平成19年度厚生労働科学研究補助金（政策科学推進研究事業）

分担研究報告書

DPC対象病院の地域における機能の評価方法に関する検討

分担研究者　伏見　清秀　（東京医科歯科大学大学院　医療情報・システム学分野　准教授）

研究要旨

急性期医療機関の機能を評価する上で、地域における役割を評価することは重要であると考えられるが、今まで客観的定量的に評価するための適切な指標がなかった。本研究では、患者調査データを元に構築した地域DPC患者データベースを活用し、個々の医療機関の傷病別地域シェアからその医療機関の機能を評価する手法の意義を検討した。DPC対象医療機関をDPC導入時期から分類して分析したところ、特定機能病院である平成15年対象医療機関は、外科的治療特に眼科、整形外科、新生児等の手術など専門性の高い分野および人口あたり医師数が少ない地域で、地域おけるシェアが高いことが示され、これらの地域での貢献度が高いことが示された。一方、平成16年、平成18年対象医療機関の一部には、特定機能病院と同等の地域シェアを持つ医療機関もあり、地域における役割には非常に大きな多様性が認められた。特に患者数が少ないながらも地域における役割が高い医療機関が散見され、これらの医療機関の機能の維持のためには医療資源配分上何らかの優遇措置が必要である可能性が示唆された。これらの結果より、疾患別地域シェアの定量化により医療機関の地域における役割が一定程度評価可能であること、これらの役割は、医療機関間、地域間で大きな相違があり、この点を医療機関の評価に含める必要性が高いことが示唆された。

A. 目的

急性期病院の多くがDPC対象病院となってきているが、それらの中には特定機能病院から中小病院までが含まれるため、それらの病院の機能を適切に評価した上で、医療機関の機能評価係数として診療報酬に反映させることが求められている。また、このような医療期間の機能評価は、地域におけるそれぞれの医療機関の機能を明確にして、地域の医療機能分担、医療機能連携等の確保につながるものと考えられる。

平成15年からのDPC包括評価の導入時には、調整係数として、従来の医療機関の診療報酬収入を確保すると共に、診療報酬の増加に一定の上限を設ける仕組みが導入されている。この係数による新しい制度への円滑な移行という当初の目的はほぼ達成されたと考えられるが、単に従来の診療報酬収入を外挿する形で、個々の医療機関の診療報酬を固定化してしまう方法を長期的に継続することの合理性は認められない。したがって、今後、それぞれの医療機関の機能と必要な医療資源配分量を適切に評価して、効率的な医療提供体制を確保する仕組みを導入していく必要がある。

本研究では、それぞれの医療機関が地域において果たしている、あるいは期待されている役割を評価し、それを医療機関の機能の評価に結びつける手法を開発するために、個々の医療機関が傷病別に見たときに地域患者のどの程度の割合に診療を提供しているか、すなわち傷病別地域患者シェアを、医療機関の地域における機能の評価として活用する可能性を検討することを目的とした。

以前の研究で開発された、地域の疾病構造を DPC 傷病名分類で評価する手法を応用し、MDC 分類別、手術の有無別等に二次医療圏内の急性期患者数を推計し、DPC 対象医療機関の疾患別二次医療圏内シェアを分析することにより、地域における医療機関が果たす役割を機能として評価する可能性を検討した。

B. 方法

平成 18 年 7 月から 12 月の DPC 調査データより、各医療機関の MDC 別手術有無別の退院患者数を集計した。また、各医療機関の属する二次医療圏内の年間患者数を平成 17 年の患者調査病院退院票より、MDC 別手術有無別に集計した。対象患者は病院の一般病床の患者とし、長期入院患者を除外するため、手術を受けていない在院日数 31 日以上の患者を除外した。求められた集計値より、MDC 別手術有無別に、各医療機関の退院患者数が二次医療圏内の総患者数に占める割合を計算し、これを二次医療圏シェアとした。これらの結果を、MDC 別手術有無別に、横軸に二次医療圏シェア、縦軸に各医療機関の年間退院患者数推計値をとり、散布図を作成し、DPC 包括評価の開始年ごとに、平成 15 年度医療機関（特定機能病院）、平成 16 年度医療機関、平成 18 年度医療機関に色分けし、それぞれの特性を分析した。さらに、医療機関別地域患者シェアの地域差を評価するために、北海道、東北、関東、北陸、東海、近畿、中国、四国、九州・沖縄の 9 地域を分けた分析をおこなった。

C.結果

1．全国の医療機関地域貢献度の評価

図 1 に MDC 分類別、手術有無別、DPC 対象年度別にそれぞれの医療機関の二次医療圏シェアと年間患者数をプロットした図を示す。

（1）内科的診療の評価

神経系疾患では症例数が年間 500 例程度でありながら地域シェアが高い平成 18 年度病院が多く認められた。これらは、神経系疾患の専門性が比較的高い地域の医療機関であると考えられた。眼科系疾患では、特定機能病院の地域貢献度が非常に高いことが推察された。耳鼻科系では平成 18 年病院の一部に地域シェアが非常に高い医療機関を認めた。呼吸器系疾患では年間 1000 例程度で地域シェアの高い平成 18 年病院が多く認められた。循環器系疾患では年間 500 例程度で、地域シェアが高い平成 18 年度病院が多く認められた。消化器系疾患では、地域シェアの高い病院は比較的少なく、患者が多くの病院に分散している傾向があると考えられた。筋骨格系疾患では地域シェアの高い特定機能病院が多く、膠原病などの専門性の高い疾患が多い可能性が示唆された。皮膚科では地域シェアの高い医療機関は比較的少なかった。乳房の疾患では年間 100 例程度

で地域シェアが非常に高い平成18年病院が多いことが特徴であった。地域における乳房疾患専門治療を提供している可能性が考えられた。内分泌系では、地域シェアが高い病院は比較的少数であった。腎尿路系、婦人科系、血液系、新生児共に平成15年、16年18年医療機関とも地域シェアが高い医療機関が散見された。小児科系では　平成15年病院以外で地域シェアが高い医療機関が散見された。外傷等では地域シェアが高い病院は少なく、分散傾向があると考えられた。

（2）外科的診療の評価

神経系疾患では、手術なしに比較して、地域シェアの高い特定機能病院が多く認められた。眼科系では、地域シェアの非常に高い病院が多く、特に特定機能病院が多いことが目立つ。これらの病院に患者が集約されている傾向を認めた。耳鼻科系では、症例数が100例程度でありながら地域シェアの高い平成18年病院が多いことが特徴であった。呼吸器系では、年間100例から200例程度で地域シェアの高い医療機関が平成15年、16年、18年ともに認められた。循環器系では症例数500を越える高シェア医療機関が多く認められ、集約化の進行を伺わせた。症例数が比較的少ないにもかかわらず地域シェアの高い平成18年医療機関が一部に認められた。消化器系では手術なしよりやや多くシェアの高い医療機関を認めた。筋骨格系では、手術なしとほぼ同様の傾向であった。皮膚科系では高シェアの特定機能病院が多かった。乳房系では症例数100例程度で地域シェアの高い医療機関を平成15年、16年、18年ともに一定数認めた。内分泌系では特定機能病院の症例数の多さとシェアの高さが目立った。腎尿路系では、シェアの高い平成18年病院が多かった。婦人科系、血液系、新生児共に平成15年、16年18年医療機関とも地域シェアが高い医療機関が散見された。外傷等では地域シェアが高い病院は少なく、分散傾向があると考えられた。

（3）総合的な評価

地域シェアが20%を超える医療機関の数は、内科系では、神経系、呼吸器、循環器、消化器、腎尿路、血液、新生児、小児で平成18年病院の中に一定数以上認められ、血液では平成15年も多かった（図2）。外科系では、眼科、循環器、筋骨格系などの平成15年医療機関も多く認められた。

地域シェアが20%を超える医療機関の割合で見ると、特に外科系の手術有り疾患で、特定機能病院が多いことが認められた。

平成19年度厚生労働科学研究補助金（政策科学推進研究事業）分担研究報告書

DPC研究班版DPCコーダーの開発について

報告者

堀口　裕正　　東京大学大学院医学系研究科　医療経営政策学講座(研究協力者)
橋本　英樹　　東京大学大学院医学系研究科　臨床疫学・経済学分野(分担研究者)
康永　秀生　　東京大学大学院医学系研究科　医療経営政策学講座(研究協力者)
石川　ベンジャミン　光一
国立がんセンター がん対策情報センター
情報システム管理課 システム開発室長(分担研究者)

研究概要

本研究班において、収集したDPCデータには、Dファイルにおいて包括支払い対象となったDPCコードについての情報は存在するが、それ以外の患者データについてはDPCコードデータが付与されていない。そのため、収集したデータの分析を行うため、DPCコードを付与する作業が必要となる。そこで、完成した様式1ファイルおよびFファイルを利用して、DPCコードを生成するロジックの開発を行い、実証実験を行った。

結果、十分に実用的な速度で目的のコーディングのできるコーダーの開発を行うことができた。

A.目的

本研究班において、収集したDPCデータには、包括支払い対象となったDPCコードについての情報はDファイルに存在するが、それ以外の患者データファイルについてはDPCコードデータが付与されていない。そのため、収集したデータの分析を行うため、DPCコードを付与する作業が必要となる。そこで、完成した様式1ファイルおよびFファイルを利用して、DPCコードを生成するロジックの開発を行った。

B.方法

下記の開発環境を利用し、完成した様式1ファイルおよびFファイルを利用して、DPCコードを生成するロジックを以下のステップで開発した。

1）　コーダーロジックの検討
2）　コーディングに必要なマスターファイルの整備

3）　ロジックの開発と実装

4）　実装評価版の作成

開発及び運用環境

研究班が収集しているDPCデータは数百病院分にもおよび、膨大なサイズとなるため、以下の環境での開発及び運用を行っている。

OS: Windows Server 2003 R2

DB: SQL 2005 Server Enterprise Edition

開発環境: Visual Studio 2005

設置場所:東京大学医学系研究科医療経営政策学講座サーバー室内

なお、研究データの守秘性の観点から、データは入室に指紋認証が必要で、窓のない部屋内にサーバー・クライアントともに設置し、大学のネットワークとも物理的に隔絶された管理区域内の研究専用ＬＡＮ内で作業を行っている。

※なお、実装評価版として上記で開発したコーダーをMicrosoft Access 2003のMDBファイルに移植したものを作成し、評価版としての提供を行う。

1、

C.結果

本コーダーのマスター部分作成にあたって利用したマスター基本情報

本コーダーを開発するにあたって次に挙げる情報(マスター)を利用した。

1、　厚生労働省からベンダー向けに配布された包括評価資料（電子点数表）

2、　MEDIS提供のレセプト電算コードマスター

3、　年度別レセ電算コード・手術Kコード対応表

本研究班により作成されたもの。年度により体系が異なっているKコードに対して、年度別の対応及びレセ電算コードへの対応を行ったもの。

4、　電子点数表上のコードとレセ電コードの対応表

本研究班において電子点数表上のコード（K/J/Dコードおよびダミーコード）と対応す

るレセ電コードについての対応表を作成した。

以上４つのデータソースから以下の６つのマスターを作成した。

1、　行為抽出マスター
2、　K コードレセ電対応マスター
3、　DPC 6 判定マスター
4、　行為情報判定マスター
5、　重症度情報判定マスター
6、　手術関連重症度判定マスター

コーディングロジック

コーディングのロジックについては付録のロジックフロー図のとおりである。

コーディングの結果および所要時間

平成 18 年度データにおいて 26 病院分の DPC データ

FF1　211,629 レコード

F　124,179,648 レコード

の全症例について平成 18 年度 DPC コーディングを行うのに 15 分程度の時間を要した。

D.考察

研究班版 DPC コーダーについて

今回開発を行ったコーダーは、次のような条件をもつものとなった。

このコーダーの特徴

1、　データ収集年に依存せず、どの患者データからでも様式１ファイルと F ファイルから

平成１５年運用版 DPC コード

平成１６・１７年運用版 DPC コード

平成１８・１９年運用版 DPC コード

平成２０年運用版 DPC コード（※次年度対応予定）

のすべてのコード生成を行うことができる。

2、　病名情報・手術処置情報等でコーディングロジック上可能性のある複数の DPC コードを生成することができる。（一部運用コーディングルール上は問題があるが、コード付与に対して可能性のある DPC コードも含む）

3、　支払コードと基本コード（DPC 定義表のコード部分を利用して作成するコード）

の双方を生成することが可能となる。

このコーダーによって可能となること

1、　データの経年比較が可能となる。

2、　人間の判断を介さずに一定のルールの下で統一されたコーディングが可能となる

留意点

2、　このコーダーは完成した様式1ファイルとFファイルデータがあることが前提であり、そもそも支払業務用のコーディングを行うために開発されたものではないため、病院での支払業務での利用は困難である。

3、　このコーダーはDPC提出データ全体での矛盾がないデータを投入することを前提として開発されているため、整合性の取れないデータを投入した、もしくは存在しないコードが含まれるデータを投入したなどの場合には予期せぬ不適切な結果もしくはエラーが出力される可能性がある。

4、　結果の正当性については可能な限り検証を行っているが、不適切な結果が出力される可能性もある。

5、　出力された年度のDPCデータは、年度内での運用ルールの変更（告示の修正・新規の保険収載）等の時期については考慮していない。したがって同一年度でのコード生成においてもその時点でのコーディングとしては不適切なコードを生成する可能性がある。

6、　本コーダーでは入力されたすべての患者に対してDPCコードを生成することとなっており、「厚生労働省の告示により包括対象外となる患者」の条件などで考慮されていない条件が存在する。

E.結果

本年度の研究において年度の異なる複数のDPCコードを同一症例に付与することが行えるシステムを開発、実証することができた。

平成20年度運用版のコードについては、次年度以降早急に開発を行う予定である。

F.健康危険情報

とくになし

G.研究発表

とくになし

H.知的財産権の出願・登録状況

とくになし

付録　コーディングロジック図

Casemix as a tool for transparency of medical services

Shinya Matsuda

Introduction

Japan has a compulsory social health insurance scheme that is categorized into the Bismarck type of system. Our universal health insurance system, which covers the 122 million population, is segmented according to workplace and living place. The type of company one works for determines the insurance society to which one belongs and the financial contributions one must make. Although thousands of independent societies therefore exist, they are all integrated into the uniform framework mandated by the national government.

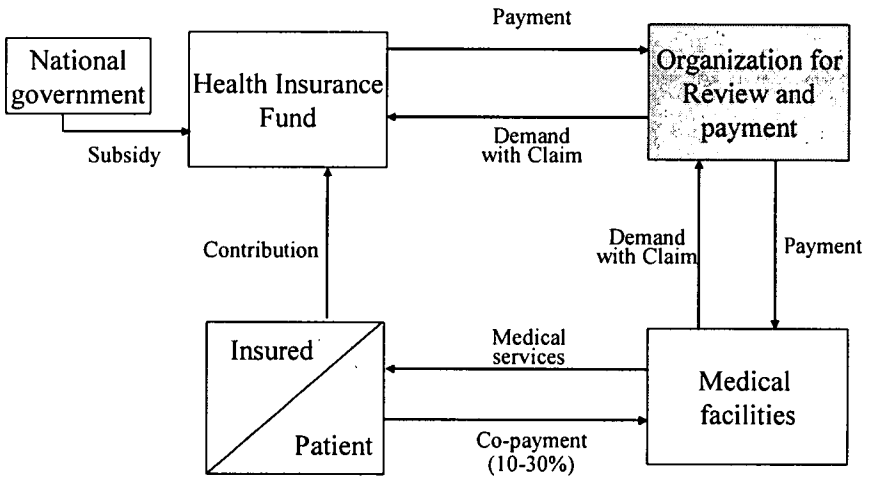
The Japanese health financing system for all societies is based upon fee-for-service reimbursement under a uniform national price schedule. Various health insurance funds, both public and semi-public, gather the premium from their insured and reimburse the cost for the medical facilities according to the type and volume of provided services (Figure 1).

The health insurance scheme is categorized into three basic groups according to age and employment status; Employee's Medical Insurance scheme (EMI) for employers and their dependants, National Health Insurance scheme (NHI) for self-employed, farmers, retired and their dependent, and a special pooling fund for the elderly. All Japanese are covered by at least one of these schemes. Because the Japanese system is portable, Japanese residents can receive medical services at any medical facilities with a modest co-payment (30%).

Today the health insurance scheme is an important infrastructure supporting the livelihood of the citizen. However, while the socio-economic structure is facing to a rapid and large changes due to ageing of the society, increase of working women, and transformation in the working environment and industrial structure, the people's awareness and social value are also rapidly changing. For example, neo-liberal way of thinking is becoming dominant in our society instead of the socio-democratic norm.

As shown in Table 1, it is an important matter how to cope with the increasing health insurance burden. Currently the following topics are under the discussion; creation of new scheme for the aged, re-evaluation of the scope of public health insurance benefits, to make the payment system more cost-efficient, introduction of Disease Management scheme, to differentiate functions of medical facilities, and so on.

Figure 1 Structure of Social Medical Insurance Scheme



Note: The Japanese medical insurance system is based on the third payer scheme.

Table 1 Chronological changes of the Total Medical Expenditures in Japan

	Total Medical Expenditures (TME)		Per capita TME (Thousand yen)	National Income (NI)		TME/NI (%)	TME for the aged		Per capita TME for the aged (Thousand yen)	TME for the aged / TME (%)
	Total (billion yen)	Increasing rate(%)		Total (billion yen)	Increasing rate(%)		Total (billion yen)	Increasing rate(%)		
1955	238.8	11.0	2.7	6973.3		3.42%				
1965	1122.4	19.5	11.4	26827.0	11.5	4.18%				
1975	6477.9	20.4	57.9	123990.7	10.2	5.22%	866.6	30.3	184	13.38%
1985	16015.9	6.1	132.3	261089.0	7.4	6.13%	4067.3	12.7	499	25.40%
1995	26957.7	4.5	214.7	374277.5	0.1	7.20%	8915.2	9.3	752	33.07%
1996	28454.2	5.6	226.1	386793.7	3.3	7.36%	9723.2	9.1	782	34.17%
1997	28914.9	1.6	229.2	391341.1	1.2	7.39%	10278.6	5.7	790	35.55%
1998	29582.3	2.3	233.9	379264.4	-3.1	7.80%	10893.2	6.0	801	36.82%
1999	30701.9	3.8	242.3	373340.3	-1.6	8.22%	11804.0	8.4	832	38.45%
2000	30141.8	-1.8	237.5	379065.9	1.5	7.95%	11199.7	-5.1	758	37.16%
2001	31099.8	3.2	244.3	368374.2	-2.8	8.44%	11656.0	4.1	757.0	37.48%
2002	30950.7	-0.5	242.9	362118.3	-1.7	8.55%	11730.0	0.6	737.0	37.90%
2003	31537.5	1.9	247.1	368659.1	1.8	8.55%	11652.3	-0.7	753.0	36.95%

Source: Ministry of Health, Labor and Welfare (2005)

As explained above, health care system in Japan is facing serious financial difficulties due to extremely rapid ageing and costly innovations in medical technology. In order to maintain our health insurance scheme, we need to change the system more efficient and transparent. In order to implement any program, we need objective data about the actual situation.

In Japan, we have a very detailed claim data, which contains various information such as diagnosis, procedures conducted, drugs prescribed, and so on. However, claim data is not standardized and not informatized, thus these very precious data have not been fully used for health policy making. One of the main purposes of the Japanese casemix project is to implement a standardized electronic claim system (Matsuda, S., et. al, 2005). The keywords are transparency and accountability. Using this framework, we will able to evaluate the cost and quality of medical services as shown in this article. In this article the author tries to explain the Japanese original casemix system, DPC (Diagnosis Procedure Combination) as a tool for transparency of medical services in the comparison with G-DRG.

Brief history of casemix system development in Japan

Since the late 90's, the Ministry of Health, Labor and Welfare (MHLW) and its affiliated research institute (Institute of Health Economics and Policy: IHEP) have started research on the feasibility of case-mix classification system as a tool of standardized medical profiling and payment. Several types of already existed case-mix classification, such as HCFA-DRG, AP-DRG, APR-DRG, and an early version of Japanese original case-mix system were tested in validity.

Although the American DRGs were evaluated as applicable for the Japanese acute-care hospitals, the physician's organization criticized that the American DRGs were too rough to correctly reflect their practice patterns. But they also recognized the necessity of case-mix profiling to improve the transparency of medical decision and processes to their patients and insurers. Thus, it was required to develop an original classification system that fits to the practice pattern in Japan, and at the same time, allows comparative benchmarking across the country and with the system of other countries.

In order to seek another way to implement the casemix system, at first, we investigated the DRG application in the European countries between 1997 and 1998. We have intensively investigated UK (HRG), France (GHM), Sweden (Nord DRG), Belgium (AP-DRG), Portugal (HCFA-DRG), Austria (LDF), Germany (FP/SE) and the Netherlands (DBC). After the two years country-study we decided to develop the new casemix system as a profiling tool of medical services under the PMC like principle. We have much influenced by the French and Austrian approach of casemix application for regional health planning and Belgian and British approach of incremental development process.

In 2001 the Japanese case-mix research team, so called DPC Project team, was organized in order to develop the Japanese original casemix system.

The structure of DPC

The basic idea for constructing new casemix system

is not that of DRG. As the Japanese medical professionals required more process oriented system, we adapted a PMC like approach. The first key of classification is diagnosis, and then types of procedures are considered to decide a group. The first step of development is to construct the definition table (Table 2). The first column is diagnosis that corresponds to a group of pathologies. In this case, "Malignancy, Stomach" contains gastric cancer (C16$), and carcinoma in situ (D002), for example. In the second step, a series of usually applied interventions are listed up according to the opinion of physician's panel. Finally other expected situation such as co-morbidities and complications are listed up by the panel. Based on this definition table, our research team analyzed the actual data and constructed the DPC groups.

Table 2 The DPC definition table

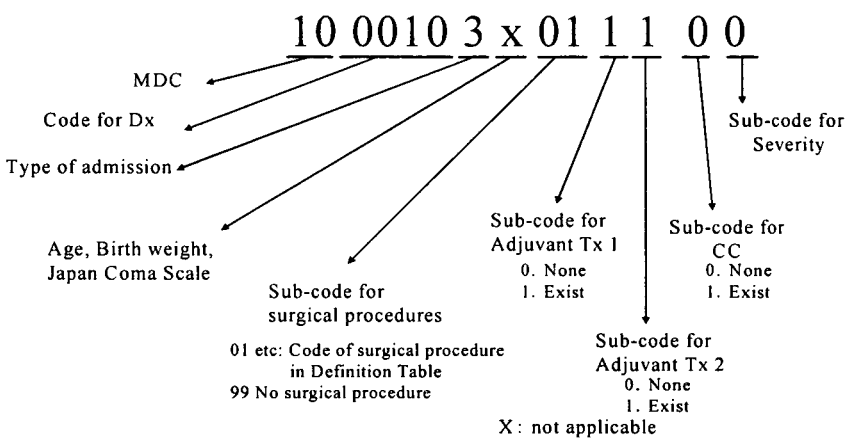
Base DPC	Diagnosis	ICD10	Surgical Procedure	JPC	Adjuvant therapy 1	JPC	Adjuvant therapy 2	JPC	CC	ICD10	Severity
Stomach, Malignancy	Carcinoma, Stomach	C16$	Total gasterectomy	K6572			CVH	G005	Renal failure	N18$	
	Carcinoma, in situ	D002	Partial gasterectomy	K6552			Chemotherapy		Cardiac failure	I50$	
			Brown procedure	K662			Radiation		.....	.....	
			.....	.....			Ventilator	J045$			

JPC: Japanese Procedure Code
Source: Ministry of Health, Labor and Welfare (2004)

In DPC algorithm, diagnosis, procedure, and co-morbidity/complication are three key variables for the classification. Additional information (e.g. birth weight in the case of neonatal intensive care) is also referred to in some groups. Diagnosis and co-morbidity/complication were coded following ICD10 coding scheme, and procedures are coded in the Japanese Procedure Code as defined in the fee schedule of the national health insurance system. The structure of the DPC ver.3 composes of 8 parts as shown in Figure 2.

The first part is Major Diagnosis Category and DPC serial number that corresponds to ICD10. The second indicates the type of admission. The third is code for age and birth weight. The fourth is existence and types of surgical procedures. The fifth and sixth indicate the existence of additional procedures and adjuvant therapy such as chemotherapy, immuno-therapy and radiotherapy. The seventh indicates the existence of co-morbidity /complications. Finally, the eighth is the code for severity. Although the eight components are the prototype of the classification structure, it should be noticed that they are for profiling, and that all of the components are not necessarily used for reimbursement schedule.

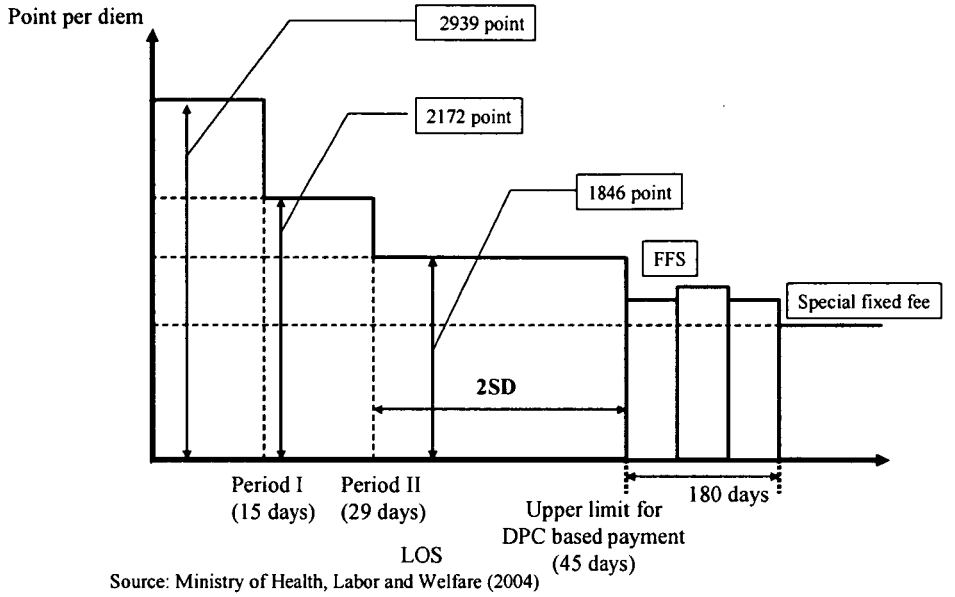
Figure 2 Structure of code of DPC ver.3



Source: Ministry of Health, Labor and Welfare (2004)

Figure 3 An example of DPC based payment for hospital

DPC 0600203x01000x (Malignancy, Stomach, Total gasterectomy, No additional procedure, No CC)



Source: Ministry of Health, Labor and Welfare (2004)

Reimbursement system based on DPC

The DPC based reimbursement scheme is quite different from other countries. The payment for hospitals composes of two components; DPC component and Fee-For-Service component. The DPC component corresponds to the "so called" hospital fee, which contains hotel fee, pharmaceuticals and supplies used in wards, lab-test, radiological examination, and procedures cheaper than ¥10,000. The FFS component corresponds to tariffs for surgical procedures and anesthesia, pharmaceuticals and expensive devices used in operation rooms, and procedures more than ¥10,000. For the DPC component, per diem payment schedule is set for each DPC group.

Table 3 shows an example for "DPC 0600203x01000x (Malignancy, Stomach, Total gasterectomy, No additional procedure, No CC)". For each group, the standard per diem payment is defined, and three periods are set for reimbursement; period I, period II and Upper limit for DPC based payment (Figure 3). The period I, II and upper limit correspond to the 25 percentile-day, ALOS day and ALOS+2SD day, respectively. Up to period I, per diem payment is set for 15% more than standard per-diem payment. Furthermore, the hospital coefficient is calculated for each facility according to its function and characteristics. On the contrary, from period II to upper limit day, per diem payment is set for 15% less than the standard payment. Over upper-limit-day, a reduced FFS payment scheme will be applied.

Table 3 An example for DPC based reimbursement

(DPC 0600203x01000x Malignancy, Stomach, Total gasterectomy, No additional procedure, No CC

No of DPC	Name of DPC	Surgical Procedure	Ad Tx 1	Ad Tx 2	CC	Severity	LOC(days)		Points			Upper limit for DPC based payment
							I	II	Under I	Between I and II	Over II	
0600203x01000x	Stomac, Malignancy	Total gasterectomy	None	None	None		15	29	2,939	2,172	1,846	45

ICD10
C16$
D002

Japnese Procedure Code
K6572

Source: Ministry of Health, Labor and Welfare (2004)

The calculation of DPC based payment is rather complicated, thus the computerization of hospital information system is an indispensable requirement. In fact, the DPC based hospital computer system for reimbursement has been developed based on the former FFS based tariff calculation system. Furthermore special computerized software for ICD coding has been also developed in order to lighten the burden of clinicians who have responsibility to complete a DPC information sheet of their patients.

Refinement process of DPC

The first version of DPC 3.0 was developed by the DPC project team from 2001. Within this DPC project team, the 21 clinical sub-specialties were organized. Based on the discussion with clinical groups and the statistical analysis of 267 thousands cases-data from 82 special function hospitals (80 university hospitals and 2 national centers), the DPC version 3 was established in 2003. The new classification composes of 2552 groups under the 16 MDCs. Based on the DPC version 3, the payment of hospital fee of the 82 special function hospitals has started from April 2003.

During the first year's implementation, the DPC project team has gathered various information about problems to be ameliorated for the use of payment. In 2003 study, the evaluation of secondary procedures (i.e., secondary surgery, chemotherapy, radiotherapy, etc) and CCs were intensively reviewed. Finally the 2004 version of DPC has been established and applied for payment from April 2004. The 2004 version composes of 3067 groups under 16 MDCs. After the 2nd revision, the new 2006 version of DPC is established, composing of 2437 groups. From 2006 the hospitals that are paid by DPC, have been expanded to other 360 hospitals, which compose of public and private facilities. Another 370 hospitals participates the DPC project without payment application. Thus we can gather the DPC data from about 300,000 acute care beds today.

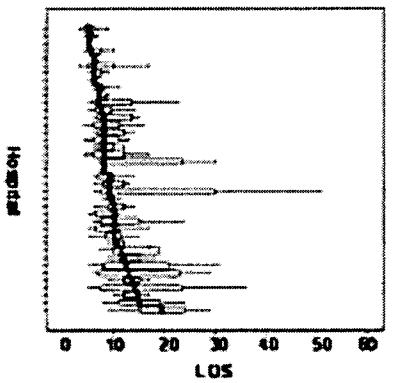
DPC as a tool for transparency of medical services

Actually, there are a lot of critics on mass media about the quality of hospital services in Japan. They often say that the Japanese hospital services are less quality but more expensive and inefficient compared with other developed countries. However, there are little objective evidences about the quality and cost of the Japanese hospital care. It is not possible to ameliorate quality and efficiency of services that are not measured. One of the most important missions of DPC project is to ameliorate the transparency of hospital activities, in order to make hospital services measurable and then to prepare a common basis for discussion about health reform. The cost-containment is not the first objective of DPC project. It is the first time in the Japanese history of health policy that the data shown in this article is open for the public. With these DPC related data, we can objectively analyze the performance of hospital services. Standardization, transparency and accountability are the keywords of DPC project.

Today citizens can access the DPC based outcome data in the website of Ministry of Health, Labor and Welfare, where the number of discharge cases is opened for each DPC by 360 hospitals. For example, a patient with multiple sclerosis can know which hospital treat this disease the most frequently in Japan. Other opened data are ALOS (Average Length of Stay) for each DPC (Figure 4), re-admission rate with reasons, complexity index (CI), efficiency index (EI), and so on.

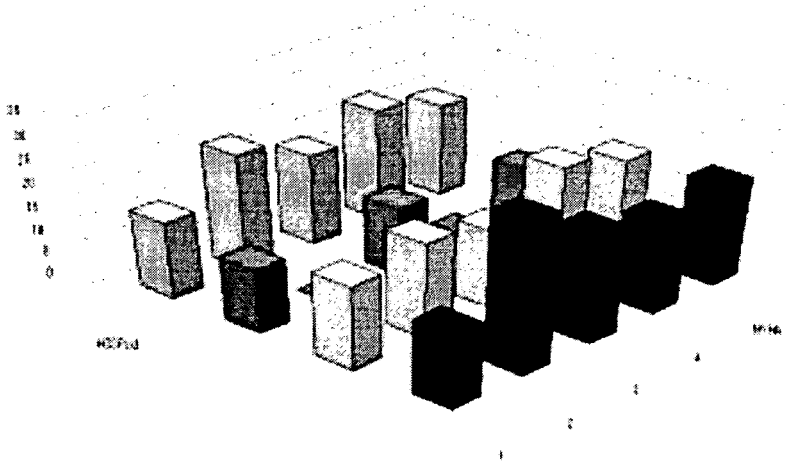
Figure 4 An example of LOS data

[0603303x04xx0x] Cholelithiasis,
Lapascopic Cholecystectomy, no CC



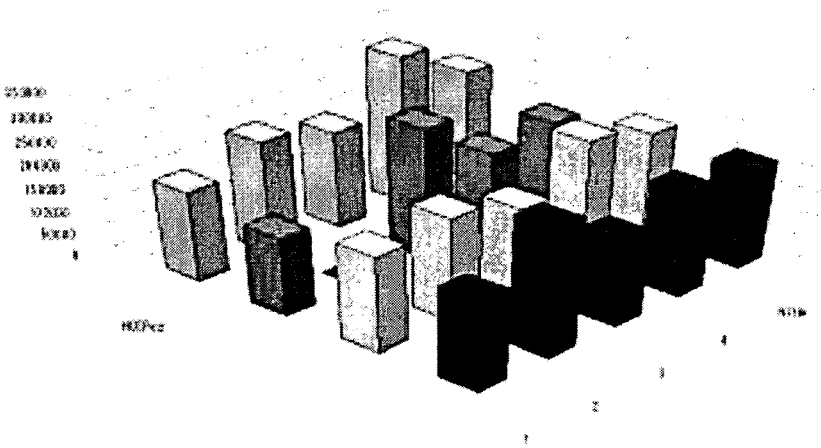
Note: There is a considerable differences in ALOS among hospitals.

Figure 5 An example of clinical study based on DPC data
DPC 6digits 050030, Angina/Chronic IHD, Surgical
Relationship between NYHA score and ALOS



Note: There is no clear tendency between NYHA score and ALOS.

Figure 6 An example of clinical study based on DPC data
DPC 6digits 050030, Angina/Chronic IHD, Surgical
Relationship between NYHA score and cost



Note: There is no clear tendency between NYHA score and cost.

Based on the DPC data, we can do various clinical analyses as shown in Figure 5 (050030 Angina/Chronic IHD, surgical; relationship between NYHA score and ALOS) and Figure 6 (050030 Angina/Chronic IHD, surgical; relationship between NYHA score and cost). These data are used for the refinement of classification and tariff table. Although clinicians often refer to the possible positive relation between clinical severity and resource consumption (cost and length of stay), above results have indicated that the hypothesis is not always true. These data are indispensable in order to get a consensus from clinician group.

DPC based cost analysis project

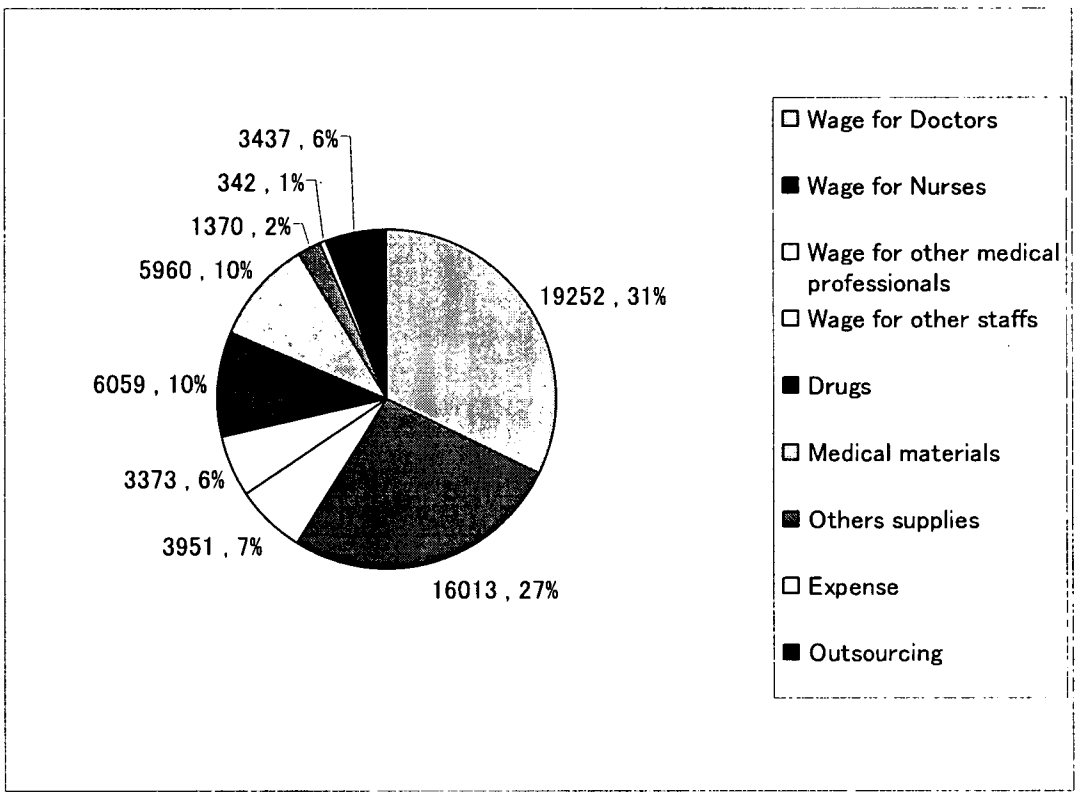
It has been long criticized by providers that the

current FFS tariff table does not correspond to real cost of medical services. As each DPC price is determined by the average charged cost based on the current tariff table, the validity of DPC price is also questioned. In order to correspond to this critic, after the two years intensive research activity, the DPC costing manual has developed in 2002. Using this manual, 28 university hospitals have tried to estimate the cost of each DPC in 2003. Although the results were positively evaluated by participant hospitals, there were several points to be ameliorated. For example, the over-heading method is requested to be tuned in order to fully apply it for all the hospitals. Furthermore, how to evaluate the depreciation and research and education cost are another issues for re-consideration.

In 2004 the costing study was extended to another 112 hospitals (private and public), and in 2005 the number of participants become more than 200 hospitals. In order to facilitate data collection, we have developed a special computer software that is used in each hospital. Figure 7 shows a part of 2004 research results.

Thus we are now making an intensive effort for the refinement of costing method in order to make it available in 2006. The coming national cost data will serve as a national reference for the DPC pricing and at the same time it will be very useful for each hospital to evaluate their cost structure and to ameliorate its productivity.

Figure 7 An example of DPC cost study
(Cholelithiasis, Laparoscopic Cholecystectomy, no CC)



Note: Based on the standardized costing manual, the cost structure is estimated for each DPC (Matsuda, 2005).

DPC as a tool for estimation of disease structure

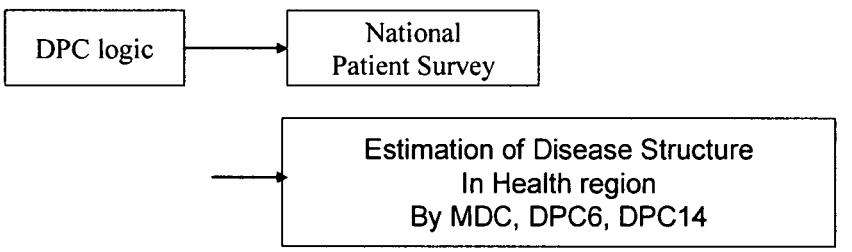
The Ministry of Health, Labor and Welfare (MHLW) conducts the Patient Survey every 3 years. In this survey, each medical facility (hospitals and clinics) is required to report the patient's data such as age, sex, address (community level), main diagnosis, complication and co-morbidity, procedures delivered for the particular day (out-patient services) or for the one month (discharged case for in-patient services). By

applying the DPC logic for this data base, we can estimate the DPC based disease structure both for national and local levels (Fushimi, 2006).

Figure 8 shows an example of disease structure estimation for Kitakyushu Health care region that covers about 1.1 million populations. Using this kind of data, the local government establishes a health policy for more rational resource allocation and each hospital can know their position in the region.

From 2008 the MHLW plans to introduce a Disease Management like health promotion program mainly targeting for Metabolic syndrome. The DPC based estimation of disease structure can be used for this program. For example, we applied this methodology to a health care region in Kyushu. The estimation result showed that about 6 % of total population may be categorized into diabetes mellitus or suspicious. This means that one of every 10 adults might be DM patients. In fact, DM is the most important cause of retinopathy and renal failure in this area. Based on these kinds of evidence, we have started the disease management program for the DM patients from 2004 with collaboration of the local municipal government (Nishiyama, et. al, 2007).

Figure 8 Estimation of disease structure based on DPC logic



Kitakyushu Health Care Region

DPC6	OPE	Total	LOS <=1	LOS 2-29	LOS 30-119	LOS >=120
010010 Brain Tumor	Yes	51	0	24	22	5
010010 Brain Tumor	No	57	1	35	14	7
010020 SAH	Yes	41	0	19	14	8
010020 SAH	No	38	10	13	11	3
010030 Non-ruptured brain aneuyrisma	Yes	18	0	14	4	0
010030 Non-ruptured brain aneurhysm	No	16	8	8	0	0
010040 Intra-cranial hematoma	Yes	49	2	16	24	8
010040 Intra-cranial hematoma	No	156	11	75	53	17
010060 Cerebro-vascular infarction	Yes	55	0	30	19	4
010060 Cerebro-vascular infarction	No	1,220	32	638	340	203

Note: By applying the DPC logic for the Patient survey, we can estimate the disease structures of each health care region
Source: Fushimi (2006)

DPC as a project of e-health

Receipt Data Download System and Code finder

The principle of Japanese health insurance scheme has long been the Fee-For-Service (FFS) based payment. The health information companies adapted to this scheme and developed the computer system corresponding to the FFS payment. Using the installed tariff table data, the computer produces a receipt (claim sheet) of each patient for reimbursement. Health institutions send this claim sheet to the payers' organization in order to receive reimbursement. In this computer system, all procedures, drugs and devices for reimbursement are registered for each patient by daily basis. There is a standard code for each of all procedures, drugs and devices. Using this FFS based computer system we can allocate a DPC code for each patient. This is the RDDL (Receipt Data Download) system. This computer system is used not only for acute in-patient services but also for chronic in-patient

services and ambulatory care. This is why DPC has a possibility to be generalized for all categories of medical services.

Another important system is the Code finder. This is a program that converts diagnosis in Japanese into ICD10 code. Based on the mapping table between diagnosis in Japanese and ICD10, Prof. Ohe (Tokyo University) invented this innovative system. By combining RDDL system and Code finder, one can determine an appropriate DPC code for each patient relatively easily. The dictionary of diagnosis is periodically renewed and reflected to the Code finder. With these basic infrastructures we could generalize the use of DPC for payment within a relatively short period (2 years from the development to application for payment).

Electronic Receipt

Unfortunately the reimbursement system is not elecronized up to now, thus each medical facility has to produce paper claim sheet and send it to payer's organization by hand or by mail. This is very inefficient. In order to ameliorate this situation, we are now developing the electronic receipt system based on the DPC system. As DPC data is already standardized and elecronized, and as DPC uses RDDL system, it is easy to generalize the DPC based electronized receipt (claim) for other medical services. If we can generalize it, we will be able to construct a very useful and powerful database for health policy making.

Current research topics of DPC

The DPC research team is now conducting a number of projects for future; i.e., development of DPC for sub-acute care, chronic care, psychiatric care and out-patient services, development of DPC based clinical indicators and benchmarking system, and so on.

It is impossible to fully evaluate the appropriate volume of payment for each hospital by DPC cost weight alone. There would be other aspects that reflect the function and resource consumption of each hospital. For example, the cost for research and training, special services such as emergency room and ICU cannot be evaluated by DPC cost weights alone. In order to correspond to this question, the DPC research team tries to establish a set of indicators that reflect particular hospital functions.

All these research projects will give very important suggestions for the debate on health reform in Japan.

Brief description of G-DRG

One of the topic of this paper is the comparative analysis of the German and Japanese health system. In the following two sections, the author tries to describe the German casemix system, so called G-DRG, in comparison with the Japanese DPC.

After the introduction of DRG based payment for the American Medicare in 1983, many European countries started feasibility studies about the DRG based hospital financing. The German federal government asked to a private consulting firm a feasibility study but results were negative. No use of ICD and the existence of German original procedure tables were main reasons for rejection of DRG use. However, facing to the financial difficulty in the late 80s, the federal government decided to adapt the casemix based payment for hospital because of easiness of cost control. In the early 90s they implemented the German original casemix system, so called SE/FP. Although the SE/FP based payment was applied to only a part of in-patient services, not for all patients, this system had showed a positive result for cost containment of hospital service expenditures.

In 90s the German hospital service expenditures continued to increase. The dual financing system, that is a combination of budget and per-diem payment, was criticized and the generalization of casemix based payment system was proposed. According to the Plan 2000 by Schroeder cabinet, the discussion had started for generalization of casemix system. As the generalization of SE/FP system was evaluated as impossible, the government decided to introduce a foreign system. The French GHM, the Austrian LDF, the 3M's AP-DRG, the Australian AR-DRG were candidates. Finally the government decided to introduce the AR-DRG because of its sophisticated structures. In order to apply the AR-DRG to German hospital environment, they have converted the Australian procedure codes to the German ones and modified some classification structures. At the same time the German government established the special institute in charge of DRG, InEK (Institute for Hospital renumeration). The institute has conducted the cost study of each DRG classification and has established the G-DRG standardized cost weight table.

Based on these results, the German government is trying to generalize the G-DRG based payment up to 2006. In the new system, the case revenue for a particular DRG is generally the product of the cost weight of each DRG and the base rate (i.e. the monetary value of a relative cost weight of 1.0). At

the moment, all hospitals are to be financed with the same base rate. For the year 2004, a nationwide base rate was 2,593 Euro. However, the real hospital base rate ranged from less than 1,000 to more than 4,000 Euro (Busse, 2007). This situation reflects historical and functional differences of each hospital. In order to absorb these differences, various kinds of additional and alternative fees are set for each hospital according to its characteristics (i.e. surcharges for innovative diagnostic and treatment procedures, surcharges for specialized centers, apprenticeship surcharge, etc). Because of the existence of these additional payments, the G-DRG system has become highly complex, leading to an increased need for coordination and s greater potential for conflict in budget negotiation between the negotiating organizations (Busse, 2007).

Comparison between G-DRG and DPC

Table 4 summarizes the comparison of G-DRG and DPC. The two casemix systems are different for its logic (procedure dominants vs. diagnosis dominant) and use for payment (per-case vs. per-diem). As the system reflects the history and culture of each country, it is very difficult to conclude which system is better.

Generally speaking, the per-case payment would have more cost containment effect than the per-diem payment. For this reason, the possibility of DPC based per-case payment is under discussion in Japan.

Many clinicians are against the introduction of DPC based per-case payment, indicating this system will have more possibility to cause inappropriate effects on quality of care because of too much incentive for cost containment. Of course malpractices can happen for the per-diem payment system because it restricts the amount of payment to some extent. In order to prevent such unwanted effects, it is necessary to prepare a set of clinical indicators by which one can monitor the quality of care. It is rather easy for DPC, a diagnosis dominant classification system, to establish such clinical indicators compared with G-DRG, a procedure dominant system.

Table 4 Comparison between G-DRG and DPC

	G-DRG	DPC
Grouping logic	Procedure dominant	Diagnosis dominant
Origin	AR-DRG	Japan original
ICD	ICD10 GM	ICD 10
Procedure code	German procedure code	Japanese procedure code
Number of groups	1082	2347
Use for payment	per-case payment	per-diem payment
Covered hospitals	All hospitals	Acute care hospitals
Application for clinical indicator	Possible	Possible, easier
Application for estimation of disease structure	Difficult	Possible, rather easy

Note: There are several differences for contents and application between the two casemix systems.

Another important difference between G-DRG and DPC is their applicability for the estimation of disease structure. As DPC is a diagnosis dominant classification, it can be applicable for chronic in-patient and out-patient services. Furthermore, DPC has developed based on the current billing system, data can be integrated into the common electronic format. Using this dataset, one can estimate the financial burden of a particular disease category and thus estimate the effect of preventive activities such as Disease Management program. Fushimi has already developed such a system based on DPC and the results of his study are used for the discussion about regional health planning in several local governments in Japan (Fushimi, 2006). In the case of G-DRG, they have developed this system independent form out-patient services, thus it will be rather difficult to develop G-DRG for a general tool to describe all medical services.

Conclusion

The most important purpose of health policy is to

assure quality care for the patient, not to rationalize health expenditures in itself. The Japanese Ministry of Health, Labor and Welfare published its principles for future health reform. This agenda composes of three main purposes; Respect of patient's choice and informatization, Realization of effective and quality care delivery system, and Construction of reliable health system. In order to promote these programs we need the standardized information about contents of medical services. The DPC based information system will serve as a fundamental basis for it.

Under the increasing consumerism and available information about the "best" medical services, patients require the quality care as highest as possible. They want the best outcome, not usual one. Higher the quality of care, usually, more the resources consumption. Thus, it becomes a crucial issue for the government how to balance the public health expenditures and quality of care. Patients must be offered standardized information about cost and quality of health services, if not, health system cannot be sustainable facing to unlimited requirement from the patients. In fact, this is happening in Japan in some clinical services, such as obstetrics, pediatrics and general surgery.

Currently in Japan, most of the medical services are covered by public medical insurance. It is clear that the current public financing is not enough to cover the all services that the patient requires. This situation seems similar both for Japan and Germany. We need more practical discussion about how to finance the medical services. Casemix information will serve as a basis for this discussion.

Under the globalization of health related information, patients can compare the health services in different countries for the clinical outcome and costs. In order to facilitate the comparison, it is desirable to establish a common basis for evaluation. Casemix system will be a candidate for such basis. Currently we try to the mapping table between DPC and other casemix system, such as G-DRG and the American DRG. Using this mapping table we will be able to compare the clinical outcome and cost for the treatment of same casemix. This situation will contribute to standardization and improvement of effectiveness and efficacy of health services.

References

Busse R. (2007). Regulating the provision of benefits in Germany: Benefit catalogue, reimbursement and quality assurance, JSSP. (in press)

Fushimi, K. (2006). DPC data application book (DPC data katsuyo book), Tokyo: Jiho.

Nishiyama, T., Tanaka, M., Yano, J., Matsuda, S., and et.al. (2007). Estimation of disease structure based of DPC and its application for disease management, Asian Pacific Journal of Disease Management, Vol.1 (1).

Matsuda, S. (2005) Report of DPC cost study 2004.

Matsuda, S., Fushimi, K., Hashimoto, H., Kuwabara, K., and et al. (2005). DPC based benchmarking in Japan, Proceedings of the 21st PCSI conference, Slovenia.

Matsuda, S. (2007). Report of DPC cost study 2006.

Ministry of Health, Labor and Welfare. (2005). Report on national Medical Expenditures 2003.

Ministry of Health, Labor and Welfare. (2004). Guide for DPC definition and remuneration 2004.

Shinya Matsuda (Professor, Department of Preventive Medicine and Community Health, School of Medicine, University of Occupational and Environmental Health, Japan)

Original Asian Pacific Journal of Disease Management 2007; 1(1), 29-33

Application of Diagnosis Procedure Combination Case Mix System and National Patient Database to Regional Estimation of Disease Structure and Disease Management

Kiyohide Fushimi[1], Shinya Matsuda[2]

[1]*Department of Health Policy and Informatics, Tokyo Medical and Dental University Graduate School*

[2]*Department of Preventive Medicine and Community Health, University of Occupational and Environmental Health*

Abstract

The estimation of medical expenses based on disease structure is necessary to improve the efficiency of the health care delivery system and to maintain the social health insurance system in Japan in the face of the rapid aging of the population which is anticipated in the near future. Our aim is to estimate regional needs for health care services by using a national patient database in conjunction with the diagnosis procedure combination (DPC) patient classification system. A data warehouse was constructed with dimensions including year, regions, DPC disease classification, and provider attributes, and then subjected to OLAP analyses. Needs for health care services in the designated medical service areas were estimated from disease structure in the districts and the average health service utilization for relevant DPC groups, as determined from DPC claim data. Actual needs for acute care hospital beds were estimated from disease structure in the districts, and revealed a large excess of acute care beds in most of areas. Admissions of patients to hospitals in medical service areas different from those for patients' residences were quantitatively determined for each of the DPC groups. It was found that patients requiring cardiac surgeries traveled farther than those with other diseases to reach hospitals conducting a large volume of such surgeries. Our results indicated the feasibility and the effectiveness of the arrangement of regional health care delivery plans based on the DPC case mix system and national patient database.

Key words: DPC, disease structure, health care resource allocation, Japan

❖ Introduction

The Japanese government has been successfully administrating the health insurance system, providing health care services to all citizens for more than 40 years; however, financial difficulties due mainly to the extremely rapid aging of the population in recent years require urgent improvement in the efficiencies of the health care delivery system in Japan. Thus, the estimation of medical expenses based on disease structure is necessary. The case mix classification-based national patient database is expected to be useful for the arrangement of regional medical care plans in view of social health care delivery including primary ambulatory, acute, emergent and chronic care. In Japan, patient surveys have been conducted every three years since the 1970's in all medical institutions and basic patient data regarding primary diseases, coded according to the ICD10, have thereby been accumulated. Thus, our aims are to construct a region-domain case mix database using a patient classification system diagnosis procedure combination (DPC)

Received: January 25, 2007
Accepted: April 18, 2007
Correspondence: K. Fushimi, Department of Health Policy and Informatics, Tokyo Medical and Dental University Graduate School, 1-5-45 Yushima, Bunkyo-ku, Tokyo 113-8519, Japan
e-mail: kfushimi.hci@tmd.ac.jp