

# Initiatives in Prospective Payment Systems Based on Diagnosis Procedure Combination

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**The Prospective Payment System (PPS) based on a patient's diagnosis procedure combination (DPC) was introduced in 82 technologically advanced hospitals nationwide in Japan in April 2003. This system was later expanded to private general hospitals that offer acute care, bringing the number of participating institutions to 1557 in fiscal year 2009. As a top vendor in the healthcare system market, Fujitsu has participated in the study and operation of PPS from the beginning and supported the smooth introduction of DPC. We have developed a DPC analysis system that organizes and compiles the necessary information from a large amount of DPC data into databases. This allows hospital management to easily retrieve useful statistical data. This tool helps medical institutions in their efforts to make full use of DPC data and to improve medical service quality and service efficiency. This paper provides an overview of PPS and how to use the DPC analysis system for administrative improvement. It also mentions how Fujitsu has worked on benchmarking between hospitals.**

## 1. Introduction

The Prospective Payment System (PPS), based on a patient's diagnosis procedure combination (DPC), was introduced in technologically advanced hospitals (mainly university hospitals) in April 2003. It is a significant revision of the conventional fee-for-service medical service payment system.<sup>1)</sup> The PPS, which was initially introduced in 82 technologically advanced hospitals nationwide in Japan, was later expanded to include private general hospitals that offer acute care, bringing the number of institutions that are participants (or are preparing to participate) to 1557 in fiscal year 2009. This is equivalent to 480 000 beds, which accounts for 53% of the general beds nationwide.<sup>2)</sup>

Fujitsu has been engaged in this program since the "trial diagnosis related group (DRG)/PPS" survey conducted in November 1998 by

the Ministry of Health and Welfare (the present Ministry of Health, Labour and Welfare). Fujitsu has also helped to smoothly introduce the PPS. In addition, Fujitsu has been actively promoting the use of DPC data available by HOPE/DPCCompass, a DPC analysis system, to standardize hospital care.

This paper provides an overview of PPS, how to use the DPC data and how Fujitsu has worked on benchmarking between hospitals.

## 2. Outline of PPS

### 2.1 Basic structure of DPC system

The DPC is a system of classifying inpatients according to standard rules. First, inpatients are classified by the "name of the disease with the highest commitment of medical resources." Then, they are classified by conditions such as the medical practice (operation, treatment, etc.), the name of sub-disease and degree of severity

into ultimately 2658 groups (**Figure 1**). For the individual classifications, 14-digit DPC codes are defined.

The names of diseases are defined based on the ICD-10<sup>(note)</sup> and the medical practices are defined based on the classes in the Medical Fee Schedule for fee-for-service payment.

The definitions of the DPCs are reviewed at the time of every revision based on the proposed reworking given by the working parties of the individual major diagnostic categories (MDCs), composed of clinical experts, and the survey data collected from hospitals participating in the DPC program and hospitals preparing to participate (those wishing to participate in the DPC program).

## 2.2 Method of calculating medical fees based on PPS

Of the 2658 DPCs, 1881 have specified medical fees per day defined. For these 1881 DPCs, the medical fees are calculated according to the PPS, unlike the conventional medical fees based on fee-for-service payment.

The amount of medical fees based on PPS consists of the prospective payment and fee-for-service payment portions (**Figure 2**). The hospital operating fees (“hospital fee” elements) accounting for about 50% of the medical fee including the hospital basic fee, examinations (except for some), medications and injections constitute the prospective payment portion and are calculated by the flat payment system regardless of the amount of medical treatment given. Meanwhile, the costs that relate to medical skills such as operations and anesthesia (“doctor’s fee” elements) constitute the fee-for-service portion and are calculated by the conventional fee-for-service system.

For the prospective payment portion, the

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note) Tenth revision of the international classification of diseases established by the World Health Organization (WHO) providing a classified table of various diseases.

amount of medical fee per day specified for each DPC is multiplied by an institution-specific coefficient.

An institution-specific coefficient is composed of the functional evaluation coefficient (functional evaluation coefficient I and functional evaluation coefficient II) to evaluate the functions of the medical institution, and the adjustment coefficient for guaranteeing the medical institution’s performance of the previous year.

## 2.3 Major points of revision of medical fee system in fiscal year 2010

Regarding the prospective payment portion, the adjustment coefficient multiplied by the amount of medical fee for each DPC was provided as a coefficient that guarantees the income of the previous fiscal year for the smooth introduction of the PPS. This adjustment coefficient was intended to be gradually abolished starting in fiscal year 2010, and has been partially replaced by the following new factors of the functional evaluation coefficient (functional evaluation coefficient II).<sup>3)</sup>

- 1) Data submission index
- 2) Efficiency index
- 3) Complexity index
- 4) Coverage index
- 5) Regional medical service index
- 6) Emergency medical service index

The data submission index corresponds to the evaluation of the correctness of the data that the hospitals participating in the DPC program and hospitals in preparation for the DPC program are required to submit. These data submitted by hospitals (DPC data) are important for reviewing the PPS and use of the data is expected to improve the efficiency and quality of medical services, which is why the correct data must be submitted.

The efficiency index evaluates the efforts made to reduce the length of hospital stay and allow patients to be discharged promptly.

The complexity index evaluates the care

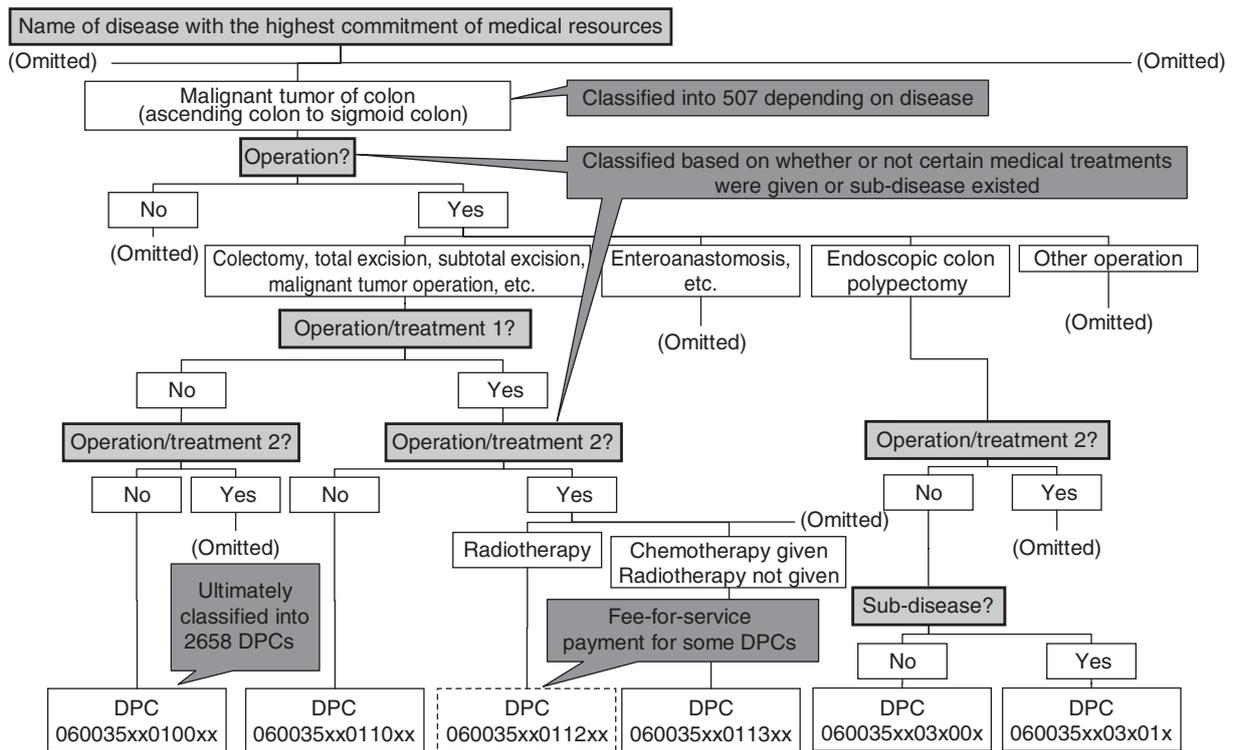


Figure 1  
Method of deciding DPC.

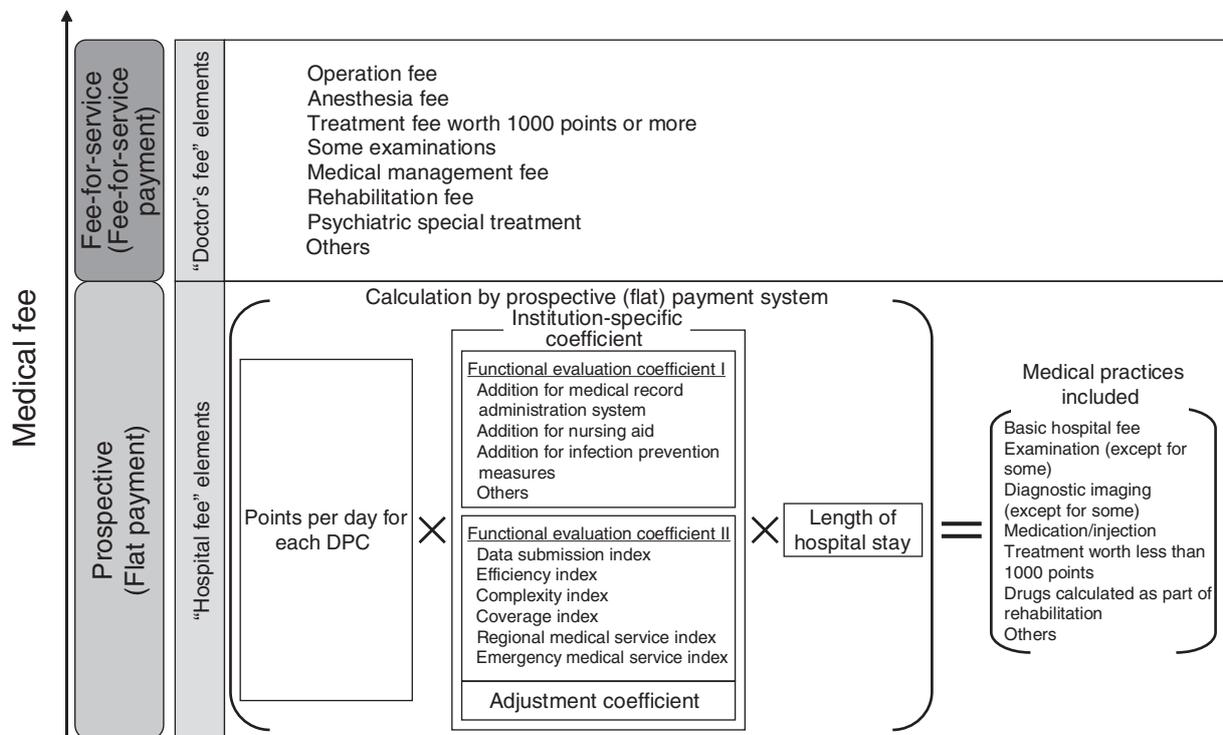


Figure 2  
Medical fee in Prospective Payment System by DPC.

given to many patients inclined to stay longer in hospitals.

The coverage index is intended to evaluate the variety of diseases that can be treated, or the contribution to regional medical services.

The regional and emergency medical service indices can also be seen as evaluations of the social contribution of medical institutions.

### 3. Use of DPC data

As mentioned earlier, the DPC system is a common method of classifying inpatients by conditions such as diseases and medical practices. The defined diseases and medical practices are also standardized and using the DPC allows comparison and analysis of the content of the treatment given to inpatients by using common methods.

This section describes how DPC data can be used at hospitals by taking advantage of HOPE/

DPCCompass, Fujitsu's DPC analysis system.

### 3.1 Outline of functions of HOPE/DPCCompass

Major data used in data analysis include medical record information per hospital stay of one patient (Form 1 file: created from a hospital chart as a summary image) and medical fee claim information (E and F files: created from fee-for-service medical expense statement information). HOPE/DPCCompass provides a system of retrieving the required information from these large volumes of data and organizing them into easy-to-understand forms such as tables and graphs. In addition, the "perspectives of analysis" often used by consultants specialized in hospital management are incorporated, which allows the desired analysis results to be quickly and simply viewed (Figure 3).

Accordingly, potentially relevant data

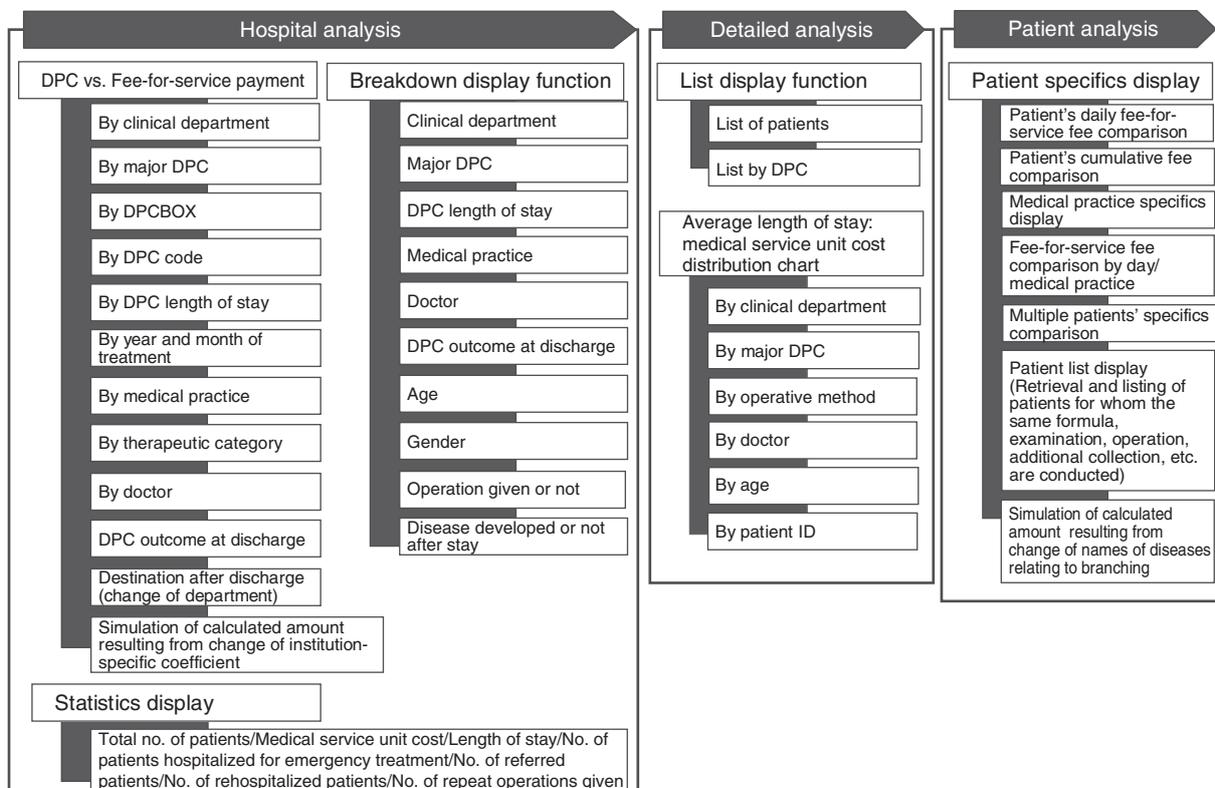


Figure 3  
Function list of HOPE/DPCCompass.

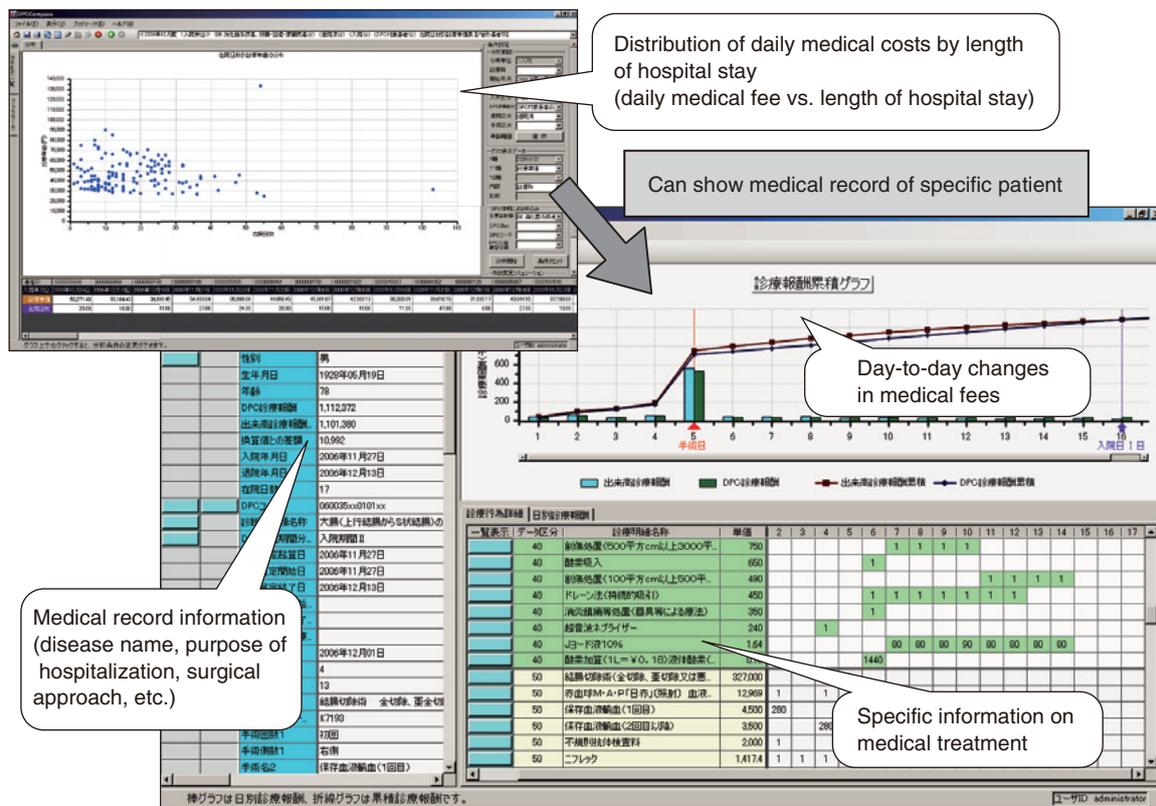


Figure 4 Screenshots of Japanese version of HOPE/DPCCompass.

groups can be easily found from a comparison with the amounts of conventional fee-for-service payment and distribution of lengths of hospital stay, and drilled down in detail to the medical practice specifics for individual patients to use for analysis.

### 3.2 Visualization of content of treatment

The capability to easily retrieve medical practice specifics for individual patients allows the content of treatment to be made visible, which can be used for consultation with parties such as doctors, pharmacists and medical record administrators to optimize the treatment (Figure 4). The following shows some examples of analysis of treatment content.

#### 1) Content of treatment included in DPC

In the DPC system, the expenses that constitute the prospective payment portion, such as examination, medication and injections,

result in a uniform medical fee regardless of the amount of medical treatment given. For this reason, when the expenses for the content including these treatments account for a large portion, the profits tend to decline. The visual representation with tables and graphs of the fee-for-service expense and the amount of medical fees required for the actual content of treatment including the prospective payment portion allows the efficiency of treatment to be visually checked by seeing if excessive examinations have been conducted or expensive antibiotics used without careful consideration.

While analysis of costs involved in medical treatment is normally required for increasing the profits from treatment, focusing only on costs involved in “goods” including the drug fees and material fees, of all DPC data, produces certain effects. A common measure is to survey the drugs often used in a hospital and consider

replacing them with generic drugs. The results of the generic drug usage survey conducted by the Ministry of Health, Labour and Welfare (MHLW) show that the percentage of generic drug usage (ratio of generic drug fees to drug fees) in hospitals participating in the DPC program is higher than that in hospitals preparing for the DPC program.<sup>4)</sup>

Studying effective treatment content in this way is expected to help improve clinical paths in hospitals.

#### 2) Average length of hospital stay

The medical fees per day established by the PPS are expensive at the beginning of a hospital stay. For this reason, the medical service unit cost (average medical fees per day) tends to be higher as a patient can be discharged from the hospital earlier. Starting in fiscal year 2010, if the length of a hospital stay is reduced to less than the national standard, a higher fee has come to be given as the efficiency index. Accordingly, it is important to view the DPC data with the length of hospital stay used as a perspective of analysis, to check whether any patients are kept in hospital longer than necessary.

One point in particular warrants attention: reducing the length of hospital stay does not necessarily lead to a higher income for the hospital. If the length of hospital stay is simply reduced and the medical service unit cost increases, the income of the entire hospital decreases if the bed occupancy rate is reduced. The point is that using the DPC system clarifies a standard length of hospital stay (national standard length) and allows the identification of long-term inpatients, and the reason for prolonged hospital stays (such as old age and complications) can be conjectured based on the DPC data.

#### 3) Content of treatment before and after operation

Comparing the content of treatment between before and after an operation with the operation date used as the reference point allows

deeper analysis of the course of treatment. For example, a detailed study of whether certain treatments needed to be given during a hospital stay can be used in planning to shift a preoperative examination for elective admission to outpatient treatment (not included in the prospective payment portion of the DPC) in some cases. This not only potentially increases the hospital's income but also reduces the length of hospital stay, which can improve the patient's satisfaction level.

### 3.3 Calculation simulation

The amounts of medical fees in the prospective payment portion of the DPC are calculated by multiplying by an institution-specific coefficient (composed of the functional evaluation coefficients I and II and adjustment coefficient). Of these, the functional evaluation coefficient I is a coefficient mainly determined based on the facility standards of a hospital. HOPE/DPCCompass allows easy simulation of the change in income caused by changing the individual coefficients included in the institution-specific coefficient. This supports those engaged in hospital management planning such as when changing the facility standards.

### 3.4 DPC coding check

Many DPC analysis systems generally use survey data that is submitted from a medical institution to the MHLW. For this reason, the medical fee claim information is obtained in the month following the month in which medical treatment was given. In addition, the medical record information (Form 1 file) only covers discharged patients, meaning that no analysis can be made for patients in hospital. This problem has been improved with HOPE/DPCCompass, and closely linking with the medical accounting system has made daily data analysis possible also for patients in hospital by using the data for up to the previous day.

When the conventional fee-for-service

payment is significantly different from the medical fee calculated based on the DPC, this has made it possible to, for example, check the selected DPC codes for any error (whether the choice of the “name of disease with the highest commitment of medical resources” was correct, etc.) before the patient is discharged from the hospital.

#### **4. Benchmarking between hospitals**

The DPC data analysis described in the previous section can be applied to a wider range of uses by incorporating data from other medical institutions. The capability to easily compare the content of treatment between the user hospital and other hospitals makes it easier to conduct studies on improving the treatment processes. Fujitsu is working on benchmarking DPC data in a forum for users of an electronic medical record system. The forum is called “Expert Users.”<sup>4)</sup>

The MHLW has data collected from hospitals participating in and preparing for the DPC program across the country, and the results of classifying the data by medical institution and DPC are posted on the Website.<sup>5)</sup> Regarding the data classified by medical institution, in particular, the lengths of hospital stays and the ratios of patients in the individual MDCs are published together with the actual hospital names. Using these data allows functional comparison with other hospitals of interest without the need to individually incorporate DPC data from other hospitals, meaning that DPC data can be effectively put to a wide range of uses.

In addition, the MHLW analyzes data from various perspectives such as the trends in rehospitalization and retransfer between buildings, comparison of the content of treatment between medical institutions (including the administration of generic drugs and antibiotics), the rates of appearance of DPCs and the rates of use of codes for unknown regions and unknown

details in the name of disease with the highest commitment of medical resources. Comparing these national standard values with the values of the user hospitals is also effective.

#### **5. Challenges for future**

This section describes Fujitsu’s future activities in relation to the DPC system.

##### 1) Effective use of data across entire hospital system

While making use of DPC data has made it easier to improve the treatment efficiency, many improvement activities are still carried out based on the results of collecting and analyzing data. Improvement after analyzing data will not produce an effect until a doctor encounters a similar patient and changes the content of treatment into a more appropriate combination based on the past analysis results. This delays the effect of the improvement activities. If the optimum content of treatment can be studied on the site of medical services from the data input phase, the improvement activities can be further advanced. To this end, information about the application of clinical paths in addition to DPC data must be incorporated in the analysis system to thereby achieve a system that is more closely linked with the electronic medical record system.

To promote the use of data in wide-ranging fields, we intend to work on enhancing the functions of the DPC analysis system into “functions that allow automatic navigation of the points of improvement by means of data analysis” as well as simple data analysis.

##### 2) Enhancement of benchmarking function

The content of the medical fee revision of fiscal year 2010 suggests that coordination with regional medical services will become increasingly important in the future. Enhancing the function of benchmarking between hospitals to use as a Cloud service will allow a larger number of hospitals to simply compare and analyze the content of treatment given at other hospitals. We wish to use this to encourage cooperation

between hospitals by promoting the sharing of information by hospitals in a certain region for optimizing treatment and studying measures to improve the quality of medical services.

## 6. Conclusion

Seven years have already passed since the PPS was introduced and the DPC system has become a common method. The DPC is now attracting attention as an effective technique for improving the efficiency and quality of medical services and is in wide use. In addition, there are high expectations for the standardization of medical services by comparison and analysis between hospitals.

From the standpoint of an industry leader, Fujitsu has made active approaches to the Japanese Association of Healthcare Information Systems Industry (JAHIS) and cooperated with the promotion measures conducted by the MHLW from the startup phase of the PPS. The PPS is at

the basis of the medical service system for acute hospitalization and the plan is to continuously review it in the future. We intend to cooperate with the MHLW and medical organizations to help further the development of medical services.

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