Development of Computer-based Nursing Process Documentation System Using NNN Linkage

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Abstract

A computer-based nursing process documentation system was developed through NNN Linkage to create standardized nursing care plans and nursing records.
The nursing care plan was developed by linking the nursing diagnosis, desired nursing outcome and suggested nursing intervention based on NNN linkage. The fetched sentences linked with each nursing activity supports nursing documentation.
The main point of the system development is to give a specific code to each nursing activity in Nursing Intervention Classification(NIC), to link an expressible recording sentence with each activity, and to try to link a related nursing cost with each activity.

Keywords:

Nursing Information System; Nursing Process Documentation System, NNN Linkage

Introduction

Whereby the practice of nursing is performed in a systemic manner, the nursing process is a deliberative activity. It consists of six phases: assessment of relevant information; definition of patient problems and resources; derivation of nursing goals(outcomes); planning of nursing actions; implementation and documentation of these actions; evaluation of nursing care and possibly redefinition of the care plan[1]. It is dynamic by focusing on the changing responses of the client during the ongoing process.

Throughout the nursing process, the nurse uses a comprehensive knowledge base to assess the client's health status, to make judicious judgments and diagnoses, to plan, implement, record and evaluate appropriate nursing care[7].

Nursing record should be involved to demonstrate this systematic approach to nursing care by providing an assessment of the patient's needs; identifying actual and potential problems; setting realistic goals; formulating an individual plan of care demonstrating a sound knowledge base and awareness of resources; identifying that this has been implemented; giving evidence of evaluation of care by a set date; indicating changes to the problems and plan in the light of the evaluation[2].

Despite the importance of the nursing process, several reasons such as knowledge deficit about nursing diagnosis, shortage of manpower, absence of unified recording forms, and deficit of validate knowledge base about each nursing diagnosis has interfered with the application of the nursing process in Korea.

To professionally and effectively implement the nursing process into nursing practice, it is necessary to develop a computer-based nursing process documentation system for standardized nursing care plans, one that includes nursing diagnosis, expected outcomes and nursing interventions. Namely, it is also necessary to standardize elements such as nursing diagnosis, nursing outcome and nursing intervention, to develop standardized nursing care plans through the linkages of elements.

The abovementioned system results in a more efficient care planning method by eliminating terminological difficulties and unnecessary documentation. In addition, by reusing the data for nursing administration and research and suggesting standardized nursing care plans using the NNN Linkage, a systematic nursing process can be applied to the nursing practice and the quality of nursing care is highly improved.

The main purpose of this paper is to present the development process for a computer-based nursing process documentation system that could create standardized nursing care plans and nursing records using NNN Linkage as a basis.

Methods

31 different wards were selected to develop and implement the computer-based-nursing process documentation system. The system development life cycle by Davis was used as the study methodology.

The process of development was as follows;
1) An expert group was organized to develop the computer based nursing process documentation system. The range of computerization was determined to support nursing care plan and nursing documentation for admitted patients, and to provide the statistical data of the nursing care plans.
2) The expert group analyzed the care planning process and nursing documentation process. The group also determined developmental principle, standard language, basic data. The expert group and the ward committee that composed of nurse supervisors, nurses and nurse managers collected and analyzed clinical data in 31 different wards.
3) Organization and arrangement of basic data, database construction, designing of the user interface system, code construction, program construction were accomplished.
4) A users manual that focuses on usage instructions, standardized nursing language and nursing process was then developed. After educating nurses in 10 different wards, the

system was used for 1 month as a trial basis. The system itself was then actually applied after checking the different problem points and after making corrections as needed. In Figure 1 shows the developing procedure of the system.

Results

Terminology standardization

We identified the nursing interventions, nursing outcomes, nursing diagnosis that can be applied to the wards by using the standardized nursing classification system: NANDA diagnosis[3], NOC outcome[4] and NIC intervention[5].

In the year 2001, the center for nursing classification in the university of IOWA college presented the NNN Linkages (linkage between NANDA diagnoses, NOC outcomes, and NIC interventions) based on linkage between previously presented NANDA diagnoses and NIC interventions, linkage between NOC outcomes and NANDA diagnoses, as well as linkage between NOC outcomes and NIC interventions[6].

development of care plans for each individual patient, since each diagnosis are related to the desired nursing outcomes and nursing interventions needed to achieve the desired outcome.

The ward committee first selected the most frequently used nursing diagnosis in each ward. By using the previously presented NNN Linkage as a basis, NOC nursing outcomes suitable to nursing diagnosis and NIC interventions needed to solve the problem were selected. The specific NOC indicators and NIC activities were then selected for each ward. The selected items included labels that were likely to be used in an acute care episode and each ward.

New items that could not be found in the standard classification system were also developed at this time. The nursing diagnoses which could not be found in the NANDA diagnoses were classified as 'nursing problems', and these nursing problems together with the NANDA diagnosis were named as 'FOCUS'.

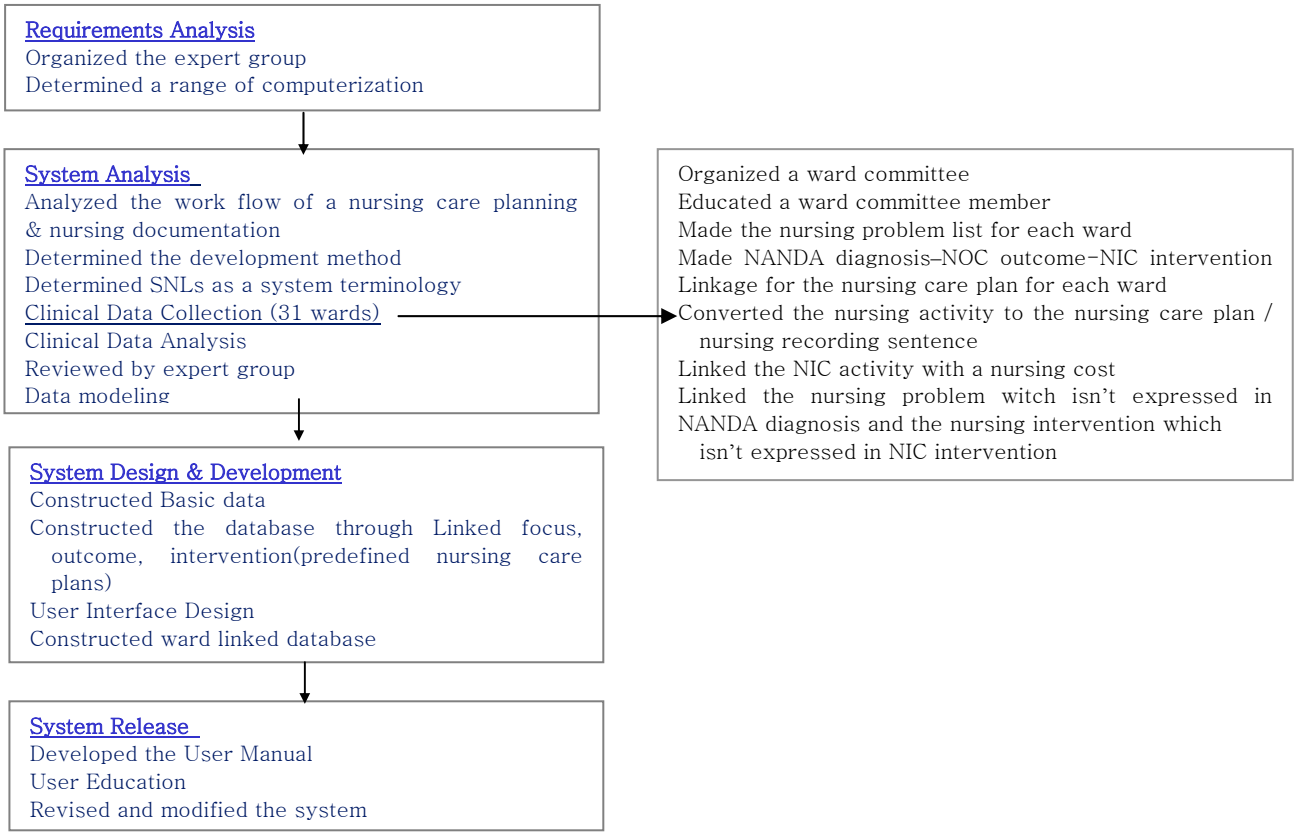

Figure 1- The development procedure of nursing process documentation system

The diagnosis can be thought of as a standardized term that represents the initial condition or present state of the patient and the outcomes as the desired or end state that results from nursing interventions. Thus, the desired outcome must be selected prior to the selection of nursing interventions, and considered it(desired outcome) and characteristics of diagnosis when selecting a nursing intervention[5].

The NANDA diagnosis is the entry point for the NNN Linkage. The NNN Linkages can be used for the

A total of 184 nursing focus was collected in 31 different wards, 77 were NANDA diagnoses, and 107 were nursing problems that could not be found in NANDA diagnosis. Nursing problems included those labels such as specific signs and symptoms of patients, invasive procedures, specific medications which tended to occur frequently while at the same time demanding nursing care. A total of 191 related factors collected in the main wards was analyzed using the related factors of nursing diagnosis mentioned in

the NANDA 2000 as a basis. There were a total of 73 NOC outcomes collected in 31 different wards, 3 were newly developed. Seventeen measurement scales were presented in NOC 2000 and one outcome measurement scale were newly developed. There were a total of 246 interventions, 173 were NIC interventions and 73 were newly developed. And there were a total of 443 focus-outcome-intervention linkages.

Visualization of the nursing effectiveness

The entry point of this system is to select the appropriate focus(nursing diagnosis or nursing problem) for each patient's condition from the Focus list of each ward. The system then displayed the desired nursing outcomes and associated interventions related to selected focus. Therefore the nurse can create a standardized and high quality nursing care plan by selecting the appropriate nursing outcome and specific nursing intervention, in the pre-defined nursing care plan.
The measurement of the NOC outcome was used to evaluate the quality of nursing care. The expected patient outcomes should be specified before an intervention is chosen. In this system, the defined goals were used as guideposts for the selection and evaluation of the nursing interventions.

This system allowed for the visualization of nursing effectiveness by comparing the difference of the NOC outcome average points, measured by using the 5 point rate(rating) scale before and after each nursing intervention.

When the nursing care plans were first created, the 5 point rating for the present condition of the expected nursing outcomes were done first. Repeated ratings were then done at set intervals, and final ratings were done at the end with the termination of the nursing diagnosis.

In addition, this system placed great emphasis on being able to easily add and terminate each nursing diagnosis, nursing outcome and nursing intervention, in order to be able to modify the nursing care plan depending on the patient' s condition. In Figure 2 shows the nursing process in this system.

Focus–Outcome-Intervention-Linkage database

First in order to build the database, the basic data such as focus(nursing diagnosis or nursing problems), related factors, outcome measurement scales, situational nursing record sentences, nursing outcomes, nursing interventions, list of link between nursing diagnosis and related factors, list of link between nursing diagnosis and outcomes, list of link between focus and nursing outcome and nursing intervention and nursing activity were constructed into oracle table by the programmer.

Second, A linkage program that could create the Focus-Outcome-Intervention linkage to be used in nursing process was developed. The Focus- Outcome-Intervention linkage database for entire hospital(pool of nursing process set) was built through linkage program. Then, nursing process set for each ward was built by selecting appropriate Focus-Outcome-Intervention linkages, the indicators for each outcome, activities for each intervention, and nursing record sentences in the pool. In Figure 3 shows the developing procedure of nursing process set.

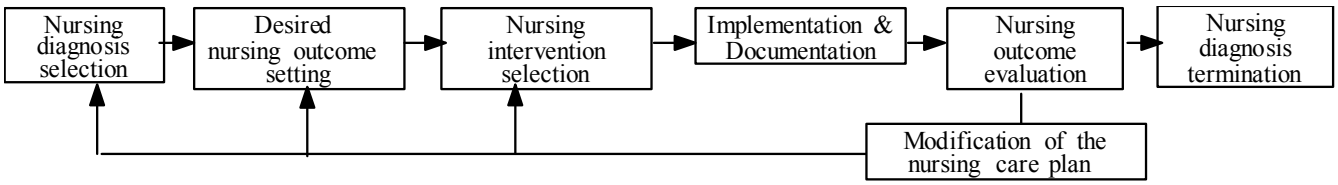

Figure 2 - The nursing process in this system

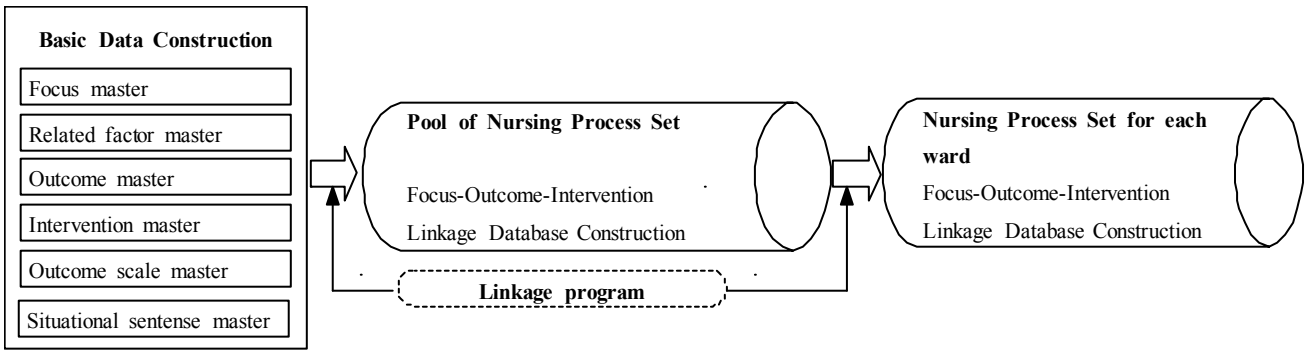

Figure 3 – The development procedure of nursing process set using linkage program

The expressible nursing record sentences according to each nursing activity were developed in order to keep the consistency in the nursing care plan and nursing record. These nursing sentences were classified into 3 categories: Data (D), Action (A) and Response (R). Nurses can record nursing documentation by selecting and editing the nursing record sentences linked to the nursing activities. The saved nursing record can be referred to according to the time, nursing diagnosis, or DAR code. Therefore, this system can

save repetitive nursing records, and also improve the quality of the nursing records.

We tried to link the nursing cost with the nursing activity. When activities that nurses performed are selected, a nursing cost automatically input to the nursing cost system.

Results of system implementation

We applied the nursing process documentation system to clinical setting (10 wards) for one month. The number of the focus used in nursing care plan was 82. Out of these 82 focuses, 40 focuses were nursing diagnosis, and 42 were nursing problem. The number of the outcome, intervention and FOI(Focus·Outcome·Intervention) linkage actually used in nursing care plan was 41, 122 and 159.

Conclusion

We developed a computer-based nursing process documentation system by using NNN Linkage. Nurse can create qualitative and individualized nursing care plan using ward nursing process set in this system.
Currently, expert advisors are giving feedbacks to each of the wards by monitoring the implementation of the system and by providing statistical data related to the nursing care plan and nursing record.
The nurses who have used this system have stated that it is difficult to rate the outcome since some of the outcomes were sometimes abstractive, and had little relation to the nursing diagnosis.
Therefore, in order to measure the effectiveness of nursing care, it is necessary to identify outcomes and indicators that are measurable, nursing-sensitive, and related to specific nursing diagnosis.

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