

论 著 临床研究

## Identification of target behavior in process of intervention for children with feeding difficulty and relevant factors in randomized controlled trial

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**[Abstract] Objective** To identify the target behavior in the process of behavioral intervention for children with feeding difficulty and relevant factors that may contribute to more effective intervention. **Methods** Children aged from 1 to 6 years with feeding difficulty randomly received interactive behavioral intervention (245 cases) or routine primary care (217 cases). By the end of the 1, 3, 6, and 9 months, the rating score of feeding difficulty and the body mass index (BMI) were assessed. The target behavior was determined based on the selecting criteria that simultaneously satisfied two conditions: ①it was relevant to improving children's nutritional status; ②it changed fast during intervention. Moreover, the relevant factors of target behavior were analyzed by multivariate analysis (Multi-Way ANOVA). **Results** Among nine behaviors of feeding difficulty, "eating slowly" was identified as a target behavior because it was closely relevant to the BMI z-score increment and had the biggest score reduction at early stage during intervention. Various factors were relevant to improving the target behavior, including parents acting as caregivers, caregiver's education level equal to and above junior college, and caregiver's concern about their children's feeding difficulty. **Conclusion** "Eating slowly" should be selected as the target behavior for early intervention for children with feeding difficulty and some social factors should be considered for optimizing the intervention.

**[Key words]** body mass index; behavioral therapy; feeding difficulty; target behavior

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In the past century, feeding difficulty in children has received little attention from pediatricians and nutritionists. These feeding difficulty may adversely affect children's growth<sup>[1]</sup>. In clinical setting, there are different types of problematic eating behaviors in feeding difficulty, for example, some children usually eat little while some children eat very slowly, and some children are picky eaters and refuse to try new foods. Epidemiological data show that the incidence rate of feeding difficulty in children is ranging from 20% to 60%<sup>[2,3]</sup>, which is much higher than that of eating disorders in children while the latter is only about 5%<sup>[4]</sup>.

Even though feeding difficulty usually fails to fit

the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision (DSM-IV-TR) criteria for eating disorders (such as anorexia, bulimia nervosa) in terms of severity and functional impairment, they do represent some types of deviation from the typically developmental milestone of feeding-eating behaviors in children. Several studies have shown that feeding difficulty in children is not only related to the biological factors, such as genetics, premature birth, and brain growth retardation<sup>[5,6]</sup>, but also related to the social environment factors, such as parents' eating habits, interaction between parents and children, and family environment<sup>[7-9]</sup>. According to a recent study, feeding

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difficulty in children is associated with psychopathological elements<sup>[10]</sup>. Thus, feeding difficulty could be seen as the embodiment of extensive behavior problems, such as hyperactivity, aggression, social withdrawal, anxiety and sleeping disorders<sup>[11]</sup>. Such evidence justifies the importance for early behavioral intervention in children with feeding difficulty.

According to Chatoor and Kerzner<sup>[12,13]</sup>, feeding difficulty is defined as the inability or refusal to eat foods, which is often accompanied by various problematic eating behaviors. From the behavioral therapy guideline<sup>[14]</sup> and the clinical characteristics of feeding difficulty in children, we concluded that in feeding difficulty, the selection of target behavior should simultaneously meet two important conditions: improvement of nutritional status by changing the behavior and easy modification. Therefore, the purpose of this study is to identify the target behavior in childhood feeding difficulty and factors related to the improvement of target behavior. In doing so, a better intervention strategy that includes considering the target behavior selection would be formulated in the future.

## 1 MATERIALS AND METHODS

### 1.1 Research subjects and their characteristics

From January 2009 to October 2009, 490 children aged from 1 to 6 years with feeding difficulty were enrolled in this study from three pediatric clinic settings in three urban districts (Changning District, Luwan District and Hongkou District) in Shanghai. Originally, the caregivers might or might not concern about their children's feeding difficulty. Some caregivers wanted to get some help for their children's feeding difficulty and some just brought their children to these clinic settings for attending "well child clinic". If the caregivers reported some feeding difficulty in their children, pediatricians might ask them if they were willing to participate in this research program and they would get some treatment to their children's feeding difficulty whatever they were going to be enrolled in the interactive behavioral intervention group or routine primary care treatment group. If they agreed to join, a set of questionnaires would be filled out by the trained pediatricians who

asked the caregivers and children questions included in these questionnaires, then obtained a medical history and conducted a physical check-up. We had strict definition for each specific problematic eating behavior in feeding difficulty, based on Kerzner's classification<sup>[13]</sup> and the children's eating behavior inventory<sup>[15]</sup>, which has demonstrated good validity and reliability in identifying children's problematic eating behaviors. For example, "eating slowly" means spending more than 30 min per meal regularly or often; "eating little" means eating much less than the average children at the same age regularly or often.

### 1.2 Assessment of feeding difficulty

Feeding difficulty was assessed according to the classification method elucidated by Chatoor and Kerzner<sup>[12,13]</sup>, that is, for each child, apart from verifying the problematic eating behaviors of feeding difficulty, a medical history was also obtained and a physical check-up was conducted for each child by two or more qualified pediatricians. If necessary, abdominal ultrasound, cardiac ultrasound, gastroscopy, liver function test, trace elements test, evaluation of dynamics in esophagus and gastrointestinal tract, allergy test, endocrinology test, neurological and psychiatric examination were performed in a tertiary-level hospital to exclude the existence of any underlying organic diseases. A structured interview was conducted to exclude the possible existence of any major psychiatric disorders. This study was approved by Ethics Committee of Shanghai Children's Medical Center. Children were recruited through the informed consent of their parents.

### 1.3 Inclusion and exclusion criteria

Children were eligible for inclusion if they met the following four criteria: ① caregivers reported the existence of any one or more of the aforementioned nine problematic eating behaviors in feeding difficulty in children; ② the problematic eating behaviors in feeding difficulty were described as "regular" or "often" when considering the nine problematic eating behaviors described in the baseline survey<sup>[15,16]</sup>; ③ children did not suffer from any organic diseases, such as congenital heart disease, cerebral palsy, and gastric ulcer;

④children did not suffer from any severe mental diseases, such as major depression and mental retardation. Thus, we excluded children with any organic diseases and major psychiatric disorders in this study.

#### 1.4 Intervention and control group

The 490 children with feeding difficulty were randomly assigned to two groups. A number of envelopes labeled with the number “1” or “2” were equally put into a closed container, when a child met the enrollment criteria, a pediatrician randomly took an envelope out and assigned the child with number “1” to the interactive behavior intervention group and “2” to the control group. At the end of 9 months, the lost to follow-up rate was 5.7% (28/490). Here, 28 cases did not fully comply with the follow-up schedule and among them, 4 cases were hospitalized for organic diseases. Therefore, 462 cases were included in this analysis. The intervention group included 245 cases while the control group included 217 cases.

#### 1.5 Questionnaire of feeding difficulty

The baseline and follow-up visit questionnaires were designed to capture the weight, height, and head circumference (measured by pediatricians). The baseline questionnaire included 17 main queries (Q1-Q17) and the follow-up visit questionnaire included 7 queries (Q1-Q7), such as children’s chronological age, children’s eating behavior, caregivers’ method of solving eating behavior problem, caregivers’ attitude, caregivers’ cultural background, caregivers’ awareness of children’s eating behavior after intervention. It has been proved good reliability and validity of these questionnaires<sup>[16,17]</sup>. The scoring and quality control processes were reported in our previous paper in detail<sup>[16]</sup>.

#### 1.6 Interactive behavioral intervention and follow-up visits

According to the principles and approaches of Kerzner<sup>[13]</sup> on assessing, classifying and treating children with feeding difficulty, we designed the interactive behavioral intervention model to be used in intervention group. We briefly present the feeding principles here: ①maintain appropriate boundaries, including: the care-

giver decides where, when, and what the child eats, and the child decides how much is eaten; ②avoid distraction when feeding and eating; ③encourage appetite, including: allow 3-hour intervals between meals and avoid snacks and, provide only water for thirst; ④maintain neutral attitude, including: the caregiver does not get overly excited or animated and, never become or even appear angry when child refuses to eat; ⑤limit duration, including: eating should begin within 15 minutes of the start of the meal and, meals should last no longer than 30 – 35 min; ⑥serve age-appropriate food; ⑦systematically introduce novel food, reward consumption of new food with praise; ⑧encourage independent feeding; ⑨tolerate age-appropriate mess.

The feeding principles by Kerzner summarized in this paper could be used to deal with all kinds of problematic eating behaviors in feeding difficulty, but some of the principles among them could be tailored to treat a particular problematic eating behavior. For example, when a child is classified as “no interest in food”, the basic behavioral intervention principle is to increase appetite by promoting hunger, the subsequent intervention approaches would be: ①ensure three meals and one afternoon snack; ②each meal should end in 20 min; ③meals should be taken away if the child does not finish within 20 min; ④allow only water between meals.

Basically, the interactive behavioral intervention model replicated the feeding principles put forward by Kerzner, but it added some unique interaction ingredients for better implementation. It emphasizes the interactions in three levels, that is, the interactions between pediatricians and children, pediatricians and caregivers, caregivers and children in this interactive behavioral intervention. First of all, every child with feeding difficulty was assessed to clarify how many feeding difficulty coexisted, and their underlying causes were clarified by at least 2 experienced pediatricians. Afterwards, the principles and approaches aimed at handling each specific problematic eating behavior in feeding difficulty were taken into practice. During the 9-month intervention period, five training sessions were given to the caregivers by experienced pediatricians, in which the detailed behavioral intervention approaches were passed on to the caregivers according to the specific conditions

of different children, at the beginning of the intervention ( $T_0$ ), the end of 1 month ( $T_1$ ), the end of 3 months ( $T_2$ ), the end of 6 months ( $T_3$ ), and the end of 9 months ( $T_4$ ) for each follow-up visit time point. The interaction between caregivers and children, the rating scores of problematic eating behaviors in feeding difficulty, and the weight, height of children were evaluated at each follow-up visit time point. In addition, an easily understandable handbook introducing the behavioral intervention in feeding difficulty was handed out to every caregiver at  $T_0$ . The clinical examinations and instructions were implemented by the pediatricians to children with feeding difficulty at each follow-up visit time point. In contrast, children with feeding difficulty in the control group only sought routine primary care treatment in the community based hospitals, where they were usually treated with appetizer (zinc supplementation medicine) and a psychological comfort. The rating scores of problematic eating behaviors in feeding difficulty, and the weight and height of children were also evaluated in the control group at each follow-up visit time point by the same pediatricians.

### 1.7 Statistical analysis

Mean  $\pm$  SD and percentage were used in measuring and counting the data. An analysis of variance (ANOVA) was used for comparing variables of different time intervals between two groups, with an in-between-factor time and a between-factor group. Dunnett's post hoc test was applied for the pairwise comparisons. Pearson correlations were used to describe bivariate correlations between score reduction of different problematic eating behaviors in feeding difficulty and BMI z-score increments. A multiple linear stepwise regression model was built to identify the significant determinants contributing to the BMI z-score increment, with the score reduction

of each problematic eating behavior in feeding difficulty served as the independent variable. To identify the problematic eating behaviors in feeding difficulty with the fastest score reduction at early intervention stage, we described and compared the score reduction of problematic eating behaviors in feeding difficulty related to BMI z-score increments in the intervention group at different time intervals, so that the one with the fastest score reduction at early stage could be discovered. Finally, we analyzed the correlations between caregivers' demographic data (all of them were dichotomous variables) and the dependent variable (the score reduction of target behavior) using multivariate analysis (Multi-Way ANOVA).

## 2 RESULTS

The percentages of children with specific feeding difficulty were as follows: "eating slowly" (75.5%), "eating little" (64.7%), "no interest in food" (51.7%), "refusing certain food" (51.5%), "picky eating" (51.5%), "unwilling to try new food" (43.3%), "eating and doing other things" (26.8%), "not eating in a fixed place" (17.5%), and "eating while playing toys" (17.1%). The number of children with one, two, three, four, five, six, seven, eight, and nine feeding difficulty was 4 (0.9%), 15 (3.2%), 61 (13.2%), 137 (29.7%), 119 (25.8%), 53 (11.5%), 48 (10.4%), 19 (4.1%), and 6 (1.3%), respectively. There were no statistically significant differences ( $P > 0.05$ ) between the two groups for the baseline characteristics, which included gender, age, height, weight, BMI z-score, scores on eating behavior problems, parents as caregivers or not, educational background of caregivers, etc. Tab 1 showed the demographics of this study by the two groups.

Tab 1 Baseline characteristics of subjects

Item	Intervention Group (N = 245)	Control Group (N = 217)
Age/month	40.60 $\pm$ 1.02	39.80 $\pm$ 1.02
Gender		
Female/n (%)	122(49.8)	108(49.8)
Male/n (%)	123(50.2)	109(50.2)
Child BMI z-score	-0.428 $\pm$ 0.113	-0.430 $\pm$ 0.107
Total score of feeding difficulties	19.65 $\pm$ 5.46	19.68 $\pm$ 5.23

续 Tab 1

Item	Intervention Group (N = 245)	Control Group (N = 217)
Parents as caregivers or not		
Parents as caregivers/n(%)	107(43.8)	96(44.0)
Parents not as caregivers/n(%)	138(56.2)	121(56.0)
Educational background of caregivers		
Junior college or above/n(%)	103(42.1)	89(41.0)
Senior high school or below/n(%)	142(57.9)	128(59.0)
Caregivers giving children zinc supplement		
Yes/n(%)	51(20.8)	40(18.4)
Caregivers seeking advice from other caregivers		
Yes/n(%)	115(46.9)	106(48.8)
Caregivers seeking advice from internet forums		
Yes/n(%)	67(27.3)	57(26.3)
Caregivers seeking advice from magazines		
Yes/n(%)	98(40.0)	93(42.9)
Caregivers' concern about their children's feeding difficulties		
Yes/n(%)	164(66.9)	152(70.1)

### 2.1 Effects of interactive behavior intervention versus the control

Compared with control group, there was significantly greater decrease ( $P < 0.01$ ) in the gross feeding difficulty rating score of the intervention group at  $T_4$ . In addition, a significant score reduction  $\Delta (T_0 - T_4)$  was observed in each of the nine feeding difficulty in the intervention group ( $P < 0.01$ ), whereas there was no significant reduction in any feeding difficulty in control group at the end of the intervention ( $P > 0.05$ ). Moreover, the BMI z-score increment in intervention group was more significantly improved than in control group, there was a significant difference between them ( $0.119 \pm 0.038$  versus  $-0.135 \pm 0.043$ ,  $F = 7.514$ ,  $P = 0.006$ ).

### 2.2 Correlation between score reduction of different feeding difficulty and BMI z-score increment in the intervention group

As shown in Tab 2, the BMI z-score increment was significantly correlated with score reduction of four feeding difficulty, such as “eating slowly”, “eating little”, “no interest in food”, and “eating while playing toys”, using the Pearson correlation coefficient analysis. Moreover, a multiple linear stepwise regression model was built to show that only “eating slowly” score reduction was independently related to the BMI z-score increment, the standardized coefficients  $\beta = 0.127$ , with the 95%

confidence interval (0.001 – 0.240,  $P = 0.048$ ). In order to prevent missing the possible target behavior, we selected aforementioned four feeding difficulty as the candidates for further analysis.

Tab 2 Pearson correlation coefficients between score reduction of different feeding difficulties and BMI z-score increment of the intervention group (N = 245)

Item	BMI z-score increment	P-level
Eating slowly	0.216	0.001
Eating little	0.248	0.000
No interest in food	0.137	0.032
Refusing certain foods	0.062	0.330
Picky eating	0.055	0.392
Unwilling to try new food	0.008	0.901
Eating and doing other things	0.061	0.345
Not eating in a fixed place	0.065	0.312
Eating while playing toys	0.151	0.018

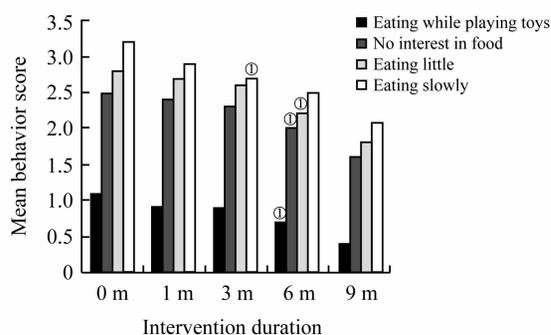
### 2.3 Score reduction characteristics of four candidate feeding difficulty in intervention group

As shown in Fig 1, the individual score of “eating slowly” dropped significantly at time  $T_2$  (3 months) compared with that at time  $T_0$  ( $P < 0.05$ ), effect size cohen's  $d = 0.767$ . The individual scores of remaining 3 feeding difficulty decreased significantly at time  $T_3$  (6 months) compared with that at time  $T_0$  ( $P < 0.05$ ). This meant that there was no significant decrease in the scores of “eating little”, “no interest in food”, and

“eating while playing toys” as early as three months of intervention (effect size cohen’s  $d = 0.307, 0.362, 0.501$ , respectively). Thus, “eating slowly” was selected as the target behavior based on the criteria for the BMI z-score increment and the fastest score reduction early during intervention stage.

### 2.4 Factors related to the greater score reduction of the target behavior

Tab 3 showed that factors related to the greater score reduction of target behavior “eating slowly” included parents as caregivers, caregivers with junior college education and above, and caregivers’ concern about children’s feeding difficulty.



①  $P < 0.05$  compared with the behavior score at 0 m of intervention

Fig 1 Score reduction of four feeding difficulties of the intervention group relevant to the BMI z-score increment

Tab 3 Factors of target behavior of eating slowly relevant to big reduction of score ( $N = 245$ )

Item	F-value	P-level
Parents acting as caregivers	4.997	0.025
Caregivers' education level equal to and above junior college	5.848	0.014
Caregivers' concern about their children's feeding difficulties	3.664	0.027
Caregivers giving children zinc supplement	0.105	0.746
Caregivers seeking advice from other caregivers	0.360	0.549
Caregivers seeking advice from internet forums	1.725	0.190
Caregivers seeking advice from magazines	0.134	0.714

## 3 DISCUSSION

The results from our study has confirmed that behavioral intervention is the effective way in the treatment of feeding difficulty and prevention of eating disorder as reported in previous studies<sup>[13,16,17]</sup>. Although feeding

difficulty can be a reflection of some underlying organic diseases, most of feeding difficulty appears in the absence of any underlying pathologies, but closely related to inappropriate feeding practices, problematic behaviors, and parent-child feeding interactions. In 2009, Kerzner<sup>[13]</sup> reviewed childhood feeding difficulty and put forward the systematic classification and intervention for feeding difficulty in children. The feeding principles elaborated in this review provided us a guideline to address different problematic eating behaviors in feeding difficulty with tailored behavioral intervention. Unfortunately, there are still many misunderstandings about the importance of appropriate intervention in children with feeding difficulty in clinical practice. Most primary care pediatricians often console parents by only telling that these problems are not serious, but this “wait-and-see strategy” may aggravate the problems because it is possible that some of children with feeding difficulty would develop into eating disorder later on.

In order to address such concern, an interactive behavioral intervention model was developed according to the feeding principles<sup>[16]</sup>. In this randomized controlled study, children with feeding difficulty presented all kinds of problematic eating behaviors, which had been classified into nine types. It demonstrated that the behavioral intervention was very effectively in ameliorating the problematic eating behaviors in childhood feeding difficulty; moreover, improving the nutritional status of these children in this study. However, there are usually multiple concurrent problematic eating behaviors in feeding difficulty in a child, making it difficult to determine which problem should be approached first. Unfortunately, we have not come across any report till date, which identifies the target behavior associated with feeding difficulty that should be intervened first in order to maximize the behavioral intervention effect.

In clinical practice, more and more pediatricians gradually accept that a behavioral intervention is an appropriate approach for managing children’s feeding difficulty. However, when considering a particular behavioral intervention in a child with usually concurrent multiple problematic eating behaviors in feeding difficulty, most pediatricians do not know which one should be intervened first, in order to maximize the effect of be-

havior intervention. In this exploratory study, we further extend our view on discovering which problematic eating behavior in feeding difficulty could serve as the target behavior among the 9 common problematic eating behaviors in feeding difficulty. This would be considered a starting point to formulate a systematic and more effective behavioral intervention strategy in children with feeding difficulty in the future.

However, to our knowledge there were no published studies aiming at identification of the target behavior, so the development of a potentially behavioral intervention in children with feeding difficulty will be limited. Generally speaking, when coping with a number of coexisting behavior problems, we should consider them one by one. For this reason, selecting a target behavior is the first and foremost step. This target behavior should be selected in accordance with two basic principles: ① the target behavior must be the primary cause for dysfunctionality, which leads to a wide range of worries and unhappiness in sufferers and their family members; ② the target behavior being addressed under intervention must show great effectiveness at early stage, that would become a necessary motivator for further behavioral therapy. Because these two characteristics in a target behavior during a behavioral intervention would inspire the motivation of caregivers and children to complete the entire behavioral intervention, that would greatly improve the success rate of this intervention.

In childhood feeding difficulty, it has been recognized by both pediatricians and caregivers that this problem, though presenting as bad behaviors, but in essence, deter the children from optimal physical growth, which was generally considered the major dysfunctionality and worries by caregivers. Hence, it would be more acceptable if a behavioral intervention modifying one particular problematic eating behavior in feeding difficulty selected from others that may result in a better nutritional status and physical growth in children. In this study, we found that modifications in merely 4 out of 9 problematic eating behaviors in feeding difficulty were possibly related to a significant BMI z-score increment. Therefore, we need get a clear understanding of what problematic eating behavior in feeding difficulty should be intervened first to obtain the better effects in terms of

improving nutritional status in children with feeding difficulty, who usually suffer from malnutrition. Furthermore, intervention of all the problematic eating behaviors in feeding difficulty at the same time is not supported by scientific evidence.

Although 4 problematic eating behaviors in feeding difficulty were shown to be associated with BMI z-score increment based on the bivariate correlations (Pearson correlation coefficient analysis), there was only 1 problematic eating behavior in feeding difficulty (eating slowly) remain significant in multiple linear stepwise regression analysis and score reduction was independently related to the BMI z-score increment. Nevertheless, the selecting criteria for target behavior in children with feeding difficulty proposed by us were more than only the nutritional status. It is necessary to monitor the changing trends in these problematic eating behaviors in feeding difficulty after behavioral intervention. Most importantly, a number of children with feeding difficulty may develop eating disorders, followed by their nutritional status deterioration, if intervention is not effective<sup>[18]</sup>. Especially during early behavior intervention stage, if the intervention is not so effective, it will attenuate the motivation for further behavioral treatment. On the contrary, if the intervention shows very effective early, it will greatly promote the motivation of all participants to continue the overall intervention. Therefore, we have monitored and compared the changing trends in 4 candidate problematic eating behaviors in feeding difficulty which were possibly related to BMI z-score increment, rather than only “eating slowly”, in order not to miss the potential target behaviors. Thus, it is clear that a problematic eating behavior in feeding difficulty that was closely relate to the BMI z-score increment and was also the fastest score reduction during intervention at early stage should be considered the target behavior in childhood feeding difficulty, because it is supposed to present the best clinical efficacy and serve as a big motivator for a successful behavioral intervention. It must be pointed out that this study showed most children had more than two problematic eating behaviors in feeding difficulty; therefore, in order to make an effective behavioral intervention, it is necessary to find the target behavior which requires priority intervention.

In the past, the importance of selecting target behavior in behavioral therapy has been affirmed by many psychologists<sup>[19,20]</sup>. As the success of this therapy is mainly dependent on this selection, it gives a positive feedback to the worried caregivers and motivates them to cooperate with the physicians in subsequent sessions of behavioral therapy. However, this issue has not been investigated in the intervention for feeding difficulty in children. According to this important theory and principle in behavioral intervention, target behavior selection in children with feeding difficulty should be taken into consideration of a positive feedback at early intervention stage, that is, the eating-behavior with fastest and early score reduction will give both pediatricians and caregivers a positive feedback. In this study, “eating slowly” had this characteristic because its score dropped significantly as early as the end of 3 months, while none of the other 3 problematic eating behaviors in feeding difficulty related to BMI z-score increment had significant score reduction. As such, “eating slowly” satisfied the two requirements which was closely related to the BMI z-score increment and had the fastest score reduction during intervention at early stage. In sum, “eating slowly” should be selected as the target behavior for priority intervention in the behavioral treatment in children with feeding difficulty. The other three feeding difficulty (“eating little”, “no interest in food”, and “eating while playing toys”) also showed to relate to children’s nutritional status that should be candidates for the target behaviors for second intervention.

Above all, we hypothesized that we may identify the target behavior, which is defined as being both closely related to the BMI z-score increment and fastest score reduction during intervention at early stage, through the observation and analysis of this prospective interactive behavioral intervention study in children with feeding difficulty. In addition, several valuable social factors could be found to facilitate the improvement of this target behavior.

There were relationships between feeding difficulty in children and their family’s social environment<sup>[8,9]</sup>. It can be hypothesized that different social environment factors in the family can promote or impede the interactive behavior intervention to some extent. In this study,

the multifactor-analysis showed that the factors closely related to score reduction of “eating slowly” target behavior include the parents as caregivers, caregivers with junior college education and above, and caregivers concern about their children’s feeding difficulty. Thus, we could get very useful information from interpretation of these results. They did have important clinical implications. First of all, in clinical practice, it is recommended that parents or caregivers with lower levels of education need special assistance from caregivers with higher levels of education. This may improve the efficacy of interactive behavioral intervention. It also may be effective in amplifying success of intervention for parents acting as caregivers themselves and, paying more attention to their children’s feeding difficulty.

In this study, although we identified the target behavior through an explorative analysis to suggest that the first intervention in this behavior may result in the better clinical outcomes; however, it still needs to withstand the rigid test of a future randomized clinical trial. In addition, the present study did not collect the behavior and evaluation data of nutrition for a period of time after the intervention was ceased. In other words, the relapse condition and long term effect of the intervention remains unknown, and this warrants future research. Another major concern is that the frequency and combinations of different feeding difficulty could have impact on the selection of target behavior that has not been considered in this study. However, the target behavior selected in this study is the most frequent feeding difficulty that is also an advantage for being a target behavior in managing feeding difficulty.

We need to conduct another randomized controlled clinical trial that evaluate the effects of this target behavioral intervention model. In this way, the effectiveness of this strategy will be tested. Furthermore, we need to consider the long-term evaluation as this will help us in knowing the relapse rate of this interactive behavioral intervention in children with feeding difficulty.

## REFERENCES

- [ 1 ] Carruth BR, Skinner J, Houck K, et al. The phenomenon of “picky eater”: a behavioral marker in eating patterns of toddlers[J]. *J Am Coll Nutr*, 1998, 17(2):180–186.
- [ 2 ] Carruth BR, Ziegler PJ, Gordon A, et al. Prevalence of picky eaters

- among infants and toddlers and their caregivers' decisions about offering a new food[J]. *J Am Diet Assoc*, 2004, 104(1 Suppl 1): s57 - s64.
- [ 3 ] Reau NR, Senturia YD, Lebailly SA, et al. Infant and toddler feeding patterns and problems: normative data and a new direction[J]. *J Dev Behav Pediatr*, 1996, 17(3): 149 - 153.
- [ 4 ] Treasure J, Claudino AM, Zucker N. Eating disorders[J]. *Lancet*, 2010, 375(9714): 583 - 593.
- [ 5 ] Samara M, Johnson S, Lamberts K, et al. Eating problems at age 6 years in a whole population sample of extremely preterm children [J]. *Dev Med Child Neurol*, 2010, 52(2): e16 - e22.
- [ 6 ] Hersrud SL, Stoltenberg SF. Epistatic interaction between COMT and DAT1 genes on eating behavior: a pilot study[J]. *Eat Behav*, 2009, 10(2): 131 - 133.
- [ 7 ] Francis LA, Hofer SM, Birch LL. Predictors of maternal child-feeding style: maternal and child characteristics[J]. *Appetite*, 2001, 37(3): 231 - 243.
- [ 8 ] Rigal N, Chabanet C, Issanchou S, et al. Links between maternal feeding practices and children's eating difficulties. Validation of French tools[J]. *Appetite*, 2012, 58(2): 629 - 637.
- [ 9 ] Hubbs-Tait L, Kennedy TS, Page MC, et al. Parental feeding practices predict authoritative, authoritarian, and permissive parenting styles[J]. *J Am Diet Assoc*, 2008, 108(7): 1154 - 1161.
- [ 10 ] Micali N, Simonoff E, Elberling H, et al. Eating patterns in a population-based sample of children aged 5 to 7 years: association with psychopathology and parentally perceived impairment[J]. *J Dev Behav Pediatr*, 2011, 32(8): 572 - 580.
- [ 11 ] McDermott BM, Mamun AA, Najman JM, et al. Preschool children perceived by mothers as irregular eaters: physical and psychosocial predictors from a birth cohort study [J]. *J Dev Behav Pediatr*, 2008, 29(3): 197 - 205.
- [ 12 ] Chatoor I, Surles J, Ganiban J, et al. Failure to thrive and cognitive development in toddlers with infantile anorexia [J]. *Pediatrics*, 2004, 113(5): e440 - e447.
- [ 13 ] Kerzner B. Clinical investigation of feeding difficulty in young children: a practical approach[J]. *Clin Pediatr (Phila)*, 2009, 48(9): 960 - 965.
- [ 14 ] Meichenbaum D. Cognitive-behavioral therapy in historical perspective[M]. Oxford: Oxford University Press, 1995: 201 - 231.
- [ 15 ] Archer LA, Rosenbaum PL, Streiner DL. The children's eating behavior inventory: reliability and validity results [J]. *J Pediatr Psychol*, 1991, 16(5): 629 - 642.
- [ 16 ] 李斐, 周迎春, 金志娟, 等. 上海市 3 城区 1 ~ 6 岁儿童饮食行为问题交互式干预的随机对照研究[J]. *中国循证儿科杂志*, 2010, 5(5): 326 - 334.
- [ 17 ] 金星明, 施榕, 金志娟. 上海市 1 ~ 6 岁儿童饮食行为问题的流行病学调查[J]. *中国儿童保健杂志*, 2009, 17(4): 387 - 389.
- [ 18 ] Rome ES, Ammerman S, Rosen DS, et al. Children and adolescents with eating disorders: the state of the art [J]. *Pediatrics*, 2003, 111(1): e98 - e108.
- [ 19 ] Lazarus AA. Behaviour therapy and graded structure [J]. *Int Psychiatry Clin*, 1969, 6(1): 134 - 154.
- [ 20 ] Keat DB. Multimodal therapy with children [M]. Ann Arbor: Pergamon Press, 1979: 102 - 125.

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## • 学术快讯 •

### 上海交通大学医学院附属仁济医院成功抢救一名颅脑贯通伤患者

日前,一例颅脑贯通伤患者在上海交通大学医学院附属仁济医院神经外科医护人员的全力抢救下,化险为夷,并在度过感染期后,康复出院。

8月9日晚,一名来沪打工的中年男性患者由外院紧急转来仁济医院急诊,急诊医生观察患者病情后,立即开通绿色通道进行头颅CT检查。原来这名患者施工时操作不慎,金属钻头由眼眶上方直接钻入颅内,病情十分紧急。

经头颅CT显示钻头由眉弓穿破颅骨入颅,颅内积气且伴蛛网膜下腔出血,且钻头末端贴近中线,极有可能穿破颅内粗大回流静脉窦——上矢状窦。据神经外科主任、国际著名颅

脑创伤专家江基尧教授介绍:颅脑贯通伤是神经外科中较少见的开放性颅脑外伤,因极易造成颅内大出血和感染,具有较高的死亡率和致残率。受伤后切忌盲目拔出异物,尤其是症状较轻的患者,在未明确异物与颅内组织和血管的毗邻关系,强行拔出极有可能造成严重的神经功能损伤、颅内大出血等致命后果。患者受伤后应及时就医,快速完善X线、头颅CT、颅骨三维重建或脑血管造影等相关检查明确诊断。开放性颅脑伤手术应尽早进行,在取出致伤物同时进行彻底的清创,修复缺损的颅底、硬膜和头皮创口。术前、术中及术后合理地应用抗生素预防颅内感染。