus only on the child, but should include caregivers as an important target of intervention. However, because daily caregiving behaviors were not objectively recorded and no mediation analysis was conducted among caregiver emotions, caregiving behavior and complications, the present study can only suggest that SFBT may indirectly influence pediatric outcomes through improved caregiver psychological status and caregiving performance, rather than confirm a complete causal pathway. This study also has several limitations. First, the sample was recruited from a single center, which may have introduced selection bias and limited the generalizability of the results. Second, the follow-up period was only two months, making it difficult to evaluate the sustained effects of SFBT on caregivers' psychological status and on children's long-term urinary function and satisfaction with penile appearance. Future multicenter, large-sample randomized controlled trials with longer follow-up and standardized SFBT protocols are warranted, and the feasibility of implementing SFBT in primary healthcare settings and remote areas should be explored to benefit more families of children with hypospadias.

5. Conclusion

Solution-focused brief therapy-based nursing intervention can relieve negative emotions in caregivers of children with hypospadias, improve their sleep quality, enhance the quality of care, and promote treatment outcomes for the children. Further high-quality studies with larger sample sizes and longer follow-up periods are needed to track the long-term effects of SFBT in caregivers of children with hypospadias after intervention.

Fund Project

Self-funded Scientific Research Project of the Health Commission of Guangxi Zhuang Autonomous Region (Z-L20230878).

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