

# Patient Data Sharing and Reduction of Overtime Work of Nurses by Innovation of Nursing Records Using Structured Clinical Knowledge

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**Abstract.** Half of nurses' overtime hours are due to records. Nursing records, which are mainly narrative records, cost a large amount of money. However, it has been pointed out that there are problems with their quality and post-use. In this study, we analyzed the value of nursing records for physicians. As a result, we found that the use of standard observation terms in nursing records can create an environment in which patients' conditions can be shared. To create this environment, the physicians of the clinical path committee classified hospitalized patients in terms of disease, treatment, and examination, and created a list of 778 process paths. Physicians, nurses, and researchers collaborated to develop digital contents with high-priority observation items and care actions adapted to patient conditions for each path. We developed a clinical support system equipped with these digital contents. In May 2019, we installed the system in a 900-bed university hospital. Then, in October 2020, we installed the system in a 400-bed general hospital. We used "nurses' overtime hours for recording" and "reduction rate" as indicators of the usefulness of this system. In the 900-bed university hospital, we compared the previous year's results for March, the end of the fiscal year. This overtime hours were 2,944 hours 00 minutes in March 2019 and 2,141 hours 55 minutes in March 2020. 27% reduction was indicated. The respective bed occupancy rates were 90.80 percent and 90.60 percent, with no difference. In the 400-bed general hospital, This overtime hours were compared to the previous year, covering November and December after one month of implementation. 386 hours in November 2019 and 204.5 hours in November 2020. 47% reduction indicated. 366 hours in December 2019 and 214.5 hours in December 2020. A reduction of 41% was shown. These results suggest that the implementation of this system can both improve the quality of team care and reduce overtime.

**Keywords.** quality management, overtime work, structured knowledge

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### 1. Introduction

Medical care is an intangible service. Therefore, without records, the medical care performed cannot be shared with others, nor can it be proven that it was performed. However, the recording process is time-consuming and labor-intensive. In Japan, the issue of overtime work by nurses has been emphasized [1-3]. Half of the overtime work of nurses is due to record making [4]. It has been pointed out that nursing records, which are mainly narrative, cost a great deal, but their quality is low, and they are difficult to use later [5,6]. The problems of nursing records can be discussed in terms of cost, quality, and conventions; however, they are difficult to solve and affect overtime work.

Tsuru et al. identified three key perspectives that make nursing records valuable to physicians. These were "symptoms of illness," "complications from surgical interventions," and "adverse events from medications" [7]. Tsuru et al. have been working to develop digital content that includes "observation of their occurrence" and "care to prevent their occurrence" as a standard nursing plan [8]. Fatigue from overtime has been reported to reduce the safety and quality of health care[9]. In addition, record omissions and delays in sharing records are problems directly related to medical safety. To address the complex related issues, we have realized a DX to improve the efficiency and quality of nursing planning and recording.

A clinical support system with 778 process paths was developed and introduced to a university hospital and general hospital. The purpose of this study was to compare overtime hours for recording nursing care before and after the introduction of the system at the two hospitals, and to determine the usefulness of this system.

### 2. Methods

This study was conducted in the following steps.

#### Step 1 (Process Path Design)

Four types of process paths, "Surgery," "Internal Medicine," and "Short-Term Hospitalization," which are generalized contents, and "COVID-19," which is an individualized content, were created using the Patient Condition Adaptive Path System (PCAPS) [9]. PCAPS has a model called "Clinical Process Chart" that visualizes the clinical process by connecting units representing the patient's condition. (Figure 1)

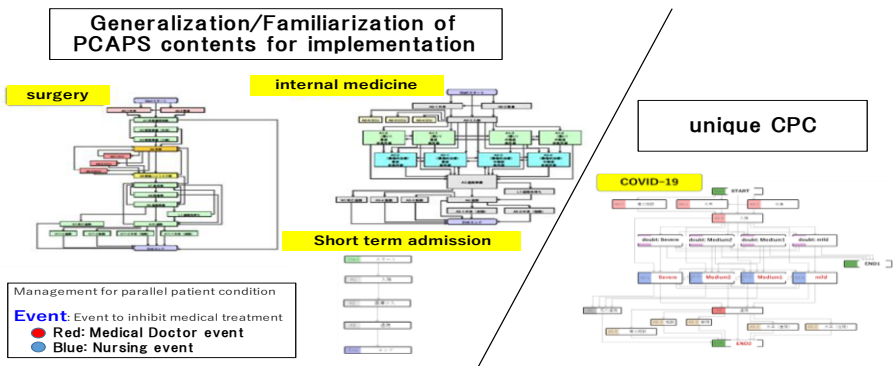
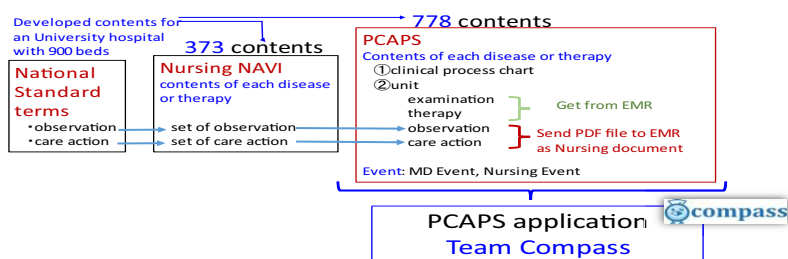


Figure 1. PCAPS Contents

## Step 2 (Development of digital path content)

Physicians and surgeons on the Clinical Path Committee of a 900-bed university hospital identified the types of path content needed by each department using the perspectives of disease, treatment, and examination. As a result, 778 clinical process charts (CPCs) were identified. Physicians, nurses, and researchers collaborated to design high-priority observations and care actions adapted to the patient condition for each path. A nursing navigation content for each disease and treatment was created with nursing observations and care actions designed, including observations required by physicians. By appropriately matching each phase of the nursing navigation contents with each unit of the CPC, 778 digital path contents were developed for each disease and treatment. Since the nursing observation items required by the physician are defined as priority items, patient conditions that should be shared between the physician and nurse can be formulated efficiently and without omission in the nursing plan. (Figure 2)



It was started to use the **Team Compass** connected EMR from may 2019 in Nara medical university hospital with 900 beds.

**Figure 2.** development of PCAPS contents

## Step 3 (Development of the application system and operation design)

A clinical support system (Team Compass) with 778 different process path PCAPS has been developed. The main functions of the developed application system are to apply path contents to hospitalized patients, create nursing plans, input nursing observations and nursing actions performed, and refer to patient progress.

Physicians and surgeons select and order the appropriate path for their hospitalized patients from the EMRS. Nurses use Team Compass to create a nursing plan for each patient by selecting the most appropriate nursing observations and nursing actions for that patient from a list of candidates in the path applied to the patient. Observations and procedures are performed and implementation entries are made according to that nursing plan. (Figures 3 and 4)

## Step 4 (Implementation)

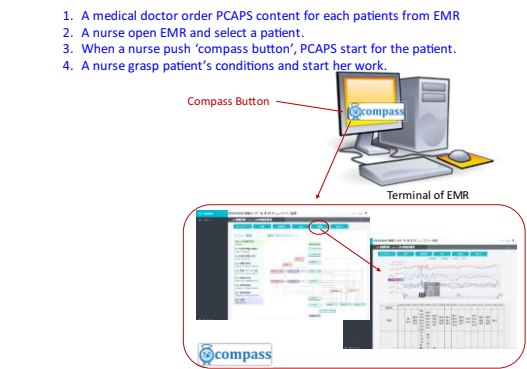
In May 2019, a clinical support system linked to the EMRS was implemented in a 900-bed university hospital.

## Step 5 (Evaluation)

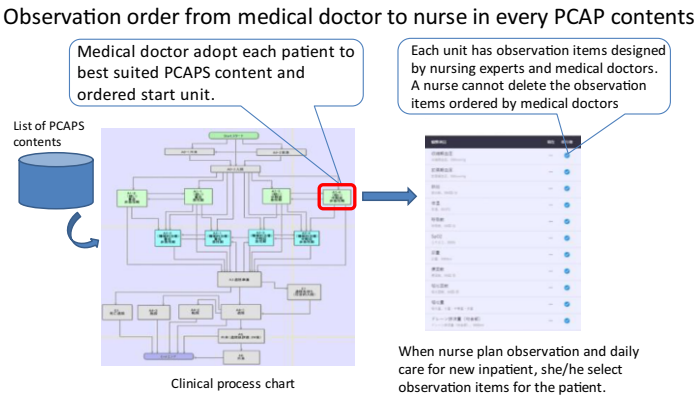
Overtime hours for recording were compared and confirmed between March 2020, the end of the fiscal year when the system was familiarized with its operation, and the same month of the previous year. Unnecessary narrative records and inadequate sequential input were suggested as impediments to reducing overtime.

## Step 6 (Verification)

After providing education on the aforementioned disincentive factors at a general hospital with approximately 400 beds, the same clinical support system was implemented in October 2020. Overtime hours for the following months, November and December 2020, were compared to the same months of the previous year.



**Figure 3.** relationship between EMR and Application System (Team Compass)



**Figure 4.** Application System (Team Compass)

3. Results

We used "overtime hours for nursing records" and "reduction rate" as indicators of the usefulness of this system.

The results were compared to the previous year's results in March, the end of the fiscal year at the 900-bed university hospital. These overtime hours were 2,944 hours 00 minutes in March 2019 and 2,141 hours 55 minutes in March 2020; a 27% reduction was indicated. The respective bed occupancy rates were 90.80% and 90.60%, with no difference; March 2018 and March 2019 are the time periods that can be said to be unaffected by COVID-19.

In a 400-bed general hospital, the months of November and December, one month after implementation, were compared to the previous year: 386 hours in November 2019

and 204.5 hours in November 2020, showing a 47% reduction; 366 hours in December 2019 and 214.5 hours in December 2020, showing a 41% reduction. November/December 2019 and November/December 2020 are the periods affected by COVID-19.

#### 4. Discussion

It was suggested that the application of 778 process paths, typified by disease and treatment, to all inpatients could reduce nurses' overtime hours for recording: 27% at a 900-bed university hospital and 40-50% at a 400-bed general hospital where disincentives were removed. In this system, clinically important observations are always performed. The creation of a system that allows physicians and nurses to share important patient conditions will contribute to improving the safety and quality of medical care. The 778 digital contents developed proved to be shareable across different hospitals. In the future, content management teams with rich clinical experience will be able to improve the content and share it on the cloud to achieve an efficient PDCA improvement cycle. It is expected that a knowledge ecosystem will be created by forming a community of hospital groups that have implemented this system

#### Acknowledgements

We are deeply grateful for the collaboration of the project members and organizations. This work was supported by JSPS KAKENHI (Grant-in-Aid for Scientific Research) No. 17H01608.

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