Factors Associated with Children's Ineffective Coping Behavior during Blood Sampling

Shiho Sato[1)], Yukiko Sato[1)], Hitoshi Shiwaku[2)]

Key Words :
preschool children
blood sampling
coping behavior
preparation

ABSTRACT

Purpose: This study investigated the factors associated with ineffective coping behaviors exhibited by children during blood sampling.

Materials and Methods: Coping behavior of 49 children aged 3–6 years was observed based on the Manifest Upset and Cooperation Scales during blood sampling; their parents responded to a questionnaire before the procedure. We obtained permission after an ethical examination of the facility with which the researchers were affiliated.

Results: Children were assigned to ineffective (n = 12) and effective (n = 35) coping behavior groups based on the Manifest Upset and Cooperation Scales. The children in the ineffective coping behavior group were younger than those in the effective coping behavior group (P = 0.013). The child's tendency toward ineffective coping behavior before blood sampling and the parent's prediction was higher in the ineffective coping behavior group as compared with the effective coping behavior group (P = 0.000). Multiple regression analysis revealed that the parent's prediction based on the Manifest Upset Scale was the significant factor that influenced a child's coping behavior.

Conclusion: The study findings suggest that it is important to take into consideration a child's age and behavior, and the parent's prediction before blood sampling.

I. INTRODUCTION

Medical examinations and procedures are often associated with physical pain or psychological distress. Children cannot understand the purpose and necessity of examinations and procedures thoroughly as they have not yet fully developed their cognitive abilities or verbal abilities. In addition, they have little experience and coping skills. As a result, children may have to undergo procedures or medical examinations that they cannot accept and that they then resist. Therefore, some support to improve coping skills and facilitate independent participation is important for children[1)].

One way of support is preparation; that is, to explain to children who will undergo treatment or examination in a manner suitable to their cognitive development, and to provide an environment or opportunity that improves the coping skills of children and their parents. Prior to examinations and procedures, preparation for children, who have not yet fully developed their cognitive abilities, is needed to help them to understand and assent to medical examinations and procedures in their own way, and to improve their coping skills[1)]. It has begun to be used actively in clinical practice and is becoming widely popular in pediatric nursing.

A researcher prepared children who were undergoing blood sampling, and verified that preparation might allow them to understand and assent to blood sampling, and might relieve the pain that the children might feel[2)]. It is a fact that many children who still cannot assent to and accept blood sampling, show ineffective coping behavior, such as crying, resistance, and acting violently.

There are several studies on the coping behavior of children, who undergo painful examinations and procedures, including blood sampling, studies that determined the actual situation of such coping behavior[3), 4)], studies that reported the factors that influence such coping behavior[5)–10)], and a study that determined the process that children accepted and acquired during examinations and procedures[11)]. As factors that had an influence on children's coping behavior, these studies included stages of development, past pain experience, explanation prior to blood sampling, and awareness and relation with the parent[4)–10)]. Although it is revealed that these factors lead to much coping behavior, there is no study that investigated the association with ineffective coping behavior (e.g., crying continually and resisting without being proactive in undergoing examinations and procedures; and strongly expressing anxiety and tension)[9)]. It cannot be said that there are sufficient studies on related factors in children requiring more individual nursing intervention and preparation.

Several studies on preparation included practical reports, case reports[12)–15)], and reports that verified its efficacy[2), 16), 17)]. It has been reported that preparation leads to decreased psychological confusion in children[16), 17)] and is effective for pain relief[2)]. In addition, a guidebook[18)], care model[19)–24)], and check list[25)] for preparation were presented to show the means by which to perform preparation. Under the circumstances, it is pointed out that an assessment of the child's background and consideration of their individual needs before performing preparations are important[2), 18)]. Thus, it is considered that the background of children who cannot be proactive in undergoing examinations and procedures, and who cannot show their effective coping skills, should be clarified.

This study aimed to determine the factors related to children who show ineffective coping behavior for blood sampling, which is conducted more routinely, and often, becomes a painful experience during painful medical examinations and procedures. In the study, the subjects were children aged 3–6 years who were considered to lack the ability to generalize and infer things during their stages of cognitive development[26)], and therefore, required preparation.

II. METHODS

1. Terminology: operational definitions

In this study, the coping behavior of children undergoing

1) *Yamagata University Faculty of Medicine, School of Nursing*
2) *Tohoku University Graduate School of Medicine, Health Sciences*

Corresponding author. Tel.: +81 23 628 5453.
E-mail address: s.shiho@med.id.yamagata-u.ac.jp (S. Sato)

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

blood sampling was defined as the response and behavior to physical pain and psychological distress that were observed when children underwent blood sampling. These were measured by the degree of the child's cooperation during blood sampling and by the degree of the child's emotions. In addition, "ineffective coping behavior" was defined as the following coping behavior of children undergoing blood sampling: the physical pain of children who resist and are not proactive in undergoing blood sampling; and the reaction and behavior of children who strongly showed psychological distress, such as anxiety or fear.

2. Subjects

Subjects were children aged 3–6 years, who underwent blood sampling in the pediatrics outpatient department of a university hospital in the prefectural capital in the Tohoku district, and their parents. The children and their parents who consented to cooperate in the survey were included in this study. Considering that the stages of development might influence coping behavior, developmentally disabled children were excluded from the subjects.

3. Data-gathering period

Data were gathered from June to September 2009.

4. Data-gathering method

This study was conducted via participant observation and a questionnaire survey using a scale to measure children's coping behavior. Children's coping behavior until entering the blood sampling room and during blood sampling was observed via the participant observation method. Before blood sampling, a questionnaire survey was undertaken by their parents. Children's coping behavior was classified into effective and ineffective groups based on the behavior observations of the children during blood sampling. Related factors were examined based on the questionnaire survey by their parents and based on the behavior observation of the children up until entering the blood sampling room. After having obtained subjects' consent before blood sampling, we asked their parents to fill out the questionnaire and observed the children's behavior.

5. Materials

a. Observed children's coping behavior during blood sampling

Using the Manifest Upset Scale and Cooperation Score (participant observation method) developed by Koseki[16], children's coping behavior during blood sampling was observed. These two scores were widely used as an observation method to assess children's coping behavior in previous studies[18), 27)]. The period from entering the blood sampling room to just before needle puncture for blood sampling was defined as stage I. The period from needle puncture to removal of needle was defined as stage II. The period from removal of the needle to leaving the blood sampling room was defined as stage III. Each coping behavior in these phases was evaluated.

(1) Demographic background data of the children

The sex, age, and names of diseases for the children were transcribed as basic attributes from their medical records. We also observed the measurement of the blood sampling time, staff in charge of the puncture, number of punctures, posture during punctures, and participation the parent when the blood sampling was performed during this survey.

(2) Coping behavior

For evaluation, children's coping behavior during blood sampling was objectively measured using the two existing scales: the Manifest Upset Scale[16] and Cooperation Scale[16].

① Manifest Upset Scale

The Manifest Upset Scale, which was derived from Wolfer's[28] scale and partially modified by Koseki[16], was used to evaluate the degree of children's anxiety and fear towards blood sampling. A single-item questionnaire scored on a scale of 1, 3, and, 5 points was used; the higher the score, the higher the level of psychological confusion, including anxiety and fear, in the child.

② Cooperation Scale

The Cooperation Scale, which was derived from Wolfer's[28] scale and partially modified by Koseki[16], was used to evaluate the degree of cooperation during blood sampling. A single-item questionnaire scored on a scale of 1, 3, and, 5 points was used; the higher the score, the higher the level of non-cooperative behavior from the child.

(3) Children's Hospital of Eastern Ontario Pain Scale (CHEOPS)

Behavior associated with pain was objectively measured using a scale developed by McGrath et al.[29] to measure behavior associated with pain due to needle puncture or other instruments. In this scale, the behavior was observed according to the following six parameters: cry, facial, child verbal, torso, touch, and legs. Each item included three to six kinds of behavior, and scoring was defined respectively in order to score each subject's behavior in the range of 4 to 13 points; the higher the total score of all of the items, the stronger the pain.

b. Observed children's coping behavior until they enter blood sampling room

For the purpose of objectively measuring children's behavior, the researchers conducted participant observation from the time when a child predicted he/she was to undergo blood sampling or from the point in time when a child was told to undergo blood sampling until entering the blood sampling room. This was done using the two scores of the Manifest Upset Scale[16] and the Cooperation Scale[16].

c. Questionnaire by parents

(1) Demographic and child's background data

To examine the children's background regarding painful medical procedures, the parents were asked to answer the following items on the questionnaire: past blood sampling

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

experience; number of experiences of blood sampling; time since the last blood sampling; experiences of strong pain, except blood sampling and vaccination; and hospitalization experience.

(2) Prediction of their child's behavior

The parents were asked to predict their child's coping behavior before blood sampling. Both the Manifest Upset Scale and Cooperation Scale were used for the predicted behavior.

(3) The State-Trait Anxiety Inventory (STAI) [30)]

The scale developed Spielberger et al. was used to measure the degree of parent's anxiety. This scale can measure both state anxiety and trait anxiety. In this study, we used only the state anxiety scale to understand the parent's anxiety for blood sampling of their children. This scale consisted of 20 questions to be scored in the range of 20 to 80 points; the higher the total score, the stronger the anxiety.

6. Ethical considerations

We submitted the research design to the ethics committee of Yamagata University Faculty of Medicine and the ethics committee of the university hospital where the survey was performed. This study was approved by these ethical review boards. The participants were informed of the purpose of the survey. In addition, the following information was given to the subjects verbally and in writing: cooperation to undertake the survey was voluntary. A subject could withdraw from participation in the survey at any time, and withdrawal from or refusal to take part in the survey would result in no medical disadvantage. The obtained information would never be used for any purpose other than the study. Personal information would remain anonymous and will not be able to be connected to the source code. The results of the survey would be presented after being processed, so that subjects cannot be identified individually. Information, such as diagnoses, would be obtained from medical records. Of all these participants, only the children and their parents who provided consent to participate in the study were included in the survey. The written consent was obtained from the children's parents after having verbally obtained the consent from both the children and their parents.

7. Analysis

The children were assigned to the effective group or the ineffective group based on the children's coping behavior during the blood sampling. The related factors of the two groups were compared regarding the following items: age of children, children's past pain experiences, explanation prior to blood sampling, children's behavior until entering the blood sampling room, parent's anxiety, and parent's prediction regarding blood sampling.

A Mann–Whitney U test (exact test) was used to assess the differences between the two independent groups. Fisher's exact test was used to assess proportional differences. To measure the degree of impact of the related factors, a multiple regression analysis was performed with the above-mentioned related factors as independent variables and with the score of coping behavior during blood sampling as the dependent variable. The Statistical Package for the Social Science (SPSS) 17.0J for Windows was used for the statistical analysis.

III. RESULTS

1. Demographic data and coping behavior data during blood sampling

Of the 49 pairs of children and their parents who were asked to participate in the survey, all of them gave their consent to the survey. The following two children and their parents were excluded from the analysis: a child with a developmental disease, which was found after the request for the survey; and a child who underwent an additional medical procedure other than blood sampling. The remainder (47 pairs; 95.9%) was targeted for the analysis. The mean age ± standard deviation (SD) of the children as the subjects was 4.8 ± 1.1 years old. All of them (26 boys, 55.3%; 21 girls, 44.7%) had experienced blood sampling in the past (Table 1). Mothers accounted for more than 80% of the parents in attendance (Table 2). The parents' state anxiety mean score related to the blood sampling of their children was 42.0 ± 8.5 (mean score ± SD) points (Table 3).

Table 4 shows the situation of blood sampling during the survey. The mean ± SD of the blood sampling time was 4.4 ± 2.7 minutes. Blood sampling was performed by a pediatrician and nurse in charge of the treatment in the pediatrics outpatient treatment room in this hospital. Adhering to each child's request as much as possible, it was determined whether a child was to be punctured in a supine position or sitting position. The parents were allowed to enter the blood sampling room and could watch over their child on the side or

Table 1. Demographic data of the children (n=47)

	Mean (SD)	n (%)
Age (years)	4.8 (1.1)	
Sex		
Boy		26 (55.3)
Girl		21 (44.7)
Experiences of blood sampling		
Yes		47 (100.0)
No		0 (0.0)

Table 2. Demographic data of the parents (n=47)

	n (%)
Mother	40 (85.1)
Mother and father	5 (10.6)
Grandmother	1 (2.1)
Grandparent	1 (2.1)
total	47 (100.0)

Table 3. Parents' anxiety and prediction of their child's behavior (n=47)

	Mean (SD)	Median (range)
Parent's state anxiety (STAI)	42.0 (8.5)	
Parent's prediction		
Manifest upset scale		3 (1-5)
Cooperation scale		3 (1-5)

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

Table 4. Situation of blood sampling (n=47)

	Mean (SD)	n (%)
Blood sampling time (min)	4.4 (2.7)	
Performed blood sampling		
Doctor		44 (93.6)
Nurse		3 (6.4)
Number of punctures		
Once		43 (91.5)
Twice		4 (8.5)
Posture during punctures		
Supine		21 (44.7)
Sitting		26 (55.3)
Relation of the parent		
Intervene in the treatment		28 (59.6)
Watch over		17 (36.2)
Nothing		2 (4.3)

Table 5. Children's coping behavior during blood sampling (n=47)

	Median (range)
Manifest Upset Scale	
Stage I	1 (1- 5)
Stage II	1 (1- 5)
Stage III	1 (1- 5)
Cooperation Scale	
Stage I	1 (1- 5)
Stage II	1 (1- 5)
Stage III	1 (1- 5)
CHEOPS	
Stage I	8 (6-13)
Stage II	8 (6-13)
Stage III	6 (6-10)

Table 6. Comparison of the sex and diseases between ineffective and effective groups (n=47)

	Ineffective group n (%)	Effective group n (%)	P-value
Sex			.744
Boy	6 (50.0)	20 (57.1)	
Girl	6 (50.0)	15 (42.9)	
Diseases			.990
Endocrine, nutritional and metabolic diseases	5 (41.7)	11 (31.4)	
Neoplasms	3 (25.0)	8 (22.9)	
Diseases of the genitourinary systems	2 (16.7)	7 (20.0)	
Diseases of the blood and blood-forming organs and certain disorders	1 (8.3)	4 (11.4)	
Diseases of the musculoskeletal system and connective tissue	0 (0.0)	1 (2.9)	
Diseases of the nervous system	0 (0.0)	1 (2.9)	
Unidentified	1 (8.3)	3 (8.6)	

Fisher's exact test

encourage him/her by holding his/her hands, and they were in a situation to be able to intervene in the treatment during the blood sampling. In this study, 28 parents (59.6%) entered the blood sampling room together with their child during the blood sampling. While the children underwent the blood sampling, they received some interventions, such as being held in parent's arm or holding the other hand (the hand that was not used for blood collection) while being encouraged by each parent.

Table 5 shows the children's coping behavior during blood sampling, which was obtained via the participant observation method. The median score on the Manifest Upset Scale score (range) for stage I to III was 1 (1–5) point. Additionally, the median Cooperation Scale scores (range) for stage I to III was 1 (1–5) point. The mean scores of behavior for pain (range) using the Children's Hospital Eastern Ontario Pain Scale (CHEOPS) were as follows: stage I, 8 (6–13) points; stage II, 8 (6–13) points; and stage III, 6 (6–10) points. This tended to increase between entering the blood sampling room and the removal of needle and decrease after the removal of needle and during stage III.

No generalized standard is currently available to classify the groups as effective and ineffective. Thus, in this study, we examined the classification of the groups with pediatric nurses, and then, classified the children based on their Manifest Upset Scale scores and Cooperation Scale scores obtained from the observation during the blood sampling. To observe coping behavior through the course of the blood sampling, the period of blood sampling was classified into three stages. However, in order to understand the children's behavior during blood sampling in detail, we calculated the total score for the Manifest Upset Scale and Cooperation Scale from stage I to stage III, and confirmed the distribution. As a result, since there was a bimodal score distribution, the cut-off was defined at 18 points (the total score). Twelve children with 18 points or more (6 boys, 6 girls) and 35 children with 17 points or less (20 boys, 15 girls) were assigned to the ineffective group and effective group, respectively (Table 6). After comparing the two groups on behavior for pain during the blood sampling based on CHEOPS, there was a significant difference observed. The CHEOPS scores of the ineffective group were higher than those of the effective group, and in the behavioral observation for pain, behaviors such as crying and acting violently were found. Therefore, it was shown that this group classification was appropriate (Table 7).

On classifying the children's diseases based on ICD-10[31], in both the groups, endocrine nutritional, and metabolic diseases were most common, followed by neoplasms, and diseases of the genitourinary systems (Table 6). In a comparison of sex as well as disease type between the ineffective and effective groups, there were no differences found.

2. Comparison of ineffective and effective coping behavior groups

The following items were compared between the ineffective

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

and effective groups: age of children, previous blood sampling experience and hospitalization experience, explanations prior to blood sampling, children's behavior until entering the blood sampling room, the parent's prediction regarding blood sampling of their children, and the parent's anxiety.

a. Age (Table 8)

The mean ages of the ineffective and the effective groups were 4.1 years and 5.0 years, respectively. In the comparison between the two groups, there was a significant difference (P = 0.013) and the ineffective group was significantly younger than the effective group.

Table 7. Comparison of the CHEOPS score between ineffective and effective groups (n=47)

	Ineffective group (n=12)		Effective group (n=35)		P-value
	Median	Mean	Median	Mean	
CHEOPS score					
Stage I	11.0	11.0	7.0	7.3	.000
Stage II	12.0	11.7	8.0	7.7	.000
Stage III	9.0	8.7	6.0	6.3	.000

Mann–Whitney U test (exact test), CHEOPS is the children's hospital of eastern ontario pain scale.

Table 8. Comparison of the age between ineffective and effective groups (n=47)

	Ineffective group (n=12)		Effective group (n=35)		P-value
	Median	Mean	Median	Mean	
Age (years)	4.0	4.1	5.3	5.0	.013

Mann–Whitney U test (exact test)

Table 9. Comparison of the previous blood sampling experience between ineffective and effective groups (n=47)

	Ineffective group n (%)	Effective group n (%)	P-value
Number of experiences of blood sampling			.608
1- 5	0 (0.0)	4 (11.4)	
6-10	3 (25.0)	3 (8.6)	
11-20	3 (25.0)	9 (25.8)	
21-30	1 (8.3)	3 (8.6)	
31 or more	5 (41.7)	14 (40.0)	
No answer	0 (0.0)	2 (5.7)	
Time since the last blood sampling			.879
1 week or less	0 (0.0)	3 (8.6)	
1 month or less	8 (66.7)	15 (42.9)	
3 months or less	2 (16.7)	8 (22.9)	
6 months or less	1 (8.3)	4 (11.4)	
1 year or more	1 (8.3)	3 (8.6)	
No answer	0 (0.0)	2 (5.7)	

Fisher's exact test

b. Children's past experience regarding blood sampling, pain, and hospitalization (Table 9, 10)

All the study's children had experienced blood sampling in the past. Above all, regarding the number of blood samplings, 31 times or more was the most common in both groups. Regarding the period of time since the last blood sampling, less than one month was the most common, followed by less than three months; the children in both groups experienced blood sampling routinely. There were three children (6.4%) and seven children (14.9%) in the ineffective and effective group, respectively, who experienced strong pain other than during blood sampling and vaccination. Most of the children had experienced hospitalizations. On comparing the number of past blood sample experiences, the time of the last blood sampling, experience of strong pain except for blood sampling and vaccination, and hospitalization experience between the ineffective and effective groups, there was no significant difference.

c. Explanations before blood sampling (Table 11)

There were 11 children (23.4%) and 26 children (55.3%) in the ineffective and effective groups, respectively, who were given explanations about the blood sampling by medical staff or their parent. In comparing the presence or absence of explanations before blood sampling between the ineffective and effective groups, no significant difference was found.

d. Children's coping behavior until they enter blood sampling room (Figure 1)

In the comparison of the children's behavior until entering the blood sampling room, between the ineffective and effective groups, there was a significant difference both in the Manifest Upset Scale score (P = 0.012) and the Cooperation

Table 10. Comparison of the experiences of strong pain and hospitalization experience between ineffective and effective groups (n=47)

	Ineffective group n (%)	Effective group n (%)	P-value
Experience of strong pain			.700
Yes	3 (25.0)		
No	9 (75.0)		
Hospitalization experience			.764
Yes	11 (91.7)	31 (88.6)	
No	1 (8.3)	4 (11.4)	

Fisher's exact test

Table 11. Comparison of the explanations prior to blood sampling between ineffective and effective groups (n=47)

	Ineffective group n (%)	Effective group n (%)	P-value
Explanations			.414
Yes	11 (91.7)	26 (74.3)	
No	1 (8.3)	9 (25.7)	

Fisher's exact test

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

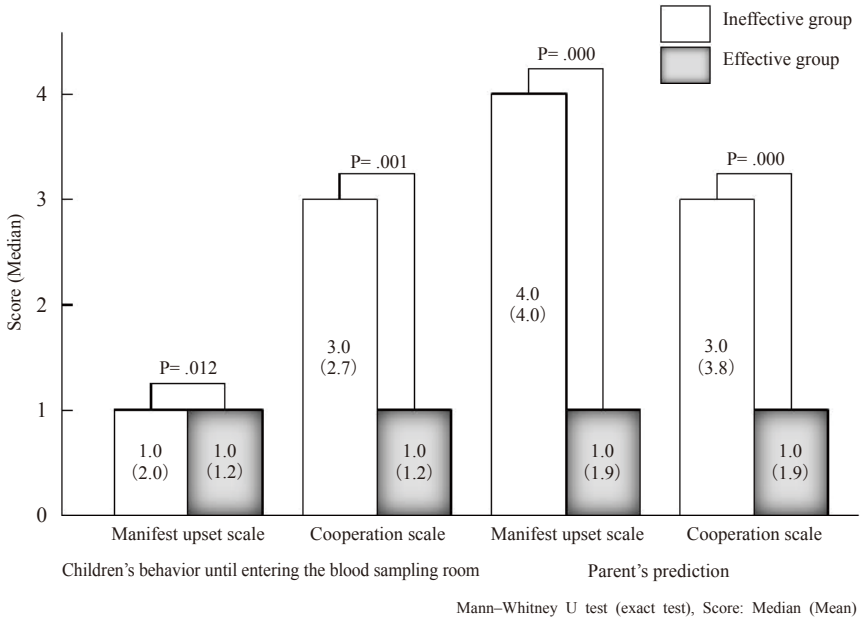

Figure 1. Comparison of the children's behavior until entering the blood sampling room and parent's prediction of their child's behavior between ineffective and effective groups.

Table 12. Comparison of the parent's anxiety between ineffective and effective groups (n=47)

	Ineffective group (n=12)		Effective group (n=35)		P-value
	Median	Mean	Median	Mean	
Parent's anxiety	40.5	42.8	41.0	41.7	.651

Mann–Whitney U test (exact test)

Table 13. Factors associated with children's coping behavior during blood sampling (n=47)

Variable	β	P-value
Parent's prediction (manifest upset scale)	.761	.000
R	.761	
R^2	.579	
Adjusted R^2	.569	

Multiple regression analysis used the children's coping behavior during blood sampling as the dependent variable (stepwise). β is the standardized coefficients.

Table 14. Classification of the children's behavior up until entering the blood sampling room (n=47)

	Ineffective group n (%)	Effective group n (%)	Total n (%)
Ineffective behavior	4 (33.3)	3 (8.6)	7 (14.9)
Effective behavior	8 (66.6)	32 (91.4)	40 (85.1)
total	12 (100.0)	35 (100.0)	47 (100.0)

Table 15. Classification of the parent's prediction (n=47)

	Ineffective group n (%)	Effective group n (%)	Total n (%)
Ineffective prediction	12 (100.0)	13 (37.1)	25 (53.2)
Effective prediction	0 (0.0)	22 (62.9)	22 (46.8)
total	12 (100.0)	35 (100.0)	47 (100.0)

Scale score (P = 0.001); both of the scores for the ineffective group were higher than those for the effective group.

e. Parent's prediction of their child's behavior (Figure 1)

In the comparison of the children's coping behavior that was predicted by the parents, between the ineffective and effective groups, there was a significant difference both in the Manifest Upset Scale score (P = 0.000) and the Cooperation Scale score (P = 0.000); the Manifest Upset Scale and Cooperation Scale scores were higher in the ineffective group than the effective group.

f. Parent's anxiety related to the blood sampling of their children (Table 12)

The mean scores of the parents' state anxiety related to the blood sampling of their children were 42.8 and 41.7 points in the ineffective and effective groups, respectively. According to the STAI[32], although a score of 42 points or less was judged as normal and 42 points or more was judged as high, no statistically significant difference was found on comparing the two groups.

3. Factors associated with children's coping behavior during blood sampling

To examine the degree of impact of the factors associated

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

with children's behavior during blood sampling, a multiple regression analysis using the stepwise method was performed. Scores on coping behavior during blood sampling was the dependent variable and age, past blood sampling experience, hospitalization experience, the presence or absence of explanations prior to blood sampling, children's behavior up until entering the blood sampling room (based on the Manifest Upset Scale and Cooperation Scale scores), parent's prediction (the Manifest Upset Scale and Cooperation Scale scores), and the parent's anxiety were the independent variables (Table 13). As a result, the multiple correlation coefficient was 0.761, and the adjusted coefficient of determination was 0.569; 56.9% of the coping behavior during blood sampling were explained by "the parent's prediction" (Manifest Upset Scale score).

4. Children's coping behavior up until entering the blood sampling room, parent's prediction, and children's coping behavior during blood sampling

The children's behavior until entering the blood sampling room was classified into the ineffective or effective groups, such as coping behavior during blood sampling (Table 14). This classification was based on consultation with the specialists in childcare. The scores were calculated based on the classification of the children's behavior up until blood sampling. Summed scores of six or more on the Manifest Upset Scale and Cooperation Scale were defined as ineffective, and fewer than six was defined as effective. As a result of this classification, of the seven children who showed ineffective coping behavior before entering the blood sampling room, four children were in the ineffective group; of the 40 children who showed effective coping behavior before entering the blood sampling room, 32 children were in the effective group. The risk ratio that the children, who showed behaviors that demonstrated that they would not cooperate and calm down before entering the blood sampling room, could be included in the ineffective group was 2.9 times higher than the effective group.

As with the above classification, children's coping behavior that was predicted by parents was also classified into ineffective and effective (Table 15). There were 25 children (53.2%), who were predicted to show ineffective coping behavior (ineffective prediction), while 22 children (46.8%) were predicted to show effective coping behavior. Of the children who were predicted to show ineffective coping behavior by their parents, 13 children belonged to the effective group. On the other hand, all of the children who were predicted to show effective coping behavior by their parents belonged to the effective group.

IV. DISCUSSION

1. Age

In the ineffective group, the children were significantly younger compared with the effective group, and the results were similar to previous studies[5)–7)]. Mikami et al.[27)] reported that the age of the children as well as their cognitive development led to cooperation behavior for blood sampling as well as recovery from psychological confusion. This report suggested that preparation involving the cognitive domain might improve coping skills for pain and psychological confusion associated with blood sampling. For preparation, it is important that it be performed in a way that is suitable to each child's cognitive ability[1)]. Additionally, there are not only studies showing an approach as per stages of cognitive development[18), 25)] described by Piaget[26), 33)], but also a study according to the category for age, such as for 2–5 year olds and 5–7 year olds. However, in this study, younger children even in the latter half of early childhood were included in the ineffective group and were unable to show effective coping behavior. Taking in account these results, for younger children, especially 3 to 4-year-old children, it was understood that it was necessary to perform preparations with words chosen according to the cognitive ability of each age and with the contents featuring specific coping methods so that they could demonstrate effective coping behavior.

2. Children's coping behavior until entering blood sampling room

For the children's behavior until entering the blood sampling room, the Manifest Upset Scale and Cooperation Scale scores were significantly higher in the ineffective group compared to the effective group. Considering the results, it can be seen that the children who could not show coping behavior well during blood sampling expressed uncooperative and restless behavior before the blood sampling and before having entered the blood sampling room. In addition, the risk that the children who showed uncooperative and restless behavior before entering the blood sampling room might be included in the ineffective group was 2.9 times higher than the effective group. Given the above, in the assessment of preparation, it is important to objectively evaluate the children's behavior until entering the blood sampling room. For children who show uncooperative and restless behavior before entering the blood sampling room, preparation according to each child's characteristics and response is thought to be necessary; for example, secure sufficient time for getting ready psychologically before blood sampling and then perform the preparation.

3. Parent's prediction

For the parent's prediction, the Manifest Upset Scale and Cooperation Scale scores were significantly higher in the ineffective group compared to the effective group. The parents of the children in the ineffective group predicted that their children's behavior during blood sampling might show stronger psychological confusion and uncooperative behavior than the effective group. Furthermore, from the results of the multiple regression analysis, 56.9% of the coping behaviors during blood sampling were explained by the parent's prediction of the Manifest Upset Scale score. In the parent's prediction, it is influenced especially by the prediction of the degree of emotion. Therefore, it can be seen that the children's behavior during blood sampling may be predicted by allowing parents to predict their children's behavior using the Manifest Upset Scale score before the blood sampling. In the parent's prediction, we could not calculate the risk ratio for the ineffective group. Of the children who were predicted to be effective, no child belonged to the ineffective group. Considering these results, it can be seen that the parents might predict their child's behavior precisely. As Lee et al.[34)] described, information from the mother would be the most effective for prediction of children's responses to painful

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

medical procedures. Takeda[6] described that information from the mother would be useful to predict each child's reaction and behavior towards blood sampling, and to understand its meaning. Similar results were obtained in this study, which suggested that prediction by the parents understanding the characteristics of their child well was extremely effective in the scene that they have experienced.

4. Child's past blood sampling experiences, hospitalization experiences, explanations before blood sampling and parent's anxiety

In this study, no difference between the ineffective group and the effective group was found in the child's past blood sampling experience, hospitalization experience, presence or absence of explanations prior to blood sampling, and the parent's anxiety. Takeda[6] reported that past blood sampling experience was an important factor for children in predicting and evaluating blood sampling, and that mothers' anxiety promoted children's anxiety and influenced their behavior. In addition, according to Nishimura et al.[7], children, who had experienced hospitalization and had the opportunity to prepare psychologically, showed relatively more coping behavior. The factors indicating no difference in the items in this study were seen as follows: the subjects included the children who had experienced blood sampling repeatedly and the children who empirically understood that blood sampling was always performed when visiting a hospital; thus, the parents of such children had no major anxiety about the blood sampling of their child. For explanation prior to blood sampling, on account of the burden of the questionnaire and the time before blood sampling, we were not able to understand the content of the explanation in detail in this study. These were not related in the children who had already experienced blood sampling and their parents. However, for the children who will undergo a first blood sampling in the future and the children who have poor blood sampling experience, it is considered necessary to investigate and examine the content of such explanations more deeply. For children's coping behavior for procedures, no standard of ineffective coping behavior that has been generalized and standardized is currently found. We classified the children's coping behavior into the two groups based on the score distribution of coping behavior in this study and analyzed it. It can be thought that there might be no difference in these items because of the classification of these scores. Accordingly, it was thought to be necessary to examine these items including the score category that would be able to be generalized in the future.

5. Limitations of the study and future tasks

Considering that the survey was performed in a university hospital, that all of the subjects had experienced blood sampling, and that some subjects repeatedly underwent blood sampling, we cannot say that the results of this study apply to children who will experience blood sampling for the first time and children who have poor blood sampling experiences. This study had a small sample size and, therefore, it is necessary to increase the number of the subjects to increase the reliability and validity in the future.

This study suggested that the factors related to ineffective coping behavior during blood sampling of children included age, coping behavior until entering the blood sampling room, and the parent's prediction. It is thought that each child's characteristics could be understood and preparations made according to each child's individual needs. This could be achieved by collecting information prior to the blood sampling procedure about age, coping behavior until entering the blood sampling room, and the parent's prediction. Specifically, for young children, children who demonstrated rejecting and restless behavior until entering the blood sampling room, and children who were predicted to show ineffective coping behavior during blood sampling by each parent, we think that it is necessary to secure a time to perform preparations before blood sampling. It is important that the contents of the preparations address their individual needs: preparation include information about effective coping behavior for children who show poor cooperation, and distraction and play for children who show emotionally restless behavior. In the future, it will be necessary to develop an assessment sheet that is specifically available, including these related factors, and to examine the use of the sheet and the implementation of such preparations according to each individual child's needs.

V. Conclusion

Children, aged 3–6 years, who were undergoing blood sampling in an outpatient department, were classified into an ineffective group and an effective group based on the children's coping behavior during blood sampling. The groups were compared and the related factors were examined. As a result, the following was found:

1. Compared to the effective group, the children in the ineffective group were significantly younger.
2. For children's behavior until entering the blood sampling room, the Manifest Upset Scale and Cooperation Scale scores were significantly higher in the ineffective group than in the effective group.
3. The parent's predictions, before blood sampling, for the Manifest Upset Scale and Cooperation Scale scores were significantly higher in the ineffective group than in the effective group.
4. For effect factors of the children's behavior during blood sampling, the parent's prediction of the Manifest Upset Scale score before blood sampling was extracted.
5. For children undergoing blood sampling, it is important to know the age of the children, the children's behavior until entering the blood sampling room, and the parent's prediction before blood sampling. It was suggested that the assessment of these data might lead to particular preparations.

ACKNOWLEDGMENTS

The authors are grateful to those subjects who participated in this study. We would also like to sincerely thank the pediatric doctors and nurses at the university hospital for their kind cooperation in this study. This study was supported by a Grant-in-Aid for Young Scientific Research (Start up), 2008-2009, No. 20890026, from the Japan Society for the Promotion of Science. We presented our research results at the 36th Annual Meeting of the Japan Society of Nursing Research in Okayama, 2010.

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.

REFERENCES

1) Thompson, R.H., Stanford, G. (Kobayashi, N., Ed., Nomura, M., Trans.): Child life in hospitals: Theory and practice. 157-168, Chuohoki Publishing, Tokyo, 2003 (in Japanese).
2) Sato, S., Shiwaku, H.: Effectiveness of preparation for venipuncture on painness among children in outpatient. Journal of North Japan Academy of Nursing Science, 10, 1-12, 2007 (in Japanese).
3) Takeda, J., Matsumoto, A., et al.: Young children's coping behaviors during painful medical procedures. Journal of School of Nursing, Chiba University, 19, 53-60, 1997 (in Japanese).
4) Okamoto, Y.: State of preschool children who are going through minor surgery. Journal of Japan Academy of Nursing Science, 19 (3), 11-18, 1999 (in Japanese).
5) Nakamura, M., Kanematsu, Y., et al.: Children's pain level and behavioral responses under medical procedure. Journal of School of Nursing, Chiba University, 15, 45-52, 1993 (in Japanese).
6) Takeda, J.: Factors influencing young children's coping behaviors to a venipuncture. Journal of Chiba Academy of Nursing Science, 4 (2), 8-14, 1998 (in Japanese).
7) Nishimura, M., Tsuda, A., et al.: The relationship between children's response undergoing painful medical procedures and family characteristics. Memoirs of School of Health Sciences Faculty of Medicine Kanazawa University, 23 (2), 127-131, 1999 (in Japanese).
8) Takeda, J., Yamate, M.: Stress coping and nursing care for children undergoing painful medical treatment. The Japanese Journal of Child Nursing, Monthly, 26 (8), 987-991, 2003 (in Japanese).
9) Soeda, K.: Children's responses and nursing care for invasive procedures. The Bulletin of Saitama Prefectural University, 2, 43-56, 2000 (in Japanese).
10) Suzuki, S.: Literature review of children's behavior and responses to the procedures and the interventions of nurses. Journal of St. Luke's Society for Nursing Research, 4 (1), 51-63, 2000 (in Japanese).
11) Suzuki, Y., Sato, Y. et al.: The process by which children consent to blood collection: from the perspective of their parents. Journal of North Japan Academy of Nursing Science, 10 (1), 25-36, 2007 (in Japanese).
12) Yoshida, Y., Ryu, T. et al.: Response of the children and families to the education used by pictorial book. Journal of Japanese Society of Child Health Nursing, 13 (2), 21-25, 2004 (in Japanese).
13) Takahashi, S., Naragino, H. et al.: Review of literature: Preparation of pediatric nursing in Japan. Journal of Japanese Society of Child Health Nursing, 13 (1), 83-91, 2004 (in Japanese).
14) Sakurada, A., Yamaguchi, M. et al.: The present situation of child health nursing preparation in japan -examination through literature review-. Journal of Nursing Research Colloquium of Tokyo Women's Medical University, 2 (1), 45-51, 2007 (in Japanese).
15) Hashimoto, H., Tani, H.: The level of stress, reaction to preparation and behavior at procedure by children with hematologic and oncological disease who undergo venepuncture. Journal of Japanese Society of Child Health Nursing, 18 (1), 65-71 2009 (in Japanese).
16) Koseki, K.: Psychological preparations for minor surgical operations in childhood. Nursing Research, 17, 83-91, 1984 (in Japanese).
17) Ogawa, J.: Nursing intervention to promote the autonomy of children with cancer in response to painful procedures. Journal of Chiba Academy of Nursing Science, 8 (1), 8-14, 2002 (in Japanese).
18) Tanaka, K.: Preparation guidebook usable in clinical pediatric practice. 31-33, 71-73, Nissouken Shuppan, Aichi, 2006 (in Japanese).
19) Takahashi, S.: Care model for children receiving medical treatment: Care model for children of about 2–5 years old. The Japanese Journal of Child Nursing, Monthly, 31 (5), 583-588, 2008 (in Japanese).
20) Naragino, H.: Care model for children receiving medical treatment: Care model for parents with children about 2–5 years old. The Japanese Journal of Child Nursing, Monthly, 31 (5), 589-595, 2008 (in Japanese).
21) Matsumori, N: Care model for children receiving medical treatment: Care model for children of about 5–7 years old. The Japanese Journal of Child Nursing, Monthly, 31 (5), 596-602, 2008 (in Japanese).
22) Ninomiya, K.: Care model for children receiving medical treatment: Care model for parents with children about 5–7 years old. The Japanese Journal of Child Nursing, Monthly, 31 (5), 603-608, 2008 (in Japanese).
23) Emoto, R.: Care model for children receiving medical treatment: Care model for children of about over 8 years old. The Japanese Journal of Child Nursing, Monthly, 31 (5), 609-615 2008 (in Japanese).
24) Katsuda, H.: Care model for children receiving medical treatment: Care model for parents with children about over 8 years old. The Japanese Journal of Child Nursing, Monthly, 31 (5), 616-620, 2008 (in Japanese).
25) Ebina, M.: Care model for children receiving medical treatment: Process of care model construction. The Japanese Journal of Child Nursing, Monthly, 31 (5), 579-582, 2008 (in Japanese).
26) Carter, B. (Yokoo, K. Trans.): Child and infant pain: principles of nursing care and management. 19-20, Medicus Shuppan, Osaka, 1999 (in Japanese).
27) Mikami, C., Sato, Y. et al.: Factors related to coping behavior at the time of preschool-children's blood sampling. Journal of North Japan Academy of Nursing Science, 13 (1), 1-11, 2010 (in Japanese).
28) Wolfer, J. A., Visintainer, M. A.: Pediatric surgical patient's and parent's stress responses and adjustment. Nursing Research, 24 (4), 244-255, 1975.
29) McGrath, P. J., Johnson, G., et al.: CHEOPS: a behavioral scale for rating postoperative pain in children. In: Fields, H.L., et al. (Eds.): Advances in Pain Research and Therapy, 395-402, Raven Press, New York, 1985.
30) Soga, S.: About STAI (The State-Trait Anxiety Inventory) . Nursing Research, 17, 107-116 (in Japanese).
31) Ministry of Health, Labour and Welfare: International statistical classification of diseases and related health problems 10th version. [Cited 20 Mar 2010] http://www.mhlw.go.jp/toukei/sippei/index.html (in Japanese).
32) Nakazato, K.: STAI. In: Kawano, T. (Ed.): Psychological test for psychosomatic medicine. 27-30, Asakura Publishing, Tokyo, 1990 (in Japanese).
33) Hongo, K. (Ed. & Trans.): Developmental psychology: Making use of children's understanding in childcare education. 27-29, Kenpakusha, Tokyo, 2007 (in Japanese).
34) Lee, L. W., White-Traut, R. C.: The role of temperament in pediatric pain response. Pediatric Nursing, 19, 49-63, 1996.

This paper was published at "the Japan Society of Nursing Research" Vol.34 No.4 in 2011.