

Usage Patterns of Nursing Diagnoses among Student Nurses in Psychiatric Unit: Relation with NANDA and SNOMED CT

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Purpose: The aim of this study was to explore how nursing diagnoses are made by undergraduate students of psychiatric unit in Korea. **Methods:** Data were collected from case reports and analyzed based on NANDA (North American Nursing Diagnosis Association) nursing diagnoses and Systematized Nomenclature of Medicine-Clinical Terms (SNOMED CT) as reference terminology. **Results:** The 30 different nursing diagnoses from 135 distinct nursing diagnosis statements were assessed after removing repetition of case studies from a total of 1,140 statements of nursing diagnoses. The most frequently used NANDA diagnosis was "ineffective coping". The thirty nursing diagnoses were grouped under 10 out of the 13 NANDA domains. In addition, 98 related factors were classified into SNOMED CT hierarchies of Clinical Finding, Procedure, and Observable Entity. The content validity index for the mapping of nursing diagnoses was 0.97, indicating a relatively strong agreement. **Conclusion:** These results can help students to improve their knowledge and better formulate appropriate diagnoses. Using standardized terminology would improve competency of education and help to ratify the steps of the nursing process, especially nursing planning. Educational strategies that enhance diagnostic accuracy are recommended.

Key Words: Psychiatric nursing, Nursing diagnoses, Systematized Nomenclature of Medicine

INTRODUCTION

1. Background

Undergraduate students of psychiatric mental health nursing need to balance practical knowledge, academic excellence, and the critical thinking needed for making a nursing diagnosis [1]. In clinical practice, undergraduate students learn to execute the nursing process through diverse settings the nursing process has been identified as a scientific methodology for delivering nursing care [1,2]. Undergraduate students need to practice using critical thinking skills for making nursing diagnoses.

The health care system in Korea has recently switched

from a paper-based system to an electronic medical record (EMR) system, due to the development of technology[1,3]. Therefore, nursing educators require educational strategies that deal with the process of making nursing diagnoses. Research also is needed to examine the application of standardized nursing terminologies in appropriate nursing diagnoses[4-6].

The nursing process forms the basis of nursing research and theory development, and guides patient-centered care. Making appropriate decisions after identifying the nursing diagnosis is the first step in an optimal nursing process, leading to apt interventions and thereby effective nursing outcomes[7,8]. The nursing process is a systematic and individualized means to achieve favorable outcomes during care under students. The nurs-

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ing process respects the individual's autonomy to make decisions and be involved in nursing care. However, nursing students need to be trained to formulate the correct nursing diagnosis. Formulating the correct nursing diagnosis is a critical step in the nursing process. Nursing diagnosis is a key element as a thorough professional job needs focus on independent nursing actions. Nursing students struggle to articulate suitably when they choose nursing diagnoses for their patients because they need to utilize the nursing process to conduct scientific nursing care. Therefore, training to make the proper diagnosis in a variety of situations is needed.

According to the NANDA-Internationals definition, nursing diagnosis is a clinical judgment about human responses to actual or potential health problems in a statement made by the nurses [9]. Systematized Nomenclature of Medicine-Clinical Terms (SNOMED CT) also provides clinical data across specialties and sites of care [10]. Although the importance of nursing terminologies is emphasized, undergraduate students in Korea still have difficulty using appropriate terminology. To improve the use of standardized nursing terminology, research needs to analyze the use of terminology in nursing diagnoses with other electronic health records in clinical practice and its relationship with NANDA nursing diagnoses and SNOMED CT related factors.

There has been a lack of research on nursing diagnoses used by undergraduate students in Korea. Moreover, there have been few studies on nursing diagnoses in psychiatric mental health nursing courses. The nursing student recognizes the need for flexibilities, adaptability, responsiveness, and sensitivity to the dynamically changing needs of clients over the course of their continuing practice and experience. Nursing faculty needs to further their education in the field of nursing diagno-

sis so that students can become good nurses. Therefore, this study focuses on patterns of nursing diagnoses made by students in a psychiatric unit in Korea to provide basic data for efficient clinical teaching.

2. Aim

The aim of this study was to analyze the patterns of nursing diagnoses made by undergraduate students while describing patient response during a psychiatric mental health nursing course in Korea. The NANDA nursing diagnoses and SNOMED CT problem list were used to obtain reference terminologies to analyze the relationship between nursing diagnoses and reference terminologies. By identifying problems faced by students during decision-making regarding nursing diagnosis, this study would ultimately provide a basic database to improve clinical teaching.

METHODS

1. Study Design

This was a retrospective study analyzing and comparing the nursing diagnoses made by undergraduate students during a psychiatric mental health nursing course with the NANDA nursing diagnoses and SNOMED CT clinical problem list (Figure 1).

2. Sample

The nursing diagnosis statements in the case reports made by undergraduate students who completed three-week practicums in a psychiatric unit at a general hospital, between 2010 and 2012 constituted the sample. A

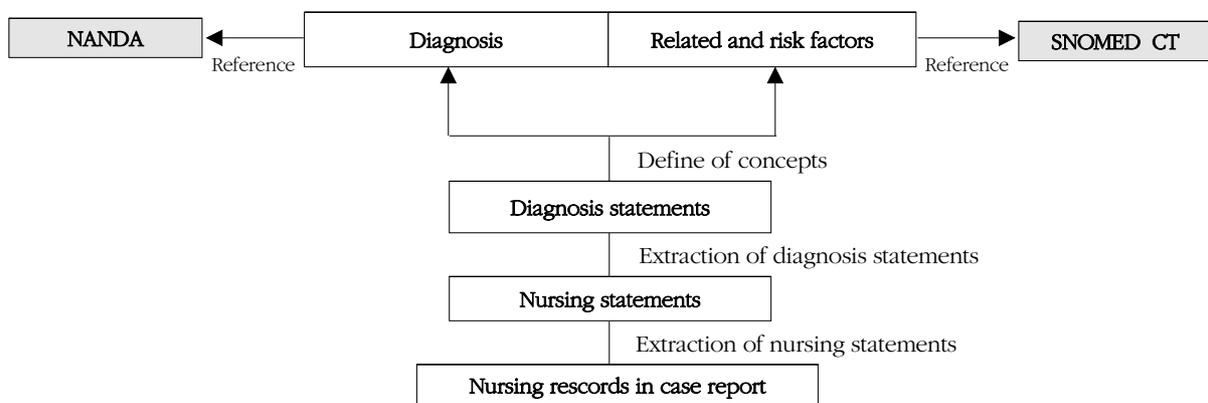


Figure 1. Research design.

total of 390 nursing diagnoses were collected from the psychiatric ward and used for the study. This study was approved by the institutional review board of the hospital for ethical considerations (No. ***2013). Written informed consent was obtained from the students who agreed to the use of case reports written by them for research.

3. Instruments

1) NANDA human response patterns (Taxonomy II)

A nursing diagnosis is used to determine an appropriate plan of care in a patient. The nursing diagnosis also provides standard nomenclature for the electronic health record, enabling clear communication among members of the healthcare team for continuous improvement of patient care. The NANDA nursing diagnoses includes 217 diagnoses, divided into 13 domains and 47 classes[8]. Undergraduate students determine nursing diagnoses using unique classificatory methods to categorize nursing information examining these characteristics or properties helps to determine individual nursing diagnoses. To collect and categorize the data, we utilized the NANDA taxonomy II, which consists of 13 domains under health promotion, nutrition, elimination/exchange, activity/rest, perception/cognition, self-perception, role relationship, sexuality, coping/stress tolerance, life principles, safety/protection, comfort, and growth/development[8].

2) SNOMED CT (Systematized Nomenclature of Medicine-Clinical Terms)

SNOMED CT is a system of clinical terminologies distributed by the International Health Terminology Standards Development Organization (IHTSDO). It is the most comprehensive, multilingual medical health care terminology system used for clinical documentation. It provides information required for decision-making and consistent reporting[11,12]. As an accompanying mapping tool, the CliniClue browser is provided to all SNOMED CT users. The CliniClue browser is a freeware set of terminology tools through which one can identify concepts, view descriptions, and explore relationships easily.

The mapping criteria for related factors in nursing diagnoses and SNOMED CT are based on the SNOMED CT Starter Guide[13] published by the College of American Pathologists (CAP). We limited the mapping of terms and hierarchies of SNOMED CT to "clinical findings" "procedures" and "observable entity" The "clinical finding" hierarchy is composed of concepts representing the re-

sults of clinical observation, assessment, and judgment; the "procedure" hierarchy represents nursing activities that the nurse has performed while providing health care; the contents of the "observable entity" hierarchy represent questions or assessments that can produce a direct result [13]. The mapping methods are classified as pre-coordination, post-coordination, mapping to the broader concept, mapping to the narrower concept, and non-mapping. Pre-coordinated indicates that a single SNOMED CT concept was used to represent clinical data post-coordinated contained more than one SNOMED CT concept. The CliniClue browser used in this study was the edition released on August 27, 2012[3,12].

4. Data Collection

The nursing diagnosis statements were collected from undergraduate students from January 2010 to December 2012. Participant undergraduate students were instructed to submit their case reports after their clinical practicum in the psychiatric unit. The nursing diagnoses mentioned in the case reports were analyzed for their relationship with NANDA nursing diagnoses and SNOMED CT related factors.

5. Data Analysis

IBM SPSS/WIN 19.0 was used for the data analyses. Descriptive statistics were calculated for the sociodemographic characteristics of the undergraduate students and the frequency of nursing diagnoses. The material for this study was obtained from 1,140 diagnosis statements from case studies. After removing duplicates, statements about the same patients' diagnosis, we extracted 135 nursing diagnosis statements consisting of the nursing problems of the patients.

We divided the 135 nursing diagnosis statements into diagnoses and related factors after removing repetitions and making modifications for mapping. We then mapped the nursing diagnoses to the NANDA, and the related factors to SNOMED CT. In order to increase the objectivity of the mapping results, two advanced psychiatry nurses and one professor of psychiatry nursing reviewed the results of the mapping. In case of disagreement, we discussed the categorization until a consensus was established.

The 135 nursing diagnosis statements were standardized according to the 30 NANDA nursing diagnoses. We mapped 118 related factor phases onto 98 SNOMED CT concepts based on their conceptual similarity. Finally,

the lists of 30 nursing diagnoses were categorized into domains based on their conceptual similarity and matched with similar related factors from SNOMED CT to analyze the relationship between them. Each diagnosis was associated with its numeric code.

6. Content Validity Test for Mapping

All samples were used while computing the content validity[14] of the mapping of nursing diagnoses. Data were verified by two experts who have been involved in terminology research for more than five years. Two nurses had doctoral degrees in nursing and over ten years of clinical experience in psychiatric nursing. We used the content validity index (CVI) to examine the level of agreement between the experts. To compute the CVI for the mapping of nursing diagnoses, we used a 4-point scale to evaluate the mapping results (1=do not agree, 2=needs modification, 3=agree, but needs some modification, 4=strongly agree).

RESULTS

1. Number of Nursing Diagnoses in Case Reports

All case reports had at least two nursing diagnoses recorded during the practicum. There were 1,140 nursing diagnosis statements from 390 case study reports. The average number of nursing diagnosis statements per case report was 2.92. The majority of the case reports had 2 nursing diagnosis statements, and 7.7% of case reports had 3 statements. As the students underwent group practicums in the same time period, there were duplicates of the same patients' diagnosis statements. After the removal of these duplicates, there were only 135 distinct nursing diagnosis statements.

A majority of the participating 366 undergraduate students was female only 24 students were male. The average age of the students was 23.8 years. They had completed a course on nursing processes in their curriculum, and three-week clinical practice placements in the psychiatry unit during their third and fourth years in the university. After their clinical practice in the psychiatric nursing unit, all undergraduate students had to submit an interim case report. They received feedback on this interim report from a clinical practice instructor, following which they submitted the final revised case report. While learning to apply the nursing process, students used a textbook on psychiatric mental health nursing and reference books in relation to nursing diagnosis. If there was a

nursing diagnosis that did not appear in the textbooks, the terms used in the nursing process were selected based on literature.

The patient characteristics recorded in the case reports are shown Table 1. The average age of the patients was 33.7 years. 52.6% were female, 35.5% had more than high school education, 71.1% were single or divorced, and 79.3% were diagnosed between the ages of 20 and 40 years. The majority 50.4% of patients were diagnosed with schizophrenia or other psychotic disorders, 17.8% with personality disorders, 11.1% with mood disorders, and 9.6% with anxiety disorder (Table 1).

2. Nursing Diagnoses most Frequently used by Undergraduate Students in Korea

135 nursing diagnosis statements were identified after removing duplications of the same patients' diagnosis during the same practicum period. The 30 most frequen-

Table 1. General Characteristics of Psychiatric Patients in the Case Studies (N=135)

Characteristics	Categories	n (%) or M±SD
Gender	Male	64 (47.4)
	Female	71 (52.6)
Age (year)		33.7±9.43
Educational level	≤ Elementary school	14 (10.4)
	≤ Middle school	21 (15.6)
	≤ High school	52 (38.5)
	≥ University	48 (35.5)
Marital status	Married	39 (28.9)
	Single	82 (60.7)
	Divorced	14 (10.4)
Diagnosis according to DSM-5	Schizophrenia and other psychotic disorders	68 (50.4)
	Mood disorders	15 (11.1)
	Anxiety disorders	13 (9.6)
	Somatoform disorders	6 (4.4)
	Eating disorders	9 (6.7)
	Personality disorders	24 (17.8)
Age at diagnosis (year)	< 20	28 (20.7)
	20~29	44 (32.6)
	30~39	56 (41.5)
	40~49	7 (5.2)
Family history	Yes	62 (45.9)
	No	73 (54.1)
Type of treatment	Hospitalization	135 (100.0)

tly selected diagnoses in these 135 statements are displayed in Table 2. Three nursing diagnoses most frequently selected by students were 'ineffective coping' (diagnosis code 00069, 18.5%), followed by 'impaired social interaction' (00052, 8.9%), and 'anxiety' (00146, 8.9%) (Table 2).

3. Distribution of Domains of Nursing Diagnoses according to NANDA Human Response

We mapped the 135 diagnosis statements selected by the students onto 30 NANDA nursing diagnoses. We then assigned a unique NANDA numeric code to each

nursing diagnosis. In one statement that did not absolutely correspond to the nursing diagnosis, we mapped the diagnosis using the conceptual meaning. Diagnoses belonging to 10 domains were selected by the undergraduate students. The 30 nursing diagnoses were distributed across only 10 NANDA domains: nutrition (domain code 2), elimination/exchange (3), activity/rest (4), perception/cognition (5), self-perception (6), role relationship (7), coping/stress tolerance (9), life principles (10), safety/protection (11), and comfort (12). The domains most frequently selected by students were coping/stress tolerance (28.8%), followed by activity/rest (12.5%), and self-perception (11.9%) (Table 2).

Table 2. Nursing Diagnoses Most Frequently used by Undergraduate Students (N=135)

Domain codes and labels	Nursing diagnoses codes and labels	n (%)	
2 Nutrition	00001 Imbalanced nutrition: more than body requirements	1 (0.7)	
	00002 Imbalanced nutrition: less than body requirements	3 (2.2)	
3 Elimination and exchange	00011 Constipation	1 (0.7)	
	00015 Risk for constipation	3 (2.2)	
4 Activity/rest	00095 Insomnia	1 (0.7)	
	00096 Sleep deprivation	11 (8.2)	
	00102 Feeding self-care deficit	1 (0.7)	
	00108 Bathing self-care deficit	4 (2.9)	
5 Perception/cognition	00126 Deficient knowledge	2 (1.5)	
	00128 Acute confusion (specify: visual, auditory, kinesthetic, gustatory, tactile)	6 (4.5)	
	00129 Chronic confusion	6 (4.5)	
6 Self-perception	00118 Disturbed body image	1 (0.7)	
	00119 Chronic low self-esteem	11 (8.2)	
	00121 Disturbed personal identity	2 (1.5)	
	00153 Risk for situational low self-esteem	2 (1.5)	
7 Role relationship	00052 Impaired social interaction	12 (8.9)	
	00063 Dysfunctional family processes	3 (2.2)	
9 Coping/stress tolerance	00069 Ineffective coping	25 (18.5)	
	00142 Rape-trauma syndrome	1 (0.7)	
	00146 Anxiety	12 (8.9)	
	00211 Risk for compromised resilience	1 (0.7)	
10 Life principles	00079 Noncompliance (specify)	6 (4.5)	
11 Safety/protection	00035 Risk for injury	1 (0.7)	
	00138 Risk for other-directed violence	2 (1.5)	
	00139 Risk for self-mutilation	2 (1.5)	
	00150 Risk for suicide	2 (1.5)	
	00151 Self-mutilation	1 (0.7)	
	00155 Risk for falls	2 (1.5)	
12 Comfort	00053 Social isolation	9 (6.7)	
	00214 Impaired comfort	1 (0.7)	
Total	10	30	135 (100.0)

4. Distribution of related factors according to SNOMED CT

We mapped 118 related factor phrases selected by the students onto SNOMED CT concepts through the pre-coordination method using the CliniClue browser. Then we assigned a unique SNOMED CT Concept ID to each concept as a concept identifier. As a result of the mapping, 98 related factors were classified into SNOMED CT hierarchies. The most frequently mapped hierarchies were Clinical Findings (89 concepts, 90.8%), followed by Procedures (6 concepts, 6.1%), and Observable entities (3 concepts, 3.1%) (Table 3).

5. The Relation between NANDA Nursing Diagnoses and Similar related Factors of SNOMED CT

The NANDA nursing diagnoses and SNOMED CT were related through similar concepts. Risk for self-mutilation and self-mutilation matched with 57 similar related factors this was the largest matched number. Anxiety matched with 56 similar related factors. However, rape-trauma syndrome had only two similar related factors from SNOMED CT namely, 'victim of abusive sexual relationship' of "clinical finding" hierarchy and 'therapy' of "procedure" hierarchy representing nursing activities. This study found that each nursing diagnosis could be matched to possible related factors of SNOMED CT (Table 4).

6. Content Validity for Mapping

On the 4-point Likert scale, the average score by two experts were 3.82 and 3.72 points, respectively. Out of the total of 253 concepts, 7 were rated at 1 or 2 points while 246 were rated at 3 or 4 points by the experts. The content validity analyses of the nursing diagnoses mapping procedure showed a CVI ratio of 0.97, reflecting a relatively strongly agreement CVIs of 0.80 or higher is generally considered acceptable [14].

DISCUSSION

This study was conducted to analyze the relationship between the nursing diagnoses made by undergraduate students in a psychiatric ward and the NANDA nursing diagnoses and to compare it with SNOMED CT to obtain basic data to improve clinical teaching.

On testing the content validity of the analysis process, we identified some descriptive errors that students had

made in their nursing diagnoses. They selected inappropriate nursing diagnoses in the following situations: 1) replacing a problem with a related factor (a lack of awareness about hygiene related to (r/t) a dressing self-care deficit), 2) restating a patient response (anxiety related to (r/t) continuous uneasy feelings), 3) making statements based on prejudice, value judgments, or personal opinions (impaired social interaction related to (r/t) habitual lateness to meetings), 4) stating nurses' negligence or mistakes as a related factor (improper positioning related to (r/t) risk for impaired skin integrity), 5) stating patients' needs related to (r/t) problems (nutrient supplementation related to (r/t) inadequate dietary intake), 6) interpreting appropriate or culturally acceptable issues as unhealthy problems (stress overload related to (r/t) academic stress), 7) stating medical diagnoses related to (r/t) patient responses (hormone therapy related to dwarfism), 8) stating nursing procedures (caring for personal hygiene related to (r/t) poor hygiene), 9) stating nursing problems related to (r/t) patient problems (communication difficulties instead of hallucinations), and 10) making ambiguous statements. These findings are similar to a previously reported description of errors made by nurses [3]. Undergraduate students often use inaccurate nursing diagnoses containing unstandardized nursing terminology that is used throughout clinical practice, in addition to inaccurate or incomplete assessments. In order to avoid these errors, it is essential to use standardized terminology, such as the NANDA nursing diagnoses and SNOMED CT in nursing education as well as clinical practice. The use of standardized nursing terminologies would improve the accuracy of nursing diagnoses, and thereby the selection of appropriate nursing interventions, thus minimizing errors and contradictions in nursing data. There is also a need to ensure accuracy of nursing diagnoses by correlating them with the defining characteristics or related factors of the NANDA nursing diagnoses. Nurses need to practice the process of critical thinking for problem solving in order to make accurate nursing diagnoses that would enable them to address a patient's health problem independently [15].

In this study, we identified 30 nursing diagnoses that students had made in a psychiatric unit. The three most frequently used NANDA nursing diagnoses were ineffective coping, impaired social interaction, and anxiety. "Ineffective coping" took up the highest proportion of 18.5%, followed by "impaired social interaction" (8.9%), and "anxiety" (8.9%).

A comparison with previous studies shows differences

Table 3. List of related Factors according to the SNOMED CT Hierarchy

(N=98)

Factors		List			
Clinical finding (n=89)	1 Abnormal gait	24 Abnormal mental state	46 Abnormal thinking	68 Alteration in family processes	
	2 Anxiety	25 Anxiety state	47 Autistic thinking	69 Bullying	
	3 Child abuse	26 Cognitive impairment	48 Coping stress tolerance finding	70 Crisis	
	4 Decreased self-esteem	27 Decreased stress tolerance	49 Deficient knowledge of disease process	71 Delusions	
	5 Denial-mental defense mechanism	28 Depression	50 Difficulty communicating	72 Difficulty controlling anger	
	6 Difficulty controlling emotions	29 Difficulty maintaining relationships	51 Difficulty maintaining standard of personal hygiene	73 Difficulty using self-expression	
	7 Dissatisfaction with body image	30 Disturbance in physical behavior	52 Disturbance in role performance	74 Disturbed body image	
	8 Disease	31 Disturbed sensory perception	53 Disturbed thought processes	75 Drug compliance poor	
	9 Drug side effects checked	32 Emotional problem	54 Excessive self-criticism	76 Family disruption with separation	
	10 Fatigue	33 Feeling of loss of feeling	55 General health deterioration	77 Guilt feelings	
	11 Hallucinations	34 Hostility	56 Impaired social interaction	78 Impulse control disorder	
	12 Inadequate food diet	35 Inadequate interpersonal communication skills	57 Inadequate social support	79 Inappropriate affect	
	13 Ineffective family coping	36 Information status	58 Lack of insight	80 Lack of physical activity	
	14 Lack of self-esteem	37 Lacks confidence	59 Lacks emotional support	81 Lives in hospital	
	15 Loneliness	38 Loss of motivation	60 Memory impairment	82 Memory loss	
	16 Mental disorder	39 Negative automatic thoughts	61 Neglectful parenting	83 Neurological injury	
	17 Obsessive compulsive disorder	40 Perception disturbance	62 Poor family relationship	84 Poor family relationship	
	18 Powerlessness	41 Prognosis uncertain	63 Psychotic symptom present	85 PTSD-post-traumatic stress disorder	
	19 Relocation stress syndrome	42 Repetition failure	64 Resistance to changes in environment	86 Self-depreciation	
	20 Separation anxiety	43 Skin disease	65 Social isolation	87 Social isolation (rejection)	
	21 Social maladjustment	44 Support system deficit	66 Traumatic brain injury	88 Unable to control emotions	
	22 Unable to plan	45 Unbalanced diet	67 Unstable self-image	89 Very low level of personal hygiene	
	23 Victim of abusive sexual relationship				
Procedure (n=6)	90 Administration of medication	91 Admission to hospital	92 Changing bed linen	93 Hospital re-admission	
	94 Therapy	95 Vulnerable family support			
Observable entity (n=3)	96 Diabetes self-management	97 Drug therapy discontinued	98 Family health status		

Table 4. The Relation between NANDA Nursing Diagnoses and Similar related Factors of SNOMED CT

Domain codes and labels	NANDA Nursing diagnoses codes and labels	Matched possible related factors of SNOMED CT*	Total
2 Nutrition	00001 · Imbalanced nutrition: more than body requirements	45, 67, 74, 94	4
	00002 · Imbalanced nutrition: less than body requirements	7, 12, 45, 67, 74, 94	6
3 Elimination and exchange	00011 · Constipation	6, 9, 19, 24, 27, 28, 45, 64, 80, 90, 94	11
	00015 · Risk for constipation	6, 9, 19, 24, 27, 28, 45, 64, 80, 90, 94	11
4 Activity/rest	00095 · Insomnia	2, 9, 19, 20, 22, 25, 28, 90, 92, 94	10
	00096 · Sleep deprivation	8, 9, 19, 51, 82, 90, 92, 94	8
	00102 · Feeding self-care deficit	2, 10, 18, 19, 25, 26, 30, 31, 38, 80, 94, 95, 98	13
	00108 · Bathing self-care deficit	26, 38, 51, 74, 94, 95, 98	7
5 Perception/cognition	00126 · Deficient knowledge	36, 44, 49, 50, 53, 58, 60, 65, 82, 94	10
	00128 · Acute confusion	9, 11, 24, 31, 53, 55, 60, 63, 82, 83, 90, 94	12
	00129 · Chronic confusion	8, 16, 24, 60, 63, 66, 82, 83, 94	9
6 Self-perception	00118 · Disturbed body image	8, 21, 26, 55, 74, 94	6
	00119 · Chronic low self-esteem	4, 6, 14, 16, 21, 24, 27, 29, 32, 35, 37, 44, 56, 57, 59, 62, 65, 84, 86, 88, 94	21
	00121 · Disturbed personal identity	4, 8, 9, 13, 14, 16, 21, 23, 24, 27, 32, 37, 42, 52, 63, 64, 68, 75, 76, 84, 86, 90, 94	23
	00153 · Risk for situational low self-esteem	3, 4, 8, 19, 23, 37, 42, 64, 74, 84, 94	11
7 Role relationship	00052 · Impaired social interaction	1, 14, 21, 29, 35, 46, 50, 53, 54, 56, 65, 87, 94	13
	00060 · Interrupted family processes	3, 13, 23, 29, 61, 62, 68, 76, 84, 94	10
9 Coping/stress tolerance	00069 · Ineffective coping	3, 13, 14, 18, 21, 22, 23, 27, 29, 35, 36, 37, 38, 41, 44, 48, 49, 50, 52, 57, 62, 65, 94	25
	00142 · Rape-trauma syndrome	23, 94	2
	00146 · Anxiety	2, 3, 6, 8, 9, 13, 14, 15, 19, 20, 22, 23, 24, 25, 27, 29, 32, 34, 35, 36, 37, 39, 42, 44, 46, 48, 49, 50, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 76, 79, 84, 85, 87, 88, 90, 94, 95, 98	56
	00211 · Risk for compromised resilience	3, 8, 23, 42, 55, 70, 76, 79, 85, 94, 95, 98	12
10 Life principles	00079 · Noncompliance (specify)	4, 6, 14, 18, 22, 24, 29, 32, 34, 37, 38, 39, 41, 42, 44, 50, 52, 58, 59, 67, 73, 86, 94, 95, 98	25
11 Safety/protection	00035 · Risk for injury	8, 9, 12, 31, 45, 55, 90, 94, 95, 96, 98	11
	00138 · Risk for other-directed violence	3, 6, 8, 23, 39, 40, 72, 78, 83, 85, 94	11
	00139 · Risk for self-mutilation	2, 3, 4, 6, 7, 11, 12, 14, 16, 19, 20, 21, 23, 24, 25, 27, 28, 31, 32, 33, 34, 37, 39, 44, 45, 46, 47, 50, 52, 53, 54, 56, 57, 59, 62, 63, 64, 65, 66, 67, 69, 70, 71, 72, 73, 74, 76, 78, 79, 85, 86, 87, 88, 89, 93, 95, 98	57
	00150 · Risk for suicide	2, 3, 4, 5, 7, 11, 13, 14, 15, 16, 18, 21, 23, 24, 25, 27, 28, 32, 34, 37, 39, 41, 42, 44, 46, 47, 52, 54, 56, 57, 59, 62, 63, 65, 66, 67, 69, 70, 71, 72, 73, 77, 78, 79, 85, 86, 87, 88, 91, 93, 95, 98	52
	00151 · Self-mutilation	2, 3, 4, 6, 7, 11, 12, 14, 16, 19, 20, 21, 23, 24, 25, 27, 28, 31, 32, 33, 34, 37, 39, 44, 45, 46, 47, 50, 52, 53, 54, 56, 57, 59, 62, 63, 64, 65, 66, 67, 69, 70, 71, 72, 73, 74, 76, 78, 79, 85, 86, 87, 88, 89, 93, 95, 98	57
	00155 · Risk for falls	1, 8, 13, 24, 55, 61, 80, 81, 91, 93, 94	11
12 Comfort	00053 · Social isolation	8, 15, 16, 21, 24, 29, 35, 44, 46, 47, 50, 51, 56, 57, 65, 89, 94, 95, 98	19
	00214 · Impaired comfort	8, 9, 44, 57, 59, 90, 94, 95, 98	9

* The numeric code of related factors of SNOMED CT as per Table 3.

in the prioritization of nursing diagnoses. In a study of schizophrenic patients [14], the most frequently used nursing diagnoses by students were "ineffective coping" "disturbed thought processes" and "disturbed sensory perception" Ineffective coping refers to an inability to form a valid appraisal of the stress, inappropriate choice of practiced responses, or inability to use available resources. Impaired social interaction is described as insufficient or excessive quantity or ineffective quality of social exchange. Anxiety indicates a vague uneasy feeling or dread accompanied by an autonomic response [8,16]. In previous studies conducted in a psychiatry unit, diagnoses of "impaired social interaction" "low self-esteem" and "ineffective coping" were the most frequently used [17,18] with similar outcomes. In a study performed by Nursel and Neriman [19] in internal medicine and surgery clinics, risk for infection, acute pain and activity intolerance were the most used terminologies.

Among children and adolescents, the most frequent diagnoses were "ineffective coping" and "low self-esteem" In adults, "impaired social interaction" and "ineffective role performance" were the commonest. In elderly patients, "disturbed sleep pattern" was the most frequently reported. In family members, "risk for caregiver role strain" was the most prevalent [20]. These results possibly reflect the characteristics of the different nursing units. Each age group has different patterns of nursing diagnoses because of differing growth developmental tasks. The nursing diagnoses depended on specific characteristics and diversity related factors of the individual or group.

It was found that Korean undergraduate students used only 30 diagnoses within 10 domains. The 10 most frequently used NANDA domains were: nutrition, elimination/exchange, activity/rest, perception/cognition, self-perception, role relationship, coping/stress tolerance, life principles, safety/protection, and comfort. In this study, most diagnoses were in the domains of coping/stress tolerance, followed by activity/rest, self-perception, role relationship, and perception/cognition in that order.

Coping/stress tolerance domain had the highest number of diagnoses (28.8%), followed by activity/rest (12.5%), self-perception (11.9%), role relationship (11.1%), and perception/cognition (10.5%). Undergraduate students recognized that most problems of psychiatric inpatients were related to coping/stress tolerance. The domains of nutrition, elimination/exchange, and life principles were seldom used while the domains of health promotion, sexuality, and growth/development were not used at all. It is noteworthy that Korean undergraduate students tended to select psychosocial rather than physiological diagnoses,

focusing more on their patients' psychosocial needs. An additional reason could be that undergraduate students were too immature to discuss about deeper life principles, such as the spiritual needs and ethical dilemmas of their patients. They may also have had difficulties in conversing with patients about their sexuality. Students may also have felt that they were invading their patients' privacy, which could account for the minimal use of these diagnoses. Therefore, nursing educators need to emphasize more on these domains during classes.

According to this result of study, nursing students are restricted to a few nursing diagnoses which adversely affects the care they provide. Selection of nursing diagnoses by students through the problem solving process may also be limited. Nursing students appeared to not only use diverse diagnoses but also seemed to fluctuate while using new diagnoses. From the results of this study, it appears that certain diagnoses were difficult for students to make and hence rarely used.

We mapped 98 related factors selected by the undergraduate students on the SNOMED CT. We identified only 15 related factors that were included in the guidelines of the NANDA nursing diagnoses. NANDA diagnoses were deemed quite useful but problems seemed to occur when students attempted to decide on the related etiology part. Nurses presumably had difficulty using the defining characteristics of NANDA, as the related factors are presented only as text, without code, and are unstandardized. Hence, the representation of nursing records needs to be improved for both undergraduate students and nurses. Most nursing records are documented still in unstandardized language and text, because of the ease of use. However, using unstandardized language hinders the communication using medical records between healthcare team members in Korea.

To address these problems, we attempted to standardize data to ensure efficient searching and utilization in EMR systems by assigning unique numeric codes to each concept selected by the undergraduate students. With the increasing use of EMR systems and information technology in health care settings, standardized nursing terminology and encoded data are gaining importance. Related factors in this study were mapped onto the three SNOMED CT hierarchies of "clinical finding" "procedure" and "observable entity" using the pre-coordination method. Undergraduate students from the psychiatry unit who participated in our study, represented related factors properly. The appropriate use of concepts, synonyms, and relationships is not only a convenient and easy way to represent nursing diagnoses, and but is also an effective way to ex-

ercise the nursing process. Computer-based systems using standardized terminology enhance nursing care and help to share information across disciplines and diverse healthcare settings. Further studies should be planned for additionally defining relationships that are needed to define concepts within the nursing domain.

The results of this study could contribute to the actualization of optimal nursing education in the field of mental health. Nursing students should be trained in critical thinking and assessment in order to formulate a correct nursing diagnosis.

CONCLUSION

We identified 30 nursing diagnoses from NANDA diagnoses that were used by Korean undergraduate students in a psychiatric nursing course and analyzed its usage patterns. The results of this study can be used to develop educational and clinical teaching strategies for nursing educators this would help undergraduate students to improve the quality of care in hospital settings, and streamline the computerized health care systems in Korea.

Undergraduate students still face difficulties while formulating nursing diagnoses with related etiologies. The results of this study were based on a limited number of case reports submitted by undergraduate students. Further studies are needed to develop psychiatric nursing diagnosis lists depending on psychiatric diagnosis, type of nursing unit such as community or facility units and subjects addressed during regular nursing care. The findings of this study could help nursing educators to understand how undergraduate students make nursing diagnoses, and thus provide them with an advanced curriculum of nursing process containing teaching strategies to train them in using diverse nursing diagnoses during their clinical psychiatry practicums. Using and standardizing nursing language can facilitate optimal nursing care and cost-effectiveness in psychiatric mental health nursing.

While dealing with psychiatric patients, the nursing diagnosis can present unique challenges. This study could contribute to conducting more scientific nursing using various nursing diagnoses. Studies are needed to test how a students' ability to make a psychiatric diagnosis affects nursing care for psychiatric problems.

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