Original Article

Roles of Visiting Nurses in Supporting Medically Dependent Children Living at Home

MAYUMI WATANABE*·**, KAZUKI MASUMORI† AND TATSUYUKI KAKUMA‡

Kurume University Graduate School of Medicine, Kurume 830-0011,
**Fukuoka Jo Gakuin Nursing University, Koga 811-3113,
†Kurume University School of Nursing, Kurume 830-0003,
‡Kurume University Biostatistics Center, Kurume 830-0011, Japan

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Summary: The purpose of this study was to identify the fundamental roles of visiting nurses as a foundation for creating effective educational programs for nurses of medically dependent (MD) children being treated at home. The relationship among the statements representing 3 types of roles was analyzed using structural equation modeling. There were 296 participants involved in performing home-visit nursing for MD children. Their structural roles related to home-visit nursing systems and skills were strongly correlated with the interpersonal roles related to support for MD children and their families, arrangements for whole families, and interprofessional collaborations. The correlations between these roles and the role determination process demonstrated that their future vision and self-growth were weak. This study makes the following recommendations: the development of specialized approaches to nursing practices; training in interprofessional collaboration; the realization of professional self-growth; and the creation of educational programs to assist visiting nurses in improving the home-visit nursing systems.

Keywords visiting nurse, medically dependent children, structural roles, interpersonal roles, role determination process, structural equation modeling

INTRODUCTION

1. Purpose

The total number of medically dependent (MD) children throughout Japan was approximately 17,000 in 2016, revealing a 1.8-fold increase from 2005. Accordingly, an increasing number of children with medically dependent, severe motor and intellectual disabilities (MD-SMID), or sub-MD-SMID are using home-visit nursing service providers, representing the current growing need for home-visit nursing services among MD children [1]. With the aim of establishing systems to support these children, medical and welfare service fees were revised in FY2018 [2]. Specifically, the necessity of developing human resources to help MD children and their families to continue their daily lives through fresh approaches, such as promoting collaboration within communities, providing education for the continuation of home life, and strengthening connections with developmental rehabilitation, was emphasized [2,3].

Classifying home-visit nursing service consumers by age, those covered by health insurance aged 40 or younger accounted for 17.7% in 2016. Home-visit nursing services for adults are covered by both long-term care insurance as well as health insurance; however, services for children are covered only by the latter [3]. At present, home-visit nursing for MD children is provided based on home-visit nursing orders issued by doctors. Home-visit nursing plans, and the number of visitations is fixed at 3 days per week or, in the presence of a special disease, 4 days per week. There-

Corresponding Author: Mayumi Watanabe, Pediatric Nursing, Fukuoka Jo Gakuin Nursing University, 1-1-7 Chidori, Koga, Fukuoka 811-3113, Japan. Tel: +81-92-943-4174, Fax: +81-92-940-2341, E-mail: m_watanabe@fukujo.ac.jp

Abbreviations: MD, medically dependent; MD-SMID, medically dependent severe motor and intellectual disabilities; QOL, Quality of life.

fore, in the case of MD children requiring daily nursing care, several home-visit nursing facilities are involved. Collaboration with doctors and home-visit nursing providers in charge is indispensable when setting their care goals. The human resources required to manage these children, including medical services, were reported to be insufficient, although certified consultation and support specialists are allocated to create welfare service plans for them [3]. With the launch of a coordinator training program for prefectures in 2017, arrangements toward the establishment of consultation and support systems for MD children were set in motion [1]. Expectations are placed on support providers' effective use of current systems and social resources.

Although steps are being taken to define the needs of MD children and their families and to assist them intheir home lives, there are concerns about the lack of human resources available to provide care. A study group on home care conducted surveys from 2017 to 2018, identifying 2 challenges: insufficient human resources to perform nursing for MD children; and difficulties related to the management of home-visit nursing facilities [4]. Due to decreasing birth rates in Japan, the number of experienced nurses for MD children is also low. The management of home-visit nursing service providers with 10 or more nurses is stable. However, providers with 9 or fewer nurses reportedly experience difficulties in developing sufficient human resources to provide nursing for MD children, as they are burdened by managerial challenges [4]. Among factors contributing to visiting nurses' competencies, greater experience in hospital nursing does not necessarily promote competency [5]. Based on these findings, there is a clear urgency to develop educational programs that are useful for small-scale home-visit nursing service providers of 9 or fewer nurses that are typically observed in provincial cities,.

The purpose of this study was to identify the fundamental roles of home-visit nurses for MD children as a basis for developing effective educational programs for them.

2. Visiting nurses

Nojima defines "roles" as a concept that closely interacts with positions and classifies them into structural roles, interpersonal roles, and the role determination process [6]. Meleis and Katada define them as an interpretation of personal behavior towards significant others [7]. Roles may be regarded as behaviors derived from interactions with others. In order to more precisely define the roles of visiting nurses, we divided them into 3 types based on structure made clear by our preliminary survey and Nojima's definition [5] : 1) Structural Roles: behavioral patterns associated with societal positions that define social spaces; home-visit nursing is a service provided in accordance with medical doctors' instructions with the consent of the care recipients' and/or their families. In this kind of nursing nurses make home visits to provide their skilled services to patients in their homes. 2) Interpersonal Roles: roles for each other are established through the mutual development of relationships in reference to nursing, where visiting nurses in interrelationships with MD children and their families support the former to maintain their health, promote their development, support each family member, make arrangements for the entire family, and collaborate with other professionals to make such arrangements; and 3) Role Determination Process: a process where a practitioner in need of role transitions specifically determines their own roles while being influenced by social norms and suggests approaches for self-growth and vision.

MATERIALS AND METHODS

1. Hypothesis

Visiting nurses' roles have been described in some studies, but their roles focusing on MD children have yet to be clarified. The present study regarding visiting nurses assumes structural roles, interpersonal roles, and the role determination process. It is hypothesized that these roles are carried out while interacting with each other. As many visiting nurses had hospital experience it is also hypothesized that the size of the home-visit nursing provider, duration of nursing experience, learning about home-visit nursing, and attitudes toward training influence role implementation (Figure 1).

2. Participants

The participants were nurses who were performing, or had performed, home-visit nursing for MD children and their families for 3 months or longer. As of FY2019, there were 4,884 home-visit nursing service providers in operation in the western part of Japan. Providers performing home-visiting nursing with 7 or more. and 5 or more, regular nurses are termed functionally enhanced types 1 and 2, respectively. As the mean implementation rate of home-visit nursing among these and non-functionally enhanced providers was 50.8%, we estimated that approximately 2,500 of these were performing home-visit nursing for MD children. Expecting approximately 1 response from

each provider and considering that stable results can be obtained even with a response rate of 40%, we targeted approximately 1,000 nurses.

3. Methods

A database was compiled using the Ministry of Health, Labour, and Welfare's list of Western Japan nursing care offices and living-related information in 2018 [8]. We mailed a written document, mainly specifying the study outline, purpose, methods, and ethical considerations, to the persons responsible for all home-visit nursing offices. We asked those with experience in home-visit nursing for MD children to participate in the study and, if they gave their consent, to fill out and return the included consent form with the appropriate participant information. After confirming the consent forms returned by home-visit nursing providers performing home-visit nursing for MD children, we mailed as many copies of the questionnaire as needed to these home-visit nursing providers in order for the persons responsible to distribute them to the participants. Responses from the participants were returned by mail. We conformed to the principle of participation based on each participant's free will and regarded a posted response as the consent of a participant.

4. Study period

From December 2019 to March 31, 2020.

5. Study items

The questionnaire examined the basic attributes and roles of visiting nurses. The former consisted of 9 items: sex, age, length of clinical experience, length of home-visit nursing experience, recipients of home-visit nursing, size of the home-visit nursing service provider, period of home nursing education, method to learn home-visit nursing, and method to learn home-visit nursing for MD children.

We conducted a preliminary survey involving 5 visiting nurses and 4 family members living with MD children, and refined roles based on the results. We finally classified these roles into 3 types and created statements for each: structural roles (19), interpersonal roles (46), and the role determination process (7). Statements regarding structural roles in home-visit nursing as a service provided based on doctors' instructions with care recipients' and/or their families' consent, and as a type of nursing, where nurses visit care recipients' homes, adopting behavioral patterns related to their positions in society, were rated on a 5-point scale: <Very true of me>, <True of me>, <Neutral>, <Untrue of me>, and <Very untrue of me>. Statements regarding interpersonal roles, where visiting nurses in interrelationships with MD children and their families support the former to maintain their health, promote their development, support each family member, make arrangements for whole families, and collaborate with other professionals to make such arrangements with families, were rated on a 5-point scale: <Very true of me>, <True of me>, <Neutral>, <Untrue of me>, and <Very untrue of me>. Lastly, statements regarding the role determination process, where a practitioner suggests approaches for self-
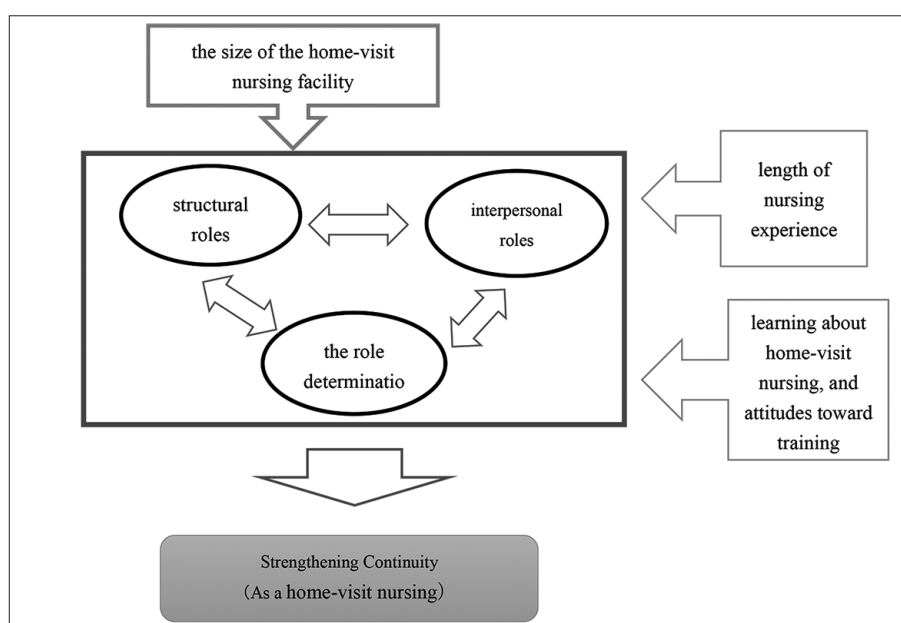

Fig. 1. Role of the Home-Visit Nurse

growth and their vision as a visiting nurse, were rated on a 5-point scale: <Agree>, <Moderately agree>, <Neutral>, <Moderately disagree>, and <Disagree>.

6. *Analysis*

We descriptively analyzed the basic attributes. To clarify the relationships among the structural roles, interpersonal roles, and role determination process, those among statements representing the 3 types of roles were analyzed using structural equation modeling. We performed these analyses adopting the maximum likelihood method. For structural roles, we analyzed the causal relationships among 19 statements as observed variables in addition to <home-visit nursing systems> and <visiting nurses' skills> as latent variables. We also analyzed correlations among statements regarding latent variables <home-visit nursing systems> and <visiting nurses' skills>. For interpersonal roles, we performed analysis with 46 statements as observed variables, and the following latent variables: <support for MD children>, <support for each family member>, <arrangements for whole families>, and <interprofessional collaboration>. We also analyzed the correlations among statements regarding the 4 latent variables. Similarly, for the third type, role determination process, we performed analysis with 7 statements as observed variables, and the following as latent variables: <approaches for self-growth> and <future visions>. We also analyzed the correlations among statements regarding the 2 latent variables. Next, we calculated the mean observed-to-latent variable values and analyzed the influence of the latent variables for each type of role. Furthermore, we divided the home-visit nursing providers into 2 groups based on their sizes defined in the revised requirements for functionally enhanced home-visit nursing providers in FY2016 (converting the number of all nurses into that of regular nurses): providers with nurses fewer than 10 and those with 10 or more, to compare the status of role performance. Similarly, we divided the nurses into 2 groups based on their length of experience in home-visit nursing for MD children: less than 5 years and 5 years or longer, again, to compare the status of role performance. We also compared visiting nurses who learned home nursing by attending school prior to becoming a member of society versus those who learned after becoming a member of society. For all analyses, we used statistical software SPSS Statistics 23.0 and Amos 23.0 for Windows.

7. *Ethical considerations*

This study was approved by the Ethical Committee of Kurume University (Approval number: xx). We publicly recruited participants. We sent a letter of request for cooperation to home-visit nursing providers in the western part of Japan and distributed as many copies of the questionnaire as needed to the persons responsible for each service provider that returned consent forms. When sending the questionnaire, we specified the study outline and explained using a written document that participation in the study was based on free will and there would be no disadvantageous treatment for those who opted not to participate. The questionnaire was anonymous and self-administered. To prevent the identification of individuals, we asked respondents to anonymously place their responses in return envelopes and drop them in mail posts. We stored the questionnaire materials in a lockable cabinet and encrypted the data before storing it on an external hard disk. Furthermore, when performing analysis, we used a laboratory computer not connected to the Internet.

RESULTS

1. *Participants' basic attributes*

We sent a letter of request for cooperation to the persons responsible of all of the 4,527 home-visit nursing providers in the western part of Japan. Among these, we obtained consent to participate in the study from 149 facilities with experience in home-visit nursing for MD children. We then mailed 515 copies of the questionnaire as described in the returned consent forms. We obtained responses from 299 visiting nurses (response rate: 58.0%) and included 296 who returned valid responses for analysis (valid response rate: 98.0%). The participants' basic attributes are summarized in Table 1. Among these nurses, 240 (81%) had 3 or more years of experience in home-visit nursing and 176 (59%) had 3 or more years of experience in home-visit nursing for MD children. The number of responses from home-visit nursing for both MD children and adults was 280 (94.6%). Home-visit nursing that was learnt after becoming a member of society by 185 (62.5%). The method of education of home-visit nursing for MD children (multiple answers allowed) was self-studying by 75 (25.3%) and those who participated in training seminars numbered 207 (70%).

2. *Elements of each type of role*

In the following section, latent and observed variables are shown in < > and [ ], respectively.

TABLE 1.
Participants' basic attributes   n=296

Sex				Recipients of home-visit nursing		
	Male	8	2.7%	MD children and their families	6	2.0%
	Femle	288	97.3%	Adults (with experience in pediatrics)	10	3.4%
Age				MD children and adults	280	94.6%
	20-29	5	1.7%	**Size of the home-visit nursing facility (converting the number of all nurses into that of regular nurses)**		
	30-39	45	15.2%			
	40-49	137	46.3%			
	50-59	94	31.8%	Unclear	4	1.4%
	60-69	14	4.7%	2.5-3	36	12.2%
	70-79	1	0.3%	3-5	78	26.4%
Length of home-visit nursing experience				5-7.5	67	22.6%
	20 years or longer	26	8.8%	7.5-10	46	15.5%
	15 years or longer	30	10.1%	10-15	29	9.8%
	10 years or longer	59	19.9%	15-20	24	8.1%
	5 years or longer	78	26.4%	20 or more	12	4.1%
	3 years or longer	47	15.9%	**Period of home nursing learning**		
	1 year or longer	49	16.6%	At school	111	37.5%
	Less than 1 year	7	2.4%	After becoming a member of society	185	62.5%
Lengths of experience in home-visit nursing for MD children				**Method to learn home-visit nursing (multiple answers allowed)**		
	10 years or longer	52	17.6%	Participation in training seminars	240	81.1%
	5 years or longer	66	22.3%	Self-learning	83	28.0%
	3 years or longer	58	19.6%	**Method to learn home-visit nursing for MD children (multiple answers allowed)**		
	1 year or longer	95	32.1%	Participation in training seminars	207	69.9%
	Less than 1 year	25	8.4%	Self-learning	75	25.3%

Unit: person (%)

2. 1 Elements of structural roles

We analyzed the relationships among statements representing structural roles, 19 as observed variables (Table 2) and the following as latent valuables: <home-visit nursing systems> and <visiting nurses' skills> (Figure 2). All estimated coefficient values for this model were significant and its goodness of fit was χ^2=523.670, P=0.000, CFI=0.825, RMSER=0.043. As path coefficients closer to 1.0 are deemed highly correlated with dependent variables [9], values of 0.7 or higher are considered satisfactory indicators [10]. Standardized paths should ideally be above 0.3 in order to be considered meaningful [11].We regard a coefficient of 0.7 or higher to indicate a high level of role performance, and those lower than 0.3 to indicate non-

performance. The path coefficients from <visiting nurses' skills> as a structural role to the following: [considering methods for families to appropriately care for MD children according to their physical conditions], [having a role in clarifying MD children's needs and individually supporting them], [playing a role in clarifying families' emotions and individually supporting them], [respecting human rights to promote the growth of families, including MD children], and [considering families from a "personal life" perspective at all times] were 0.80, 0.80, 0.78, 0.78, and 0.72, respectively. This reveals that the visiting nurses were carrying out these roles to a high level. On the other hand, the path coefficients from home-visit nursing systems to the following: [noting that the duration

TABLE 2.
Elements of structural roles (observed variables)

Home-visit nursing systems		Path coefficients
S1	Having established systems for support, including post-discharge services	0.41
S2	Noting that the duration of each visit tends to be longer in home-visit nursing for pediatric patients	0.28
S3	Adopting a system for emergency home-visit nursing, including during out-of-service hours	0.27
S4	Visiting MD children based on the instructions of doctors in charge when their conditions change	0.36
S5	Confirming whether families are appropriately using hygiene materials	0.56
S6	Building systems to nurture MD children's and their families' sociability	0.62
S7	Building systems for MD children to lead their daily lives as a member of their family	0.66
S8	Consulting supervisors and staff when treating families who do not match	0.36
S9	Fielding questions from families with sincerity and giving the due dates	0.37
Visiting nurses' skills		
S10	Understanding that needs change according to life stages	0.60
S11	Understanding the necessity of changing times for home visits according to life stages	0.54
S12	**Considering families from a "personal life" perspective at all times**	**0.72**
S13	Respecting MD children's intentions	0.55
S14	Respecting families' intentions	0.67
S15	**Respecting human rights to promote the growth of families, including MD children**	**0.78**
S16	**Playing a role in clarifying families' emotions and individually supporting them**	**0.78**
S17	**Having a role in clarifying MD children's needs and individually supporting them**	**0.80**
S18	**Considering methods for families to appropriately care for MD children according to their physical conditions**	**0.80**
S19	Regarding entire families as recipients of home-visit nursing when supporting them	0.53

*path coefficient of 0.7 or higher as indicating a high level of carrying out a role and those lower than 0.3 as indicating not carrying out it
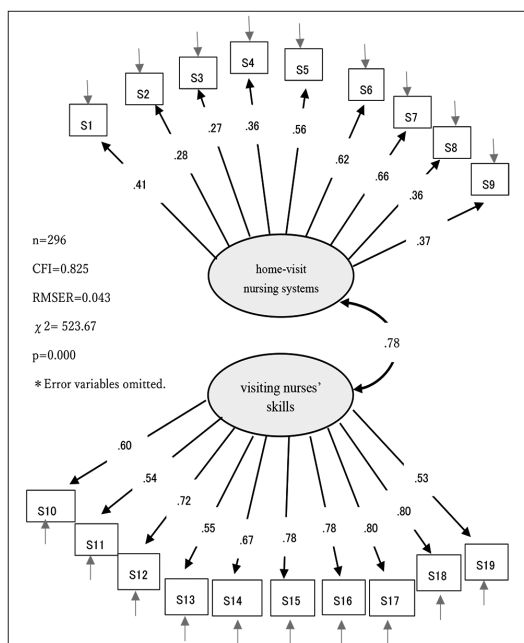

Fig. 2. Model Diagram for Visiting Nurses' Structural Roles (n=296)

of each visit tends to be longer in home-visit nursing for pediatric patients] and [adopting a system for emergency home-visit nursing, including during out-of-service hours] were 0.28 and 0.27, respectively. This reveals that the visiting nurses were not carrying out these roles. <Home-visit nursing systems> and <visiting nurses' skills> were positively correlated to a high degree, achieving a coefficient of 0.78 and demonstrating that established home-visit nursing systems improve visiting nursing skills.

2. 2 Elements of interpersonal roles

We analyzed the relationships among statements representing interpersonal roles: 46 as observed variables (Table 3) and the following for latent variables: <support for MD children>, <support for each family member>, <arrangements for whole families>, and <interprofessional collaboration> (Figure 3). All estimated coefficient values for this model were significant and its goodness of fit was χ^2=3856.87, P=0.000,

TABLE 3.
Elements of interpersonal roles (observed variables)

Support for MD children		Path coefficients	Support for each family member		Path coefficients
h1	**Assessing whether MD children are living in their own way**	**0.78**	**h25**	**Receiving consultations from families about medical care for MD children**	**0.73**
h2	**Providing support for MD children to promote their growth and development**	**0.78**	h26	Receiving consultations from families about their concerns	0.67
h3	**Providing support for MD children while considering their future**	**0.80**	**h27**	**Adopting elaborate approaches to make it easier for families to consult**	**0.75**
h4	Helping MD children become able to care for themselves	0.65	**h28**	**Encouraging families to express their distress through conversations**	**0.73**
h5	Understanding MD children's paces when they play	0.69	**h29**	**Making time for families to consult**	**0.75**
h6	Assisting MD children with play	0.68	h30	Reviewing the contents of consultations from families, and answering their questions another day	0.00
h7	**Reading MD children' facial expressions such as smiles**	**0.73**	h31	Talking to siblings of MD children about the latter's safety	0.66
h8	Communicating with MD children gently	0.61	h32	Understanding care supporters' status of participation	0.62
h9	Having MD children in skin-to-skin contact according to their physical conditions	0.65	**Arrangements for whole families**		
h10	Confirming that there is nothing wrong with medical devices for MD children	0.45	**h33**	**Making arrangements to sufficiently care for MD children without changing families' habits**	**0.79**
h11	Performing safety management with MD children's levels of motor activity taken into account	0.62	**h34**	**Making arrangements to sufficiently care for MD children without changing families' sense of values about life**	**0.81**
h12	Making arrangements for emergency visits according to MD children's conditions	0.64	**h35**	**Helping families develop a sense of accomplishment through care**	**0.80**
h13	Organizing around MD children's beds to ensure that they can live safely	0.54	**h36**	**Encouraging families to demonstrate their own power**	**0.81**
Support for each family member			**h37**	**Providing support with the busyness of families taken into account**	**0.70**
h14	**Assessing whether families are living in their own ways**	**0.78**	h38	Providing advice for families on the treatment of siblings of MD children	0.63
h15	**Assessing families' life rhythms**	**0.75**	h39	Supporting siblings of MD children	0.57
h16	**Understanding families' health conditions**	**0.70**	h40	Coordinating care for MD children with main caregivers and supporters	0.66
h17	**Assessing the difficulties faced by families in daily life**	**0.75**	h41	Supporting families to have sufficient time for respite	0.64
h18	**Assessing families' levels of fatigue**	**0.70**	**Interprofessional collaboration**		
h19	Providing advice for families on medical device safety management	0.67	**h42**	**Introducing social resources for caregiving and parenting to families**	**0.73**
h20	Telling families that the way they pay attention to MD children's safety varies during the course of a day	0.58	**h43**	**Collaborating with other professionals and adopting unified methods to appropriately care for MD children**	**0.79**
h21	Confirming whether families have any safety concerns	0.64	**h44**	**Providing information about related services**	**0.84**
h22	Being aware of families' concerns and distress	0.63	**h45**	**Supporting MD children and their families while sharing information with other professionals**	**0.85**
h23	**Receiving consultations from families about the development of MD children**	**0.72**	h46	Collaborating with schools	0.39
h24	Accepting consultations and requests from families without denying them	0.67			

* path coefficient of 0.7 or higher as indicating a high level of carrying out a role and those lower than 0.3 as indicating not carrying out it
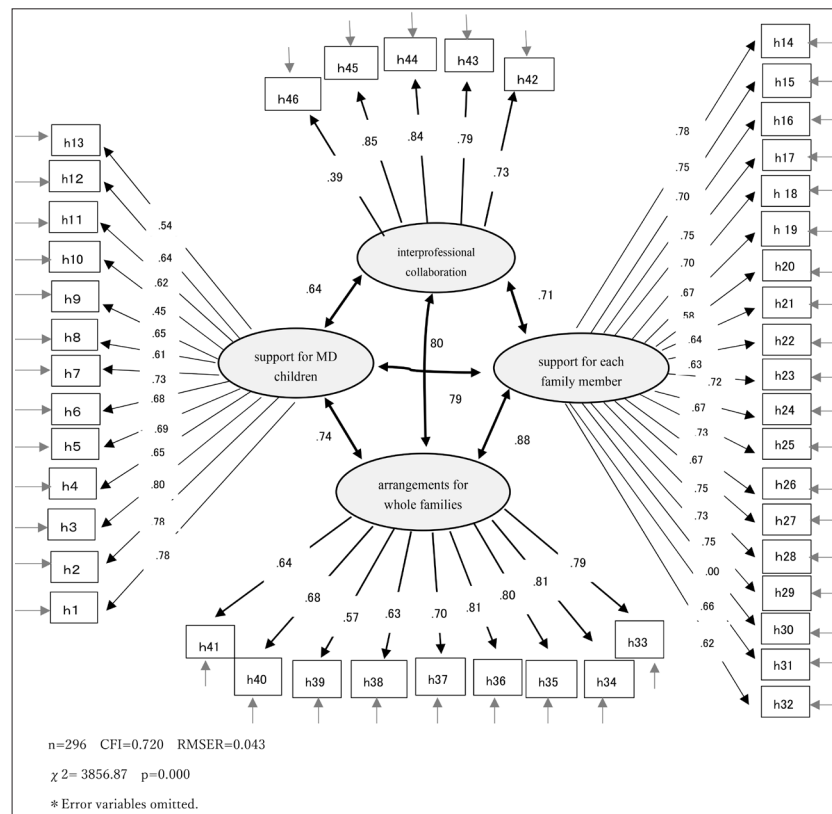
Fig. 3. Model Diagram for Visiting Nurses' Interpersonal Roles (n=296)

CFI=0.720, RMSER=0.043. The path coefficients from <support for MD children> as an interpersonal role to [providing support for MD children while considering their future], [providing support for MD children to promote their growth and development], [assessing whether MD children are living in their own ways], and [reading MD children' facial expressions such as smiles] were 0.80, 0.78, 0.78, and 0.73 respectively. This suggests that the visiting nurses were carrying out these roles to a high level. For this role, there were no values lower than 0.3 and the level of carrying it out was moderate or high in all cases. The path coefficients from <support for each family member> to [assessing whether families are living in their own ways], [assessing families' life rhythms], [assessing the difficulties faced by families in daily life], [assessing families' levels of fatigue], [receiving consultations from families about the development of MD children], [receiving consultations from families about medical care for MD children], [adopting elaborate approaches to make it easier for families to consult], [encouraging families to express their distress through conversations], and [making time for families to consult] were 0.78, 0.75, 0.75, 0.70, 0.72, 0.73, 0.75, 0.73, and 0.75, respectively, demonstrating that the visiting nurses were also carrying out these roles to a high lev-

el of support to MD children. On the other hand, the path coefficient from <support for each family member> to [reviewing the contents of consultations from families, and answering their questions another day] was 0.00, revealing that the visiting nurses were not carrying out this role. The path coefficients from <arrangements for whole families>, including all family members and MD children, to [making arrangements to sufficiently care for MD children without changing families' habits], [providing support with the busyness of families taken into account], [encouraging families to demonstrate their own power], [helping families develop a sense of accomplishment through care], and [making arrangements to sufficiently care for MD children without changing families' sense of values about life] were 0.79, 0.71, 0.81, 0.80, and 0.81, respectively, confirming that the visiting nurses were carrying out these roles to a high level. Lastly, the path coefficients from <interprofessional collaboration> to [introducing social resources for caregiving and parenting to families], [collaborating with other professionals and adopting unified methods to appropriately care for MD children], [providing information about related services], and [supporting MD children and their families while sharing information with other professionals] were 0.73, 0.79, 0.84, and 0.85, re-

spectively, revealing that the visiting nurses were carrying out these roles related to interprofessional collaboration to a high level. The correlation coefficients between <support for each family member> and <arrangements for whole families> and between <support for MD children> and <support for each family member> were 0.88 and 0.80, respectively, demonstrating a strong correlation in both cases. The correlation coefficient between <support for MD children> and <interprofessional collaboration> was 0.64, revealing a moderate correlation. This demonstrates that support for each family member leads to arrangements for whole families, and support for MD children leads to support for each family member.

2. 3 Elements of the role determination process

We analyzed the relationships among statements representing the role determination process: 7 as observed variables (Table 4); and <approaches for self-growth as a visiting nurse> and <future visions> as latent variables (Figure 4). All estimated coefficient values for this model, except for 1, were significant, and its goodness of fit was χ^2=32.656, P=0.002, CFI=0.978, RMSER=0.035. The path coefficients from <approaches for self-growth> to [developing human resources to appropriately care for MD children] and [developing human resources to appropriately care for families] were 0.971 and 0.863, respectively, revealing that the visiting nurses were aware of the necessity of actively playing these roles. On the other hand, the path coefficient from <approaches for self-growth> to [realizing that the number of home-visit nursing providers treating pediatric patients is small] was 0.07, representing their idea that the number of home-visit nursing providers treating MD chil-

dren does not influence individual visiting nurses' growth. Moreover, the path coefficient from <future visions> to [realizing the necessity of services to build networks for mutual aid in communities] was 0.91, reflecting their strong feeling about this issue, whereas the path coefficient from such visions to [realizing the necessity of promoting MD children's participation in society] was 0.52. With a coefficient of 0.31, <Approaches for self-growth> and <future visions> had a weak positive correlation.
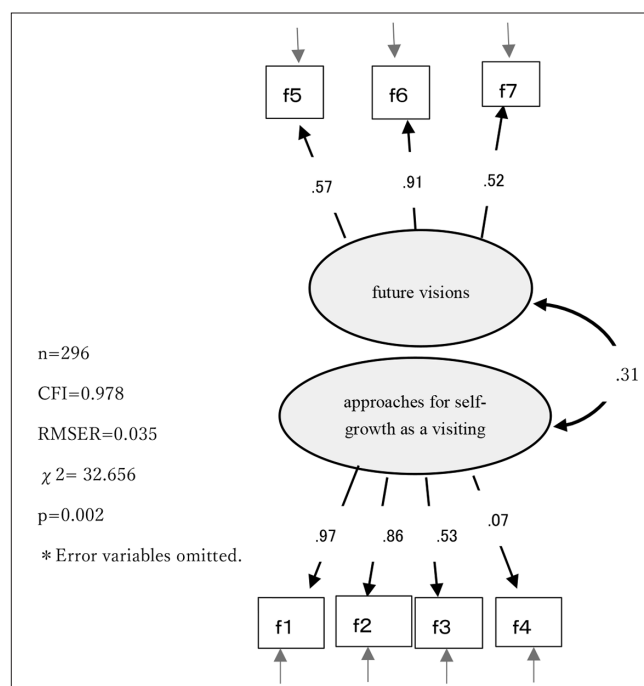

Fig. 4. Model Diagram for Visiting Nurses' Role Determination Process (n=296)

TABLE 4.

Elements of the role determination process (observed variables)

Approaches for self-growth		Path coefficients
f1	**Developing human resources to appropriately care for MD children**	**0.97**
f2	**Developing human resources to appropriately care for families**	**0.86**
f3	Continuously receiving training to continue home-visit nursing for pediatric patients	0.53
f4	Realizing that the number of home-visit nursing facilities treating pediatric patients is small	0.07
Future visions		
f5	Regarding human resource development programs as necessary	0.57
f6	**Realizing the necessity of services to build networks for mutual aid in communities**	**0.91**
f7	Realizing the necessity of promoting MD children's participation in society	0.52

* path coefficient of 0.7 or higher as indicating a high level of carrying out a role and those lower than 0.3 as indicating not carrying out it

2. 4 Relationships among structural roles, interpersonal roles, and the role determination process

Based on the hypothesis that a practitioner carries out their roles through interactions among structural roles, interpersonal roles, and the role determination process, we calculated the mean observed-to-latent variable value for each type of role, and clarified the relationships between the latent variables and these 3 types of roles (Figure 5). All estimated coefficient values for this model were significant and its goodness of fit was χ^2=45.216, P=0.000, CFI=0.952, RMSER=0.053.

The path coefficients from structural roles to <home-visit nursing systems> and <visiting nurses' skills> were 0.71 and 0.85, respectively, demonstrating that the visiting nurses were carrying out their skilled roles of providing home-visit nursing systems.

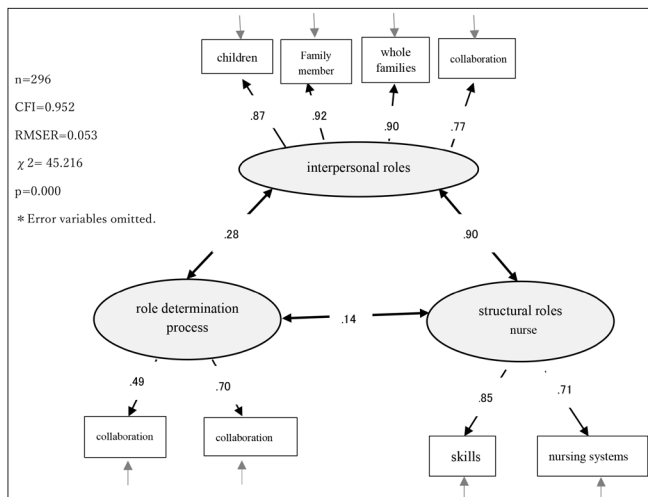The path coefficients from interpersonal roles to <support for MD children>, <support for each family member>, <arrangements for whole families>, and <interprofessional collaboration> were 0.87, 0.92, 0.90, and 0.77, respectively, revealing a high level of carrying out these roles to support MD children and their families. Thus, the visiting nurses were also playing roles related to interprofessional collaboration. In contrast, the path coefficients from the role determination process to <approaches for self-growth> and <future visions> were 0.70 and 0.55, respectively, revealing that they did not carry out these roles to a high level in approaches for their own professional growth. On analyzing the correlations among structural roles, interpersonal roles, and the role determination process, a tendency of visiting nurses playing structural roles to also carry out interpersonal roles was observed, and a strong positive correlation between the 2 types of roles was represented by a coefficient of 0.88. The correlations between interpersonal roles and the role determination process, as well as between structural roles and the role determination process were weak and positive, represented by coefficients of 0.28 and 0.14, respectively. Thus, visiting nurses playing both structural and interpersonal roles only slightly performed role determination processes.

Fig. 5. Model Diagram for the Three Types of Roles (n=296)

2. 5 Comparison of the status of role performance based on the home-visit nursing service provider size

We divided home-visit nursing providers into 2 groups: providers with fewer than 10 nurses and those with 10 or more. We compared the status of role performance between each of them using the Mann-Whitney U-test (Table 5). Neither the structural roles

TABLE 5.
Comparison of the Status of Role Performance Based on the Home-visit Nursing Facility Size   n=296

	10 or more (n=70)		Fewer than 10 (n=226)		P-value
	M	SD	M	SD	
Home-visit nursing systems	4.06	0.45	4.02	0.45	0.131
Visiting nurses' skills	4.33	0.5	4.40	0.46	0.212
Support for MD children	4.12	0.61	4.12	0.52	0.705
Support for families	4.03	0.57	4.02	0.52	0.525
Arrangements for entire families	4.00	0.69	3.91	0.57	0.421
Interprofessional collaboration	3.80	0.75	3.73	0.70	0.399
Approaches for self-growth	2.12	0.83	3.41	0.77	0.367
Future visions	4.53	0.63	4.50	0.60	0.708

The Mann-Whitney U-test was conducted.   P<0.05

(<home-visit nursing systems>, <visiting nurses' skills>), interpersonal roles (<support for MD children>, <support for families>, <care approaches>, <interprofessional collaboration>), nor role determination process (<approaches for self-growth> or <future visions>) significantly differed amongst the two groups.

2. 6 Comparison of the status of role performance based on the length of experience in home-visit nursing for MD children

We also divided the nurses into 2 groups based on their length of experience in home-visit nursing for MD children: less than 5 years and 5 years or longer, and compared the status of role performance between them using the Mann-Whitney U-test (Table 6). Neither the structural roles (<home-visit nursing systems>, <visiting nurses' skills>) nor interpersonal roles (<support for MD children>, <support for families>, <care approaches>, <interprofessional collaboration>) were significantly different. However, 2 elements of the role determination process, <approaches for self-growth> and <future visions>, significantly differed, at P=0.00 and P=0.039 (P<0.05), respectively, as nurses who had been performing home-visit nursing for MD children for 5 years or longer achieved significantly higher scores than those with less than 5 years of experience in this area.

2. 7 Comparison of the status of role performance based on the period of home nursing education

Lastly, on comparing the status of role performance based on the period of home nursing education using the t-test (Table 7), neither the structural roles (<home-visit nursing systems>, <visiting nurses' skills>), interpersonal roles (<support for MD children>, <support for families>, <care approaches>, <interprofessional collaboration>), nor one element of the role determination process, <future visions>, significantly differed. Another element of the role determination process, <approaches for self-growth>, was significantly different, at P=0.026 (P<0.05), as visiting nurses who learned home-visit nursing after becoming a member of society achieved significantly higher scores than those who learned it during school prior to becoming a member of society.

DISCUSSION

We discuss 1) the characteristics of the roles carried out by visiting nurses in home-visit nursing for MD children living at home, and then provide 2) suggestions for effective education programs.

1. Characteristics of the roles carried out by visiting nurses

1) Structural roles

Nurses have been reported to positively evaluate their own nursing practices in terms of respect for home-visit nursing service users [12]. Similarly, in the present study, the visiting nurses provided support, focusing on respect for MD children and their families such as considering care methods that are suitable for the children's individual needs and families' situations. As homes are MD children's and their families' living spaces, the nurses may have placed a higher

TABLE 6.
Comparison of the Status of Role Performance Based on the Length of Experience in Home-visit Nursing for MD Children   n=296

	5 years or longer (n=143)		Less than 5 years (n=153)		P-value
	M	SD	M	SD	
Home-visit nursing systems	4.05	0.5	4.03	0.41	0.246
Visiting nurses' skills	4.34	0.53	4.40	0.45	0.89
Support for MD children	4.13	0.61	4.10	0.54	0.525
Support for families	4.06	0.55	3.99	0.55	0.226
Arrangements for entire families	3.94	0.69	3.93	0.61	0.688
Interprofessional collaboration	3.76	0.79	3.75	0.68	0.803
Approaches for self-growth	4.0	0.78	3.5	0.77	0.00*
Future visions	4.59	0.67	4.50	0.57	0.039*

The Mann-Whitney U-test was conducted.   *P<0.05

TABLE 7.
Means, Standard Deviations, and T-test Results for the Period of Home Nursing Learning

	At school (n=184)		After becoming a member of society (n=112)		P-value
	M	SD	M	SD	
Home-visit nursing systems	4.07	0.43	4.05	0.45	0.831
Visiting nurses' skills	4.35	0.47	4.36	0.49	0.62
Support for MD children	4.11	0.53	4.12	0.59	0.833
Support for families	3.99	0.51	4.06	0.56	0.437
Arrangements for entire families	3.97	0.58	3.96	0.61	0.569
Interprofessional collaboration	3.78	0.66	3.78	0.73	0.916
Approaches for self-growth	3.36	0.83	3.58	0.8	0.026*
Future visions	4.5	0.61	4.55	0.53	0.764

The Mann-Whitney U-test was conducted. *P$<$0.05

level of importance on helping the latter provide medical care for the former while considering the quality of life (QOL) of both at all times. This is partially consistent with the definition of structural roles in the present study: Nurses provide their nursing skills while supporting the daily lives of MD children and their families.

On the other hand, neither the establishment of systems to provide care during out-of-service hours nor the management of worsening physical conditions were strongly perceived by them as their roles. This suggests low levels of understanding and practices related to home-visit nursing systems as a structural role. As another influencing factor, it should also be noted that home visits are often planned with a limited number of nurses. Furthermore, the provision of care during out-of-service hours is difficult for home-visit nursing. Regarding the management of worsening physical conditions, in many cases, nurses require the discernment of a doctor . This can present difficulties, especially in cases where time is of the essence and nurses must make emergency determinations based on children's physical conditions. Thus, it is thought to be difficult to appropriately judge and manage MD children's physical conditions solely upon doctors' instructions.

It should also be noted that although we did not make comparisons between the persons responsible and other nurses or between regular and non-regular nurses. The visiting nurses believed that decisions related to home-visit nursing systems as a structural role should not be made by each visiting nurse but rather be made under doctors' instructions. According to pre-

vious studies, the duration of education for regular nurses is shorter than that for non-regular nurses [13]. Comparing the persons responsible and other nurses in home-visit nursing providers, the former often evaluated each nursing practice with a higher rate of positivity [12], whereas the latter's personal sense of accomplishment faded away significantly faster [14]. It is easy for the persons responsible of these providers to recognize the details of home-visit nursing for each user, as they frequently consult with care recipients and other professionals, such as doctors, about instructions and medical services before decision-making. Thus, considering that those responsible for carrying out the roles of collaborating and coordinating with other institutions and professionals, nurses may have thought that such coordination was not their role.

When nurses are unable to assess the level of emergency based solely on the physical conditions of children with short hospital stays, they frequently need to turn to a doctor for their discernment regarding the treatment for deteriorating conditions. Thus, the difficulty of appropriately judging and managing MD children's physical conditions only by following a doctors' instructions may have resulted in a low level of role implementation related to the duration of each visit and emergency management. This indicates the necessity to reviewthe current system in terms of "home visits based on the instructions of doctors in charge." Many visiting nurses have experience of working as hospital nurses. Hospital nurses are generally educated to comply with the principle of performing medical practices following a doctor's instructions. Nursing practices, such as accurately understanding

situations, complying with instructions, judging MD children's conditions, and selecting appropriate care methods, are rarely experienced in hospitals. In other words, the necessity of making judgments that they have never experienced in hospitals is a heavy burden on nurses. Burnout is effectively prevented among nurses who receive necessary training as professionals and acquire solid skills and knowledge [12]. Based on this, training may be necessary for both the individuals in charge and other nurses. It may also be necessary to educate both regular and non-regular employees about home-visit nursing systems, the impact of home-visit nursing provider sizes, the proper management of worsening physical conditions, and selecting appropriate treatment methods while complying with instructions.

2) Interpersonal roles

As direct support for MD children and their families, the visiting nurses maintained the patient's health, promoted their development, supported each family member, and made arrangements for whole families. Some home-visit nursing providers use a training program (created by the Japanese Nursing Association in 2016) for nursing ability development and evaluation, consisting of items related to care and care recipients (users) [15]. Through this training program, nurses can better comprehend MD children as care recipients and users and acquire the knowledge and skills necessary to meet their needs and expectations. Such content may be similar to the objective of basic nursing education and hospital training: acquiring the care-related knowledge and skills required to understand the recipients of nursing care, which is one of the learning goals imprinted on nurses from the beginning of their education. Therefore, nurses are likely to consider the provision of knowledge and skills as they provide indispensable services for users.

Moreover, in order to build key partnerships that reduce physical and mental burdens, it is important for nurses to actively communicate with families [16]. It has been reported that curses focus on supporting families according to their own pace, sharing parenting with them in daily life, and connecting mothers to society from a long-term care perspective [17]. Other members' power is essential for the maintenance of MD children's daily lives with care, and cooperation from the whole family, rather than just one of its members, is critical. Family coordination and suggestions for the use of external resources are also necessary to ensure that they can live with MD children while leading their own lives. It is important not only to help family members stay together around MD children, but also to propose measures for them to stay connected to society and not to be isolated within their communities. In this respect, the visiting nurses may have paid special attention to support for families as key persons, arrangements for whole families, and inter-professional collaboration for such arrangements.

3) Role determination process

In the present study, visiting nurses not only reported their own nursing practices, but also made use of experience and knowledge as a visiting nurse to educate families and co-working nurses. Thus, they used their empirical knowledge as visiting nurses to educate others. In order to present one's empirical knowledge in educational settings, it is necessary to reflect upon his/her experiences and examine appropriate methods to convey them, with the learners' levels of understanding taken into account, and therefore review his/her knowledge and skills to understand care recipients and provide the care they need. This process helps nurses further their growth. Favorable evaluation by others also increases their sense of self-affirmation. Thus, educating families and other nurses, in addition to reporting one's own nursing practices, may also positively influence nurses' professional growth. Realizing that developments in human resources lead to both educators' and learners' growth is likely to promote work satisfaction. Visiting nurses with higher levels of work satisfaction and positive emotions have been reported to adopt proactive behaviors and stay motivated [14]. Based on this, educating others may promote visiting nurses' work satisfaction.

The type of service to provide MD children and the profession with which to collaborate should be determined while offering home-visit nursing, while also taking into account changes in their level of need for medical care and growth/developmental stage. Visiting nurses are expected to have an overall perspective on the communities where MD children and their families live, understand related measures, and selectively utilize them rather than focusing only on these people. In ward nursing, these abilities are needed for team leaders and managers. In the present study, nurses who had been working in home-visit nursing facilities for 5 years or longer believed that they assumed the roles of human resources development and collaboration leader with other facilities. However, even in small home-visit nursing providers, Maruyama et al. suggest the possibility of nurses achieving a sense of participation and accomplishment in facility management. When

roles were clearly allocated among employees and each one carried out their duties, the motivation to continuously work for their facilities increased [13]. Training seminars may be necessary to learn nursing skills for MD children and their families, as well as acquire knowledge of entire professional communities, related measures, and their usage. This will help visiting nurses with work experience less than 5 years maintain their motivation and continue providing home-visit nursing for MD children.

In short, providing nursing care for MD children with an eye toward the future may be possible if strategies for personal development and vision are adopted. The circumstances of MD children and their families , as well as the possibility that their situations may change, must also be taken into account.

2. Relationships among the 3 types of roles

In the present study, structural and interpersonal roles were correlated, but the correlations between these roles and the role determination process were weak.

Complementing, transferring, and determining roles is a prerequisite to implementing appropriate role behaviors [6]. In the present study, the correlations between the role determination process to transfer and determine roles and structural and interpersonal roles were weak. Thus, the hypothesis that visiting nurses assume and carry out these 3 types of roles was not established, possibly due to the scarcity of opportunities for them to recognize and reflect upon their roles. This indicates the necessity for visiting nurses not only to fulfill the requirements but also assume structural and interpersonal roles, and implement these in relation to the role determination process as a basis for appropriate home-visit nursing for MD children.

In the current training system for visiting nurses, with the previously mentioned ladders incorporated since 2016, learning sessions are held regularly, and interviews with the persons responsible are conducted periodically. In such training, nursing practices are evaluated, but the rate of self-evaluation among participants is limited to approximately 40% [13]. Although nurses evaluate their own practice for users whenever they create home-visit nursing plans and reports, they rarely evaluate themselves. Thus, visiting nurses may have sufficient opportunities to play structural and interprofessional roles, but they lack those to reflect on themselves and develop a future vision.

Arata et al. described how aiding others is manifested as a form of self-actualization in nurses when they appropriately define their own existence through experiences and become motivated to carry out and fulfill relevant roles [18]. Based on this, self-reflection during training may help nurses clarify their emotions and thoughts related to nursing practices and discover new possibilities in nursing, all of which promote self-growth.

Unlike in hospital settings, nurses in home-visit settings pay closer attention to the level of goals achieved and client satisfaction; however, they may lack sufficient opportunities for self-reflection as nurses. Although the correlation between structural/interpersonal roles and self-reflection is considered weak at present, regular self-reflection may serve as an opportunity to create new nursing practices, which will consequently improve the QOL of MD children and their families. This may pave the way for practices to build partnerships with families. Self-reflection opportunities for visiting nurses may also be created in training seminars and study sessions within home-visit nursing facilities by raising their work awareness and actively providing them with feedback.

3. Suggestions for effective education programs

The roles carried out by visiting nurses are important to help MD children continuously receive long-term care at home. As the management-related difficulties faced by home-visit nursing providers treating MD children have been reduced since the revision of medical costs, the number of providers performing home-visit nursing for MD children is likely to increase in the future. To allow ward nurses, including those without experience of treating MD children, to be in charge of home-visit nursing, education programs for them to become able to carry out the 3 types of roles may be required. The results of the present study revealed that visiting nurses who treat MD children carry out structural and interpersonal roles to a high level, but their level of carrying out their role in the determination process is low, highlighting the importance of increasing opportunities for them to learn about this process, in addition to their training focusing on structural and interpersonal roles.

Functionally enhanced type 1,2, and 3 home-visit nursing service providers were institutionalized in 2014 and 2018, respectively [19]. These providers address multiple issues, including improving medical service systems and providing home-visit nursing training for community-based medical institutions. Holding training seminars not only independently, but also through collaboration with other home-visit nursing facilities, and creating opportunities for reflection on home-visit nursing practice for MD children, where

the number of cases is still small compared with adult cases, may promote nurses' knowledge, information, and skills related to structural and interpersonal roles.

Based on these findings, educational programs to increase the number of nurses who perform home-visit nursing for MD children and continuously provide nursing care should also promote nurses' understanding of home-visit nursing systems and the mechanisms required to carry out their structural roles, in addition to the persons responsible. Continuous training for the acquisition of specific skills to understand MD children and their families, and provide medical care and support for them, as well as interprofessional collaboration, is also necessary. In addition to training focusing on structural and interpersonal roles, it may be important to incorporate approaches to the role determination process in order to encourage nurses to reflect upon themselves while acknowledging their professional growth and share their findings from self-reflection with other nurses. Implementing the role determination process, which promotes self-actualization and the realization of self-growth may help nurses take root in their workplaces, and consequently ensure the high-quality home lives of MD children and their families.

Study limitations: The present study was conducted at the initial stage of the COVID-19 pandemic and there were limits to the number of participants to whom the questionnaire could be sent. As the subjects were limited to visiting nurses performing home-visit nursing for MD children, responses may have been biased. Therefore, it may be necessary to continuously examine the status of service providers performing home-visit nursing for MD children based on the present data.

CONCLUSION

To identify the elements of the roles carried out by nurses in home-visit nursing for MD children living at home and structure the roles of visiting nurses as a basis for developing effective education programs for them, we examined 296 nurses who responded to our questionnaire.

1) <Home-visit nursing systems> and <visiting nurses' skills> as visiting nurses' structural roles were strongly correlated.

2) <Support for MD children>, <support for each family member>, <arrangements for whole families>, and <interprofessional collaboration> as visiting nurses' interpersonal roles were strongly correlated.

3) <Future visions> and <approaches for self-growth> as elements of the visiting nurses' role determination process were weakly correlated.

4) These structural and interpersonal roles were strongly correlated, whereas the correlations between them and the role determination process were weak.

5) This study suggests the necessity of educational programs for visiting nurses to establish home-visit nursing systems for MD children, to develop methods for specific and individualized nursing practices, be trained with an emphasis on interprofessional collaboration, and consider their own professional development.

REFERENCES

1. Ministry of Health, Labour and Welfare. A Status Survey on Children Requiring Medical Care and a Study on Interprofessional Collaboration among Medical, Welfare, Health, and Education Services for Themsupported by Health and Labour Sciences Research Grants (for Comprehensive Research Projects on Policies for People with Disabilities) Interim Report. 2016. (Accessed June 3, 2019, at https://www.mhlw.go.jp/content/12200000/000365179.pdf)

2. Ministry of Health, Labour and Welfare. Revision of Welfare Service Fees for People with Disabilities in FY2018. 2017. (Accessed June 3, 2019 at https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000202214.html)

3. Kajihara A, Hagiwara A, and Matamura A. A Guide to Admission/Discharge Support and Home-visit Nursing Practice for Pediatric Patients. Herusu Shuppan 2018; 48-73.

4. Report of the Pediatric Home Care Review Board. 2017. (Accessed August 8, 2019, at http://dl.med.or.jp/dlmed/teireikaiken/20180404_4.pdf.)

5. Mori Y, Oyama Y, Hirooka K, and Fukahori H. Difficulties Experienced by Nurses Newly Engaged in Home-visit Nursing and Associated Factors. J Jpn Acad Nurs Admin Policies 2016; 20:104-111.

6. Nojima A. Nursing Practice for Family Empowerment. Herusu Shuppan 2014; 100-103.

7. Meleis AI and Kataa N. Transition theory and nursing. Gakken 2018; 15-36.

8. Ministry of Health, Labour and Welfare. Search for nursing care offices and living-related information, 2018. (Accessed November 30, 2019, at https://www.kaigokensaku.

mhlw.go.jp)

9. Hosoda Y. Effects of the educational infrastructure on the metacognitive clinical learning environment of students in baccalaureate nursing programs. J Jpn Acad Nurs Sci 2007; 27:33-41.

10. Pui-Wa L and Qiong W. Introduction to structural equation modeling: issues and practical considerations. Educ Meas 2007; 26:33-43.

11. Chin WW. Commentary: Issues and opinion on structural equation modeling. Manag Inf Syst Q 1998; 22:7-15.

12. Sugitani E, Mikane S, and Futoyu Y. Evaluation of visiting nurses' practice of client-centered care. Kawasaki Medical Welfare Journal. 2011; 21:135-144.

13. Maruyama Y, Goto J, and Kanoya Y. The realities and problems of the service training for visit nurses in home-visit nursing care office. The University Bulletin of Chiba Institute of Science. 2017; 10:101-108.

14. Mochizuki S, Mogi M, and Iijima S. An approach to work satisfaction and burnout among visiting nurses in A Prefecture in Japan. Yamanashi Nursing Journal 2009; 8:9-14.

15. Matsubara M, Masaki N, Nagao M, Nakagami E, Koga T et al. Nurse educators' perceptions of the practical competency required by new visiting nurses for home-care visits without assistance and factors influencing their perception formation. Japanese Red Cross Hiroshima Coll 2019; 19:13-22.

16. Ishizawa M, Tomioka S, Otake M, Akama A, Suzuki I et al. The actual situation of visiting nurses' views of a family and family nursing practice and factors affecting visiting nurses' family nursing practice. Yamagata Medical Journal 2009; 27:79-88.

17. Arimoto A, Yokoyama Y, Nishigaki K, Dai Y, Baba C et al. Viewpoints of visiting nurses to support mothers caring for MD children with special health-care needs. Journal of Japan Academy of Community Health Nursing. 2012; 14:43-52.

18. Arata Y, Nakao H, and Hamada Y. The structure of motivation for growth of clinical nurses. J Jpn Acad Nurs Scie 2019; 33:29-37.

19. Medical Economics Division, Health Insurance Bureau, Ministry of Health, Labour and Welfare. Handling of Notification Procedures Related to the Home-visit Nursing Facility Standards, 2019. (Accessed December 10, 2020 at https://www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000203039.pdf)