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Structuring Clinical Nursing Knowledge using PCAPS - Patient Condition Adaptive Path System

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Abstract. Quality assurance has become key concerns in healthcare and it is important to standardize the processes for healthcare properly. Though it was needed to describe process of healthcare diagnosis and treatment, it was very difficult by the reason of being service products including complexity and expertise. We challenged to visible, structurize, standardize and IT-systematize of clinical knowledge for healthcare quality management. The patient condition adaptive path system (PCAPS) was developed. PCAPS describes an overall flow of possible clinical pathways that a patient's disease state may trace and detailed medical judgment and treatments for each disease state. It suggests possibility of quality assurance using the standard plan of medical treatment process. PCAPS comprises two major tools: clinical process chart and unit sheet. These describe the total flow of treatment and the concrete medical treatments involved in each step. The PCAPS master is proposed. This is a glossary of the terms that are used in the unit sheet. Each master file has special structure for each work domain. In other words, PCAPS describes the standard process of healthcare using the clinical process chart, unit sheet, and PCAPS master. We apply nursing master file for nursing care action and observation offered by MEDIS-DC in Japan. Through we developed many PCAPS contents, we identified description of structured nursing knowledge. The nursing master file was brushed up by designing PCAPS content using it. It was suggested that PCAPS contents as standard clinical plan designed by medical specialist team included nursing knowledge.

Keywords: nursing knowledge, structurize, standardize, quality assurance, PCAPS

1 Introduction

Recently, quality assurance has become a necessity not only in industry but also in healthcare. In order to realize the aim of quality assurance in healthcare, it is necessary to implement some activities and studies for its standardization. One of the most important of these studies is the development of the clinical care pathway, which describes the plan of healthcare tasks according to the typical state of the patient as a result of a particular disease.

However, it has been revealed that previous studies, including that on the clinical care pathway, have one important drawback. Not all patients with the same disease are in the same state and there are not necessarily a lot of numbers of patients that are in the typical state of the disease. Further, patients' states can constantly and quickly undergo changes. The existent clinical care pathways do not have adequate functions that standardize healthcare tasks depending on different patient states; therefore, these care pathways cannot detail plans of healthcare tasks for patients that have atypical states. Hence, there is currently a strong awareness about the realization of quality assurance in healthcare in consideration of various patients' states.

PCAPS: Patient condition adaptive path system (PCAPS) is proposed to describe the standard process of healthcare services required in order to take timely and adequately action on the basis of a patient's state [1],[2]. PCAPS details the healthcare tasks that need to be undertaken according to an individual patient's state. For this purpose, it is

essential to (1) grasp the complete flow of treatment that can be assumed for a particular target disease and (2) manage the change in a patient's state in order to shift to the next unit safely and effectively. We propose the clinical process chart and the unit sheet to achieve above requirements, respectively.

The clinical process chart describes the flow of clinical processes according to the patients' states; this chart comprises several "units." A healthcare service module is mounted in each unit for carrying out medical treatments, examinations, etc., and for evaluating a patient's state in order to decide the subsequent unit. Accordingly, a clinical process is modeled by incorporating a module of healthcare services, which is termed as a "unit."

The unit sheet embodies the function of a unit, which is described above. Each unit in the clinical process chart has one unit sheet. The unit sheet serves to manage the patients in a particular unit. All the information necessary for this purpose is provided in the unit sheet. In particular, the unit sheet includes not only healthcare tasks such as medical treatments and examinations but also the patient's target state in the unit, the unit transition criteria, and so on.

Moreover, the PCAPS master is proposed. This is a glossary of the terms that are used in the unit sheet. It provides the definitions of each term and structured detailed descriptions, if required.

In other words, PCAPS describes the standard process of healthcare using the clinical process chart, unit sheet, and PCAPS master (Fig.1).

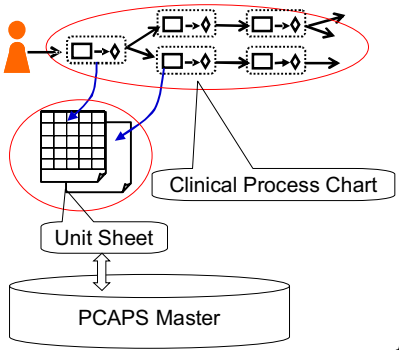

Figure.1 The Concept of PCAPS

2 Purpose of this Study

The unit sheet contains all the knowledge and information necessary for a particular unit. The clinical task part is constructed by PCAPS master file. We try to use a nursing master file offered by MEDIS-DC since 2005, which is developed by Tsuru.et.al.. The purpose of this study is to evaluate suitability and ability of covering for describing nursing in clinical situation.

3 Construction of the Unit Sheet Structure

3.1 Fundamental Structure of the Unit Sheet

As a result of a discussion about the role of the unit sheet, we proposed five fundamental items. Each of these items is explained as follows.

- **"Target State"**

The units are separated according to the patients' states in the clinical process chart. Healthcare service aims to achieve a particular target state for the patients in one unit; if a patient reaches that target state, we can proceed to the subsequent unit. Therefore, each unit has a target state that the healthcare service aims to attain. This target state should be defined by the patient's state in PCAPS. Thus, Target State is one of the fundamental items in a unit sheet.

- **"Healthcare Tasks"**

For every unit, a set of healthcare service are needed to achieve the target state. Healthcare Tasks, being one of the fundamental items of the unit sheet, are defined therein; the unit sheet comprises a set of healthcare services that aim to achieve the target state.

- **"Patient State" and "Conditional Direction"**

Irrespective of whether the same healthcare tasks are done, the change in patients' states varies. Therefore, it is necessary to manage patients who do not make appropriate progress. In the unit sheet, the items for management are Patient State and Conditional Direction. The former is a management indicator that judges whether patients are making good progress; if the progress is not satisfactory, additional treatment is provided according to the latter item.

- **"Unit Transition Criteria"**

Since patients have varying states, the processes from hospitalization to discharge also vary. Therefore, there are numerous divergences in the clinical process chart, and it is necessary to decide the units that are appropriate for the patient. This is done is by the Unit Transition Criteria item.

According to the definition provided above, the unit sheet consists of five items: Target State, Healthcare Tasks, Patient State, Conditional Direction, and Unit Transition Criteria.

3.2 Functional Structure of Healthcare Tasks

Healthcare Tasks is the most complicated item from among the five fundamental items, and this item should be detailed using more particular items. The designed structure of Healthcare Treatment is shown in Table 1.

Table. 1 The Entire Structure of Healthcare Tasks

First Layer Items	Second Layer Items	Third Layer Items	
Healthcare Tasks	Examination	Specimen Examination	Radiographic Examination
		Physiological Examination	Endoscopic Examination
		Pathological Examination	Other Examinations
	Medical Treatment	Nutrition	Blood Infusion
		Medication(Internal/External Medicine)	Dialysis Treatment
		Medication(Injection)	Radiotherapy
		(Other) Medical Treatment	Rehabilitation
		Operation	Bed Rest
	Observation	Observation	
		Observation and Diagnosis	
	Nursing Care	Nursing Care in Hospital	Nursing Care for maternity
		Nursing Care at Home	
	Information Provision	Explanation and Concent	
		Other Information Provision	

We construct the structure of the unit sheet in three layers, as shown in Table 1.

The first layer items include the fundamental items in the unit sheet (Target State, Healthcare Tasks, Patient State, Conditional Direction, and Unit Transition Criteria).
The second layer items comprise the functional items of the first layer items. In the second layer item of Healthcare Tasks, we include “Examination,” “Medical Treatment,” “Observation,” “Nursing Care,” and “Information Provision” .
The third layer items comprise the specific items of the second layer items. As a result of the discussion, we design the third layer items of Healthcare Tasks, as shown in Table 1. We applied the nursing master file offered from MEDIS-D to observation and nursing care of second layer.

4 Verification

We proposed the system shown in Fig. 2 for applying PCAPS to a hospital. The examples of the unit sheet created in this study describe knowledge and information about healthcare service, but they do not concretely describe the manner in which to do the healthcare jobs. With regard to the quality assurance of healthcare, it is necessary to support concrete jobs; therefore, we need to arrange the structure of the unit sheet by taking into consideration the support of concrete jobs. We developed some important some PCAPS contents, which are cancer, Kawasaki disease, allergy etc. We can describe nursing observation and nursing action to medical intervention. The term is full.

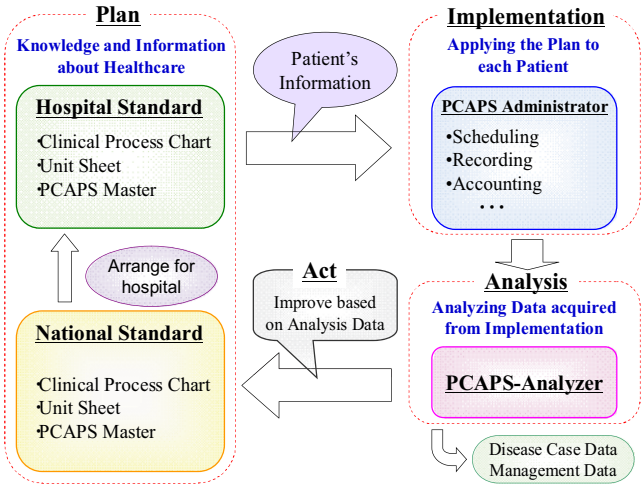

Figure.2 Scope of Application of PCAPS

5 Conclusions

In this paper, we have proposed the fundamental structure of the unit sheet, taking into consideration the aspects of healthcare. We constructed a detailed structure of Healthcare Tasks using three layers. In order to resolve the issue mentioned above, we arrange the structure of the unit sheet and develop a PCAPS master to define the manner in which to describe and support concrete jobs. We can describe nursing observation and care to medical intervention. The term is full.

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