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Development and Testing of a Standardized Primary Health Assessment Instrument (SPHAI) for Home Health Care

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Abstract

The purpose of this study was to develop and test a standardized primary health assessment instrument (SPHAI) that can be used to assess the health problems and care needs of home-bound clients at the primary level. For this, the preeminent experts in the field were identified and, after an intensive literature review, a preliminary instrument was established. The 25 panelists then participated in a three-round Delphi survey method to identify those items that had a content validity index of 0.8 and over. This led to an instrument composed of 5domains, 19 components, and 43items. This instrument was then reviewed from 316 homecare nurses working for three types of home health care programs in Korea. The nurses assessed the tool in terms of item variation and redundancy, and to determine its internal consistency and reliability. The responses suggested that the SPHAI is suitable for use in all three programs in terms of identifying homebound clients, developing guidelines for evidence-based care, and improving documentation. However, the present study should be regarded as an exploratory study: the feasibility of the SPHAI should be tested by nation-wide empirical studies that are funded by the Korean government.

Keywords: Home health care; Need; Assessment; Instrument; Delphi technique; Korea

Introduction

The proportion of elderly people (65 years and older) in Korea is expected to increase rapidly from 10.7% in 2009 to 14.3% in 2018, finally reaching 20.8% in 2026 [1]. Analysis by the Ministry for Health, Welfare, and Family Affairs of Korea (MHWFA) indicates that this rapid aging of the population may be problematic since productivity will be decreased dramatically [2]. It has been suggested that the health care expenses of the elderly can be managed more efficiently by establishing and managing a home health care system at the national level [3,4]. In Korea, the home health care system differs slightly from the American home health care system or the Japanese visiting care system [5] in that it consists of three related service programs, with each service having its own unique law and regulations. The first service program is called the home care nursing (HCN) program, which serves patients who have been discharged early from hospital; this program was established by the Medical Care Act in 2000. The second service program is called the visiting care nursing (VCN) program and it was developed for managing homebound elderly patients with chronic diseases; it was established by the Long-term Care Security for the Elderly Act in 2007. The third program is called the home health care (HHC) program and it was developed to prevent illness and promote health in vulnerable people in the community; it was established in 1990 by the Community Health Act [2].

Having three home health care programs that operate under different legal bases can create considerable confusion among not only the service providers but also the clients. Another problem is that the qualifications of the home health care providers, as specified by the three Acts. And standardized health status assessment tools that allow homebound clients to be identified and provided with the most appropriate services are lacking. Medicaid in America is able to correctly identify the health problems of home-based clients and effectively address their care needs because of continuous, adequately funded research into accurate health assessment tools [6-8]. However, such research and the national implementation of a standardized health care assessment tool do not occur in Korea or Japan, despite home-based health care having been implemented as a health policy 10 and 40 years previously, respectively. Instead, the Japan Visiting Nursing Foundation (JVNF) recommends that visiting care nursing clients should be assessed by using 72 items and 30 abstract screening tools [9,10]. Consequently, Japan has had difficulty managing the quality of its visiting care nursing service and evaluating its efficacy; this problem continues to the present day [10]. This knowledge will promote the development of a national standardized health assessment tool that will allow the health problems of homebound clients to be identified and cared for by the most appropriate home health care service. At present, such an instrument is lacking. To improve the current home health care system in Korea, it is necessary to recognize the similarities and differences of the three service programs; this will help to identify the relevant reciprocal connections and the referral network between the programs. The aim of the present study was to develop a standardized primary health assessment instrument (SPHAI) that would allow home health care professionals and staff in Korea to identify homebound clients early after they develop a need for home-based health care and to select which of the HCN, VCN, and HHC programs are most suitable. The specific purposes of this study are as follows: (a) to develop the SPHAI; (b) to verify the content validity and reliability of the SPHAI in terms of suitability for the HCN, VCN, and HHC programs.

Methods

Design

A methodological research study was conducted to construct a SPHAI that is suitable for assessing the health status and care needs of homebound clients of the HCN, VCN, and HHC programs. In addition, the feasibility of the SPHAI was tested by the mail survey.

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Participants

The SPHAI study participants were from three different sources. First, there was an advisory panel composed of ten professors from community and home health nursing departments and 15 senior home care nurse specialists with 10 or more years of experience in the HCN, VCN and HHC programs. Second, to measure the assessment contents of the final 43 items, the nursing records of 90 homebound clients (n=30 for HCN, VCN, and HHC, respectively) were analyzed. Third, to test the SPHAI, 316 home nurses were asked to survey the SPHAI over a period of one month. Of these, 102, 116, and 98 were HCN, VCN, and HHC nurses, respectively. The response rates were 29.7%, 48.4%, and 34.5%.

Procedures

The construction of the SPHAI required two stages. Stage 1 consisted of an extensive literature review that allowed potential domains, components and items to be identified [11,12]; this then led to the development of a preliminary SPHAI. This was followed by a three-round Delphi survey involving the panel of 25 advisors, who made recommendations regarding the suitability and location of the individual items. This stage was performed during August and November, 2008. In Stage 2, the feasibility of the SPHAI was tested by asking 316 home nurses to provide an opinion about the SPHAI at two time points separated by one month. Specifically, they were asked to verify at a preliminary level the internal consistency and reliability with which the SPHAI can be applied in the field. This stage was conducted from December 2008 to January 2009. The two-time point surveys were then analyzed by using SPSS-PC. The details of Stages 1 and 2 are as follows. First, the 25 panelists were selected by expert group meetings, after which questionnaires explaining the purpose of this study were sent to each panelist. All panelists supported this study, seeing it as important for the improvement of Korea's current healthcare situation. All also agreed to participate in the consensus-making process. All communicated *via* e-mail or phone; when necessary, personal contact meetings were held. The author first developed the conceptual framework of the SPHAI by comprehensively reviewing the literature that discusses the instruments that are currently used in the HCN, VCN, and HHC fields. The items were then defined and compared with help from the literature. These included JVNF assessment items [9,10], America's HHC assessment items [13], and the homebound client assessment items used by the HCN, VCN, and HHC programs in Korea [14]. Thereafter, a three-round Delphi survey was held. For this, each panelist was provided with detailed instructions and asked to carefully score each proposed primary level assessment item with regard to its inclusion in the final instrument; this was done by assigning each item with a score ranging from 1 to 5, where 1 shows the item should not be included and 5 shows the item should be included. For second and third rounds, the results from the previous round were given and each panelist was asked to consider each item again. The response recovery rate for the opinion-gathering three-round Delphi survey was 100%. To establish the final instrument, the criteria for content validity index (CVI) was set above 0.8 [15,16]. The contents of the SPHAI were under constant revision until unanimous consensus was reached. Once the SPHAI had been developed, the nursing records of 90 homebound clients were reviewed by the author, who assessed the health problems and nursing service needs of each client with regard to the items in the SPHAI. The final assessment items in the SPHAI were based on these detailed nursing record analyses. To confirm the feasibility of SPHAI, Stage 2 was performed by asking 316 home nurses to assess the instrument. The reliability of the instrument appeared to be relatively stable, as determined by a test-retest analysis for verifying the stability of scale (Cronbach'α = 0.86~0.99). The consistency of a measured assessment item was calculated by considering the two responses of each nurse separated by one month.

Ethical considerations

The study was approved (KU-IRB-09-10-A-2) by the Bioethics Research Committee. Informed consent was obtained from all study participants. The ethics consultation committees were assured that the data would be reported in aggregate form, that it would not be possible to identify specific individuals, and that all responses would be kept confidential and would be used for the purpose of the study only.

Results

Development of the SPHAI (Stage 1)

Conceptual framework: The conceptual framework of health status and needs-based assessment of homebound clients was first developed by Olaison and Cedersund [17]. Of all care management processes, needs-based assessments particularly facilitate the integrative assessment of the problems of homebound clients [18-20]. Synthetic analysis of the literature and the opinions of the advisory panel, which was composed of many of Korea's preeminent home health care experts, revealed that the conceptual framework of SPHAI should involve five domains that are based on the health problems and nursing care needs of home health care clients, namely (a) function and physiology, (b) health behavior-related, (c) cognition and psychology, (d) family and social support system, and (e) environment.

The literature that was used to select these 5 domains pertains to domains that are currently used in Japanese, American and Korean homecare models (Table 1). For example, the primary assessment instrument provided by JVNF (2007), which seeks to identify the health problems of homebound clients and the primary level of nursing service that is demanded, is based on the domains of function, nursing and medical management, health management, dementia cognition, family function and social resources, and environment. The MDS-HC (Minimum Data Set-Home Care) RAI in America, which is also an instrument of home health care, is composed of health problem and service utilization domains such as health functions, sensory function, excretion control, health problems, and mental health [13,20]. The Korean RAI-HC [21], which is a modified and supplemented form of the MDS-HC RAI, is also composed of health problem and functional support domains such as communication, eye, audition, vision, excretion control, health status and preventive activities, emotion, and behavior cognition. In addition, the American OASISII assessment tool [8] synthesizes the practical problems of home health care clients and their need for home care services by including the domains of sensory condition, skin, respiration and excretion, medication, nerve and emotional condition, supportive activity, living environment, and medical instrument care. Moreover, the home health care classification devised by Saba [22] seeks to assess home health care and to diagnose health problems by using the domains of function, physiology, health behavior, and psychology [23]. Notably, although an assessment instrument has been initiated and used by the long-term recuperation insurance system in Korea to select elderly clients who are eligible for visiting care [2], this instrument is becoming inadequate because it focuses solely on the need for home care service, as indicated by the inclusion of ten care treatment items such as catheterization care and injury treatment. In addition, there are several instruments that have been used in a more general fashion to measure the health status of all local community residents, not just home health care clients. These include OMAHA [24], the domains of which are physical,

health behavior, social psychology and environment; NANDA [25], the domains of which are movement, communication, exchange and selection, cognition/knowledge/emotion, relationship, and value; and the instrument described by Gorden [26], the domains of which are activity, exercise, sex, reproduction, excretion and nutrition, rest, health perception, health management, self-cognition, role-relation/coping-stress/value-conviction, and durability. Similarly, in Korea, the instrument used to assess homebound clients in terms of their health status and type of care service includes the domains of health problems that impair activities of daily living (ADL) or instrumental activities of daily living (IADL): the need for rehabilitation service, the need for nursing treatment, health behavior, behavior change, behavior conditions, the cognitive impairments in depression and dementia, family support, level of management, and referral system [2].

Developing the SPHAI: After the literature assessment, the resulting preliminary instrument involved 5 domains (denoted as Level I) comprising of 21 components (denoted as Level II), which in turn consisted of 66 assessment items (denoted as Level III). The first domain of function and physiology consisted of the following components: sensory function (speech, vision, hearing, oral hygiene, pain, sleep behavior), activities of daily living (ADL, IADL, motor disorder, joint function), nutrition (digestive function, dehydration, weight change, peripheral parenteral nutrition, total parenteral nutrition), excretion (bowel training, enema, fistula enema), skin (skin cleanliness, bedsore, surgery wound, pressure ulcer, congestive ulcer), circulation (blood pressure disorder, circulation disorder), respiration (respiratory disturbance, suction care, tracheostomy care, tracheostomy exchange, oxygen treatment, nebulizer), infection (fever or flare, signs and symptoms of infection), and fluid (dehydration, metabolism). The domain of health-related behavior consisted of the following components: healthy lifestyle (smoking, drinking, exercise/physical activity, eating behavior) and medicine (medicine management, compliance). The domain of cognition and psychology consisted of the following components: psychological emotion (anxiety, depression, life desire, feeling of loss in the spouse), problematic behavior (behavior change/abnormal behavior, alcoholism), and cognition (delirium, cognitive function). The domain of family and social support consisted of the following components: interpersonal relationship (social activity, psychological isolation, interpersonal relationship, abuse), family (live alone, family function), and support system (family, health care resource, social welfare resource). The last domain of environment had the following components: safety (risk of fall, risk factor), living environment (home environment, living environment), interchange (interpersonal relationship), and support (family, health care service, social welfare service).

Following the first round, the instrument consisted of 21 components and 66 items (Table 2). With regard to the components, the respiration and fluid components had been deleted and the oral component was added. With regard to the Level 3 assessment items, seven items (motor disorder, joint function, metabolism, blood pressure disorder, abuse, living alone, and living environment) were deleted on the basis of recommendations of the author, which received <80% consensus agreement from the panel. All deleted items involved subjective assessments of patient 'vigor' or 'inappropriateness' and

JVNA[1)]	MDS-HC[2)] RAI	Korean[3)] MDS-HC RAI	OASIS II[4)]	HHCC [5)]	OMAHA [6)]	NANDA[7)]	GORDEN[8)]	HHC [9)]	VCN [10)]	Ryu H.
Function Nursing& medical treatment	Sensory Function Excretion control	ADL/IADL Communication Audition Vision Excretion	ADL/IADL Sensory condition Skin Respiration & excretion	Function Physiology	Physical	Movement Communication	Activity Exercise Sex Reproduction Excretion	ADL/IADL Rehabilitation Nursing treatment	ADL/IADL Rehabilitation Nursing treatment	Function/ Physiology
Health management	Health problem	Health status Preventive activity Diagnosis disease	Medication	Health behavior	Health-related behavior	Exchange Selection	Nutrition Metabolism Health perception, management Rest-sleep	Health behavior & problem Behavior change & status	Behavior change	Health behavior
Dementia Cognition	Mental health	Emotion Behavior Cognitive	Nerve & Emotional condition	Psychology		Cognition Knowledge Emotion	Self-cognition	Cognitive function Depression Dementia	Cognitive function	Cognition Psychology
Family function Social resource Social skill		Social function Support service	Supportive activity		Social psychological dimension	Relation-ship Value	Role relation Coping-Stress Value-Conviction	Family support system		Family & social support system
Residence & Living environment			Environment		Environment			Management status		Environment

1) Japanese Visiting Nursing Foundation [9]. 2) Landi F, et al. [13] 3) Kim, C. et al. (2005), Korea minimum data set for home care a valid instrument in the community. Kunsa co., Seoul. 4) Shaughnessy PW, et al. [8]. 5) Harris M.D. [23] 6) Westra BL, et al. [24]. 7) Brooks, B.A. et al. [25]. 8) Gorden M. [26]. 9) Ministry for Health, Welfare, Family Affairs, & Korea Health Industry Development Institute [14]. 10) Ministry for Health, Welfare, Family Affairs [2].

Table 1: Review of the major domains employed by other instruments that assess the health problems and care needs of homebound clients.

Round	Domain (Level I)	Component (Level II)	Items (Level III)				
			Deleted	Added	Modified	Total	CVI Range (%)
1	5	21	7	1	8	66	60.9 ~ 100.0
2	5	19	2	0	4	50	77.3 ~ 100.0
3	5	19	0	0	2	43	89.9 ~ 100.0

Table 2: Results of the three-round Delphi survey.

were deleted to simplify the initial health assessment. Moreover, bowel training was divided into excretion control and urination control; oral hygiene, sleep behavior, and dehydration were moved into more appropriate components; family support was moved from family function; and social activity, psychological isolation, and interpersonal relationship were all integrated into interpersonal relationship. In addition, one item was added, namely language communication. All of these changes were made to eliminate unnecessary or redundant items and components.

During round two, the majority of items received strong consensus approval. However, several comments from the panel led to the addition of the component 'need for special treatment', which contained all special treatments, namely respiration care (tracheostomy care and tracheostomy exchange, oxygen treatment, nebulizer, artificial respiration), special nutrition (peripheral parenteral nutrition, total parenteral nutrition), excretion aid (catheter exchange and care, enema, fistula enema, bladder washing and training, catheterization care and excretion), and others (surgery wound, pressure ulcer, congestive ulcer, suction care, diabetic foot care, cancer pain care, wound care, bedsore care, machine monitoring). This process led to the deletion of the 'respiratory disturbance' component. Two items (living alone, living environment) were deleted and four items were modified. This resulted in 19 components and 50 items, which were then sent out for a third round to get final consensus. By the end of the third round of Delphi analysis, the modifications made aimed to simplify or clarify the instrument and were generally minor in nature. Anxiety and depression were combined as a negative mood, family function was renamed family support, and the society component was modified to include family support and social psychological isolation. As a result, there were 5 domains (Level I), 19 components (Level II), and 43 items (Level III).

Feasibility testing and additional content validation (Stage 2)

The feasibility of the SPHAI was tested by 316 home care nurses who were currently managing homebound clients under the aegis of the HCN, VCN, or HHC home health care programs. As shown in Table 3, all 43 assessment items of the SPHAI clearly depicted the characteristics of homebound clients who were being managed under the HCN, VCN, and HHC programs. Notably, the inter-rater reliability test also showed high correlation values (0.86~0.99).

Discussion

Korea is facing a rapid increase in the proportion of people who are aged 65 years and over. However, unlike developed countries, Korea lacks a stable financial structure or a health care system that is sufficient for managing this demographic change. Consequently, the development of a national policy that efficiently allocates and manages the available financial resources for health care has become an urgent priority. This study developed the SPHAI, which can serve as a primary level of health assessment tool that enables full identification of all of the health problems of individual homebound client sand the type(s) of home health care they need. After undergoing initial construction, a three-round Delphi analysis, and feasibility testing, the SPHAI instrument consists of 5domains, 19 components, and 43 items. These indicators can provide high-quality information regarding the performance of particular home health programs and the effects of the region on their performance. However, to improve the quality of home health service, it is also necessary to successfully communicate the findings of tools such as the SPHAI to the appropriate target audience, after which evidence-based decisions can be made. Thereafter, the effectiveness of tools like SPHAI will depend on the identification of effective solutions and the resources needed to implement those solutions. Nevertheless, the SPHAI is likely to be highly suitable for the first step of this quality-control process since it is a need-based health assessment tool that was developed with the actual home health care circumstances in Korea in mind.

The needs-based assessment method [17-19] is particularly appropriate when the health care needs of a wide variety of homebound clients must be met. In Korea, these clients range from the HHC clients of public health centers, who are mainly healthy, to the hospital-based HCN clients, most of who have been in hospital for a brief period of time before being discharged. When the SPHAI tool is compared to that of JVNF [9], it lacks items that allow abuse of the elderly patient to be noted; however, this can be compensated by the presence of items such as anxiety, alcoholism, and heart-lung condition. There are also segmented differences were shown in items such as:(a) nutrition and food-digestive function, nutrition condition, weight change, eating habit and moist condition (b) excretion-excretion condition, urination condition (c) health care and self nursing-smoking, drinking, exercise and physical activity (d) medication management-medication, adaption degree. In addition, analysis of the assessment items of the MDS-HC RA, [13,20,27], on which the JVNF tool is based, revealed that it does not contain any assessment items regarding emotional condition, psychiatric medication, the use of anti-psychiatric drugs, social psychological wellbeing, social function, pressure ulcer, condition of the skin and foot, and elderly abuse, although there are items such as interpersonal relationship, infection symptoms and syndrome, and pyrexia.

In the process of conducting the present study, the author discovered why Japan still lacks a nation-wide standard assessment instrument/service evaluation tool despite establishing a visiting nursing service 30 years earlier than Korea; Although many individual attempts have been made to develop tools to assess the health problems of clients of visiting nursing services, none have been designed to be used at the national level for the wide array of home care services that exist currently [10,28]. This has made it difficult to control the quality of home health care and to evaluate the efficacy of the various services that provide it. This is also a problem in Korea, which, despite having established hospital-based home care nursing a decade ago, is still not able to properly evaluate the efficacy and quality of these services. In contrast, America has approached this issue from a rational cost-management perspective: sufficient funds were provided for research that has since led to the development of Outcome and Assessment Information Set II (OASISII), which effectively manages the home health agencies and evaluates the quality of their services [7,29]. We strongly recommend that Korea and Japan adopt a similar strategy. To promote this objective in Korea, the present study was performed; in this study, preeminent home health care advisors were brought together to develop a health assessment instrument based on items identified from previous domestic and international studies, after which the validity and reliability of each item were, tested [30]. This instrument can now be applied in the practical field under governmental supervision; this will no doubt lead to further fine-tuning of this instrument that will make it invaluable for standardizing and improving the quality of home health care services at the national level in Korea. In conclusion, the SPHAI tool can be used by home health service agencies to assess the health problems and nursing care needs of all home-based clients. This information can then be used to identify which of the existing home health care services are most appropriate for individual clients, to develop guidelines for evidence-based care, and to improve the quality of care. However, the present study should be regarded as an

Standardized primary health assessment instrument			Cronbach's coefficient			
Domain	Component	Item (number of specific assessment criteria)	HCN (102)	VCN (116)	HHC (98)	Total (316)
Function/ Physiology	Sensory	1. Vision (5)*	.95	.97	.94	.96
		2. Hearing (7)**	.93	.94	.95	.94
		3. Pain (6)***	.94	.93	.92	.93
	Activity	4. Activities of Daily Living (ADL) (13/6)	.97	.98	.99	.98
		5. Functional activities of daily living (IADL) (10/6)	.99	.99	.99	.99
	Nutrition	6. Digestive function (5)	.92	.90	.91	.91
		7. Dehydration (7)	.96	.96	.96	.96
		8. Weight change (3)	.92	.93	.91	.92
	Oral	9. Dental condition (6)	.97	.93	.97	.95
		10. Oral hygiene (5)	.93	.95	.97	.95
	Excretion	11. Excretion control (3)	.98	.99	.99	.99
		12. Urination control (6)	.93	.92	.98	.95
	Skin	13. Skin cleanness (5)	.94	.91	.99	.94
		14. Bedsore (5)	.96	.94	.99	.98
	Circulation	15. Circulation disorder (6)	.88	.90	.89	.89
		16. Edema (5)`	.86	.89	.87	.88
	Infection	17. Fever or flare (7)	.97	.97	.97	.97
		18. Signs and symptoms of infection (7)	.96	.96	.96	.96
	Need for special treatment	19. Respiration care (6)	.90	.94	.92	.92
		20. Special nutrition (4)	.99	.95	.91	.96
		21. Excretion (5)	.97	.96	.99	.98
		22. Others (e.g., machine monitoring) (7)	.99	.97	.98	.98
Health behavior	Healthy lifestyle	23. Smoking (3)	.94	.89	.99	.93
		24. Drinking (5)	.93	.94	.92	.93
		25. Exercise/ physical activity (5)	.92	.93	.94	.94
		26. Eating behavior (6)	.97	.91	.96	.95
		27. Sleep pattern (6)	.90	.90	.87	.89
	Medicine	28. Management (2)	.92	.84	.88	.88
		29. Compliance (3)	.97	.97	.94	.96
Cognition/ Mental	Language	30. Difficulty in Communication (5)	.94	.94	.94	.94
	Psychological emotion	31. Anxiety/depression (8)	.99	.99	.99	.99
		32. Life desire (feeling of loss)(5)	.94	.91	.95	.93
	Problematic behavior	33. Abnormal behavior (14)	.99	.98	.98	.98
		34. Alcoholism (5)	.94	.93	.96	.94
	Cognition	35. Delirium (6)	.97	.95	.95	.96
		36. Cognitive function (5)	.96	.96	.96	.96
Family /Society	Interchange	37. Interpersonal relationship (6)	.92	.94	.90	.92
	Support	38. Family support (3)	.93	.93	.93	.93
		39. Health care service (3)	.90	.95	.94	.93
		40. Social welfare service (3)	.89	.82	.86	.86
Environ-ment	Safety	41. Risk of fall (3)	.90	.95	.93	.93
		42. Risk factor (12)	.94	.96	.95	.95
	Living environment	43. Home environment (7)	.93	.95	.99	.96

Abbreviations: HCN (home care nursing), VCN (visiting care nursing), and HHC (home health care).
*, **, and *** show examples of how each item is measured. *Vision (5) means that the item 'vision' has a five-point scale: patients are scored as 1 (normal, i.e., no problems with reading), 2 (has difficulty reading small letters but can read big letters), 3 (has difficulty reading letters but can distinguish movement), 4 (unable to distinguish shades, colors, or shapes), and 5 (others). **Hearing (7) means that the item 'hearing' has a seven-point scale: 1 (normal, i.e., has no problem hearing), 2 (needs a hearing aid), 3 (can hear loud sounds with difficulty), 4 (can hear a voice spoken loudly close to the ear), 5 (has difficulty hearing loud sounds), 6 (lacks auditory capacity, including severe impairment), and 7 (others). ***Pain (6) means that the item 'pain' has a six-point scale: 1 (none, i.e., no pain), 2 (pain step 1, namely slight pain with little numbness), 3 (pain step 2, namely pain with numbness, i.e., normal pain), 4 (pain step 3, namely unbearable pain, i.e., severe pain), 5 (pain step 4, namely cancer pain, i.e., very severe pain), and 6 (failure to recognize the pain).

Table 3: The content validity of the SPHAI items, as determined by inter-rater reliability testing of home nurses operating in the HCN, VCN, and HHC program.

exploratory study; the feasibility of SPHAI should be tested by multiple empirical studies performed at the nation-wide home health care agency level.

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