

Development of Patient-Oriented Costing System by Function Tracing

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Background

- Understanding patient-oriented costing is extremely important to developing an efficient system for providing high quality health care.
- The use of patient-oriented costing can also support the improvement of current levels of management efficiency and quality of health care.

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Standardized Patient-Oriented Costing System

- Health care is an aggregate service in which patients receive treatment and care from various professionals in different settings and at different times, which makes the accurate calculation of patient-level costs extremely difficult.
- Despite these difficulties, there is increasing interest in the development of a standardized patient-oriented costing system from both individual hospitals and the government.

Lewis et al. 1996; Conteh et al. 2004.

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Hospital-Level Perspective

- At the hospital level, standardized patient-oriented cost calculations are necessary for various aspects of business management
 - E.g. budget preparation and control, evaluation of cost and performance, establishment of management master plans.
- Cost calculations can also be used to support informed negotiations of fund procurement and as reference data for benchmarking.

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Hospital-Level Perspective

- Accurate patient-oriented cost calculations may also improve certain attributes of care management, such as the planning and control of care, assessment of cost performance in care, patient safety and infection control. *Fukuda et al. 2009*
- The importance of the management ability of each hospital is also increasing, because hospital managers need to properly assess potentially-controllable costs in the context of rising medical expenditures.

Garattini et al. 1999; Madorran-Garcia et al.2004; Cardinaels et al. 2004.

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Governmental perspective

- From a governmental perspective, standardized hospital cost calculations represent essential information used in the process of health care policy making, such as the development of reimbursement systems, estimation of financial resources required for health care services, and decision making based on economic evaluations.

Governmental perspective

- Previous studies have emphasized the need for payments to reflect the necessary costs.
- Although there have been previous studies that have addressed cost calculation for health care in Japan, it is difficult to apply their findings to hospital management and government policy making.

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Governmental perspective

- A major caveat to the interpretation of the majority of these studies is the limitation of scope: these included limited cost coverage.
 - Personnel costs, which frequently account for the largest portion of the total cost, were not included
 - Limited diagnoses, and limited hospital departments.
- The traditional cost calculation systems used to quantify hospital costs are extremely time- and labor-intensive.

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Objectives

The aim of this study was to develop a patient-oriented health care costing system that, when compared with traditional costing systems, is able to quantify costs with a greater accuracy using patient-oriented functions, as well as to produce these costs more efficiently with regard to data preparation and calculation.

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METHODS

Database

- We developed a multi-institutional database in collaboration with the Ministry of Health, Labour and Welfare, Japan for a costing project based on traditional costing methods.

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Database

- This database consisted in part of cost data from patients admitted to 138 acute care hospitals throughout Japan in 2004 .
 - Including 20 national university hospitals, 29 private university hospitals and 89 non-university hospitals.
- The data obtained included financial data, number of beds, staff assignments, floor space and number of patients.

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Database

- The data also included claims data and discharge summary data on all patients discharged between July 2004 and October 2004 from 139 hospitals.
 - Including 21 national university hospitals, 29 private university hospitals, and 89 non-university hospitals

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Database

- The claims data used refers to the hospital reimbursement claims based on the nationally uniform fee-for-service system (the Diagnosis Procedure Combination [DPC] system).
- Details of algorithms used in the database development have been previously reported.

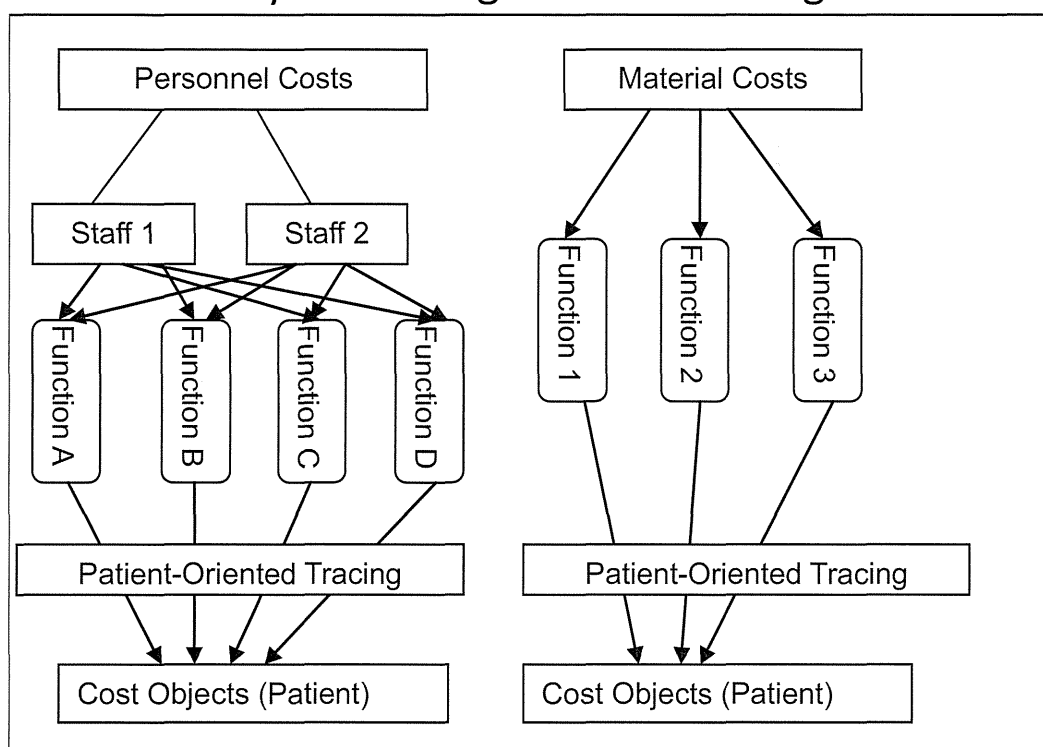
Hayashida et al. (2009)

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New Patient-Oriented Costing System Using Function Tracing

- Using this database, we developed a patient-oriented costing method, and also utilized a traditional hierarchical cost system to quantify patient-level costs.
- The patient-oriented costing method required the following information: Claims data, the number of staff, the allocation of costs for individual services by activity indicators or substitute, floor space, profit and loss statements, material costs, rental costs, and depreciation.

Calculation method of the new patient-oriented costing system using function tracing



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Practical Application of the New Costing System

- We then applied this new costing system to the calculation of patient-level costs in two voluntary participant acute care hospitals.
- Patient-level costs per day were calculated with the cooperation of the staff from these hospitals, and feedback was obtained from the staff with regard to the usability and practical application of the system.

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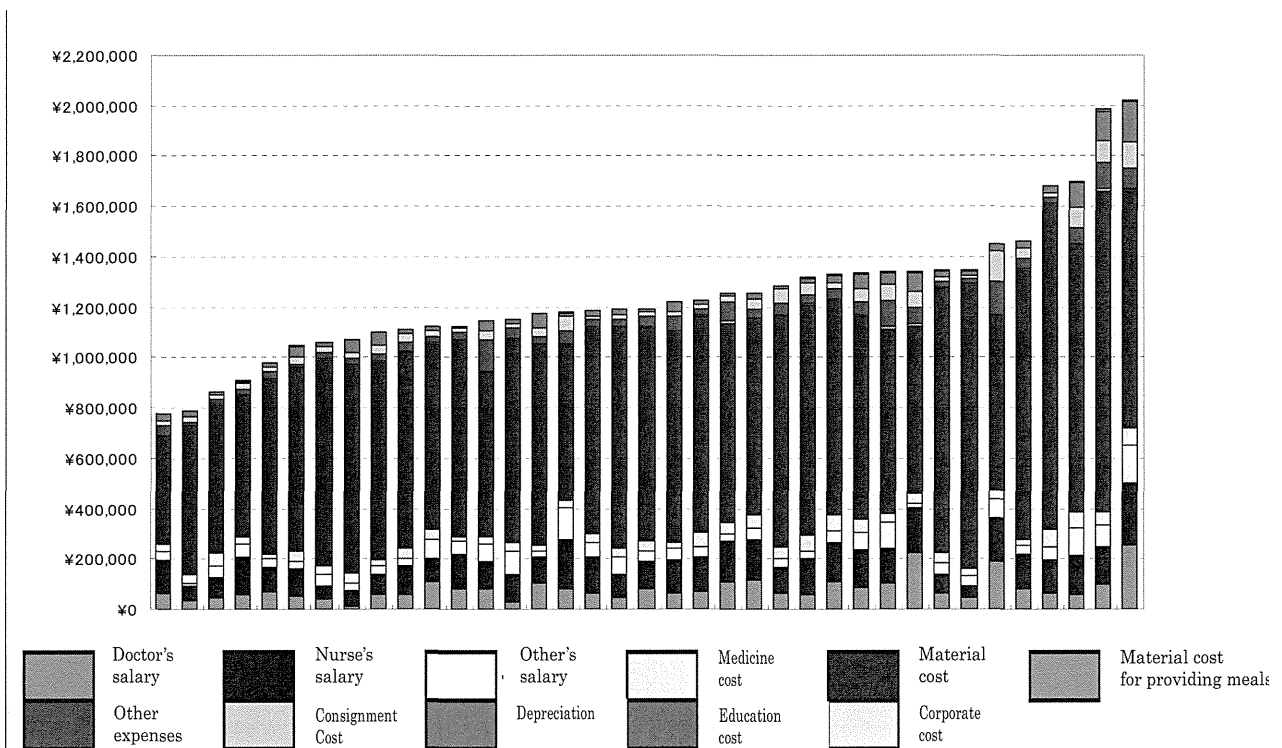
RESULTS

Database

- Our database comprised of data from 284 730 patients and individual patient case-level costs with components. For the model, we used an exchange rate of 110 Japanese yen (JPY) = US\$1.
- A wide range of average costs per hospitalization, from \$820 to \$65 737 (Q₁: \$4 373; Q₂: \$7 163; Q₃: \$12 712) was observed. Average costs per diem varied from \$300 to \$2 475 (Q₁: \$437; Q₂: \$491; Q₃: \$565) .

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Multi-institutional comparisons of hospital costs and cost components in patients with angina



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Results

New Patient-Oriented Costing System Using Function Tracing I

- The new costing system utilizes two methods of assignment costs to each cost object: direct tracing and tracing by function drivers. Of the two methods, direct tracing is the most precise because it relies on physically-observable causal relationships.
- Driver tracing, which is ostensibly less accurate than direct tracing, relies on causal factors known as drivers to assign costs to cost objects (for each patient).

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Results

New Patient-Oriented Costing System Using Function Tracing II

- Traditional methods of cost calculation have difficulties in the identification and tracking of resources to individual patients.
- In contrast, the use of driver tracing can in principle identify all resources used by a patient, and the associated costs can therefore be calculated.

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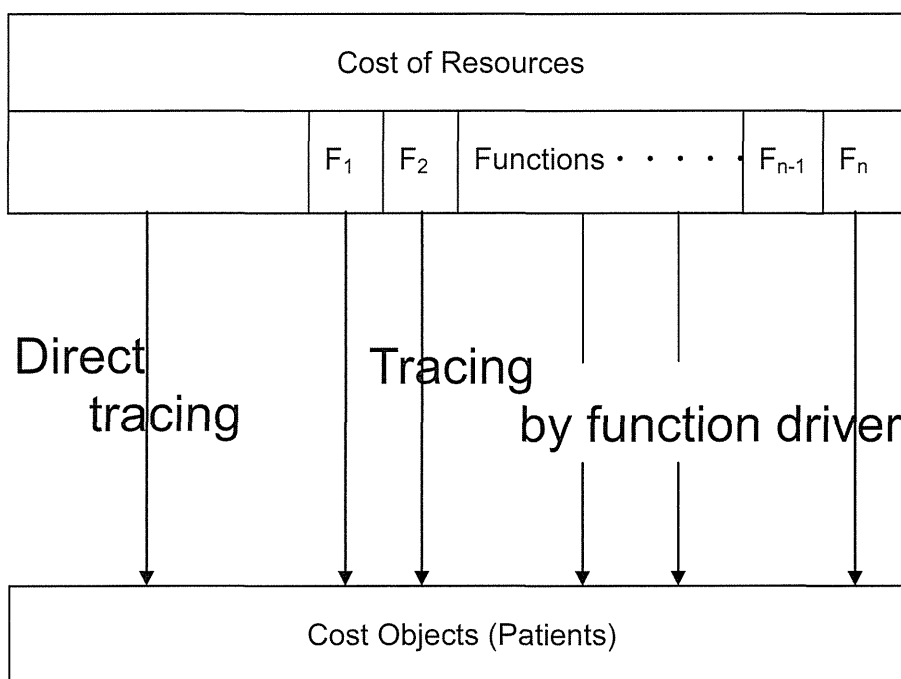
Results

New Patient-Oriented Costing System Using Function Tracing III

- Based on this principle, all costs of resources of hospitals are apportioned according to the Mutually Exclusive and Collectively Exhaustive (MECE) principle into patient-oriented functions.
- A function definition database was prepared, and measurements for utilization were calculated for each function according to this list. This function definition database was then used to assign costs of each function to cost objects for individual patients.

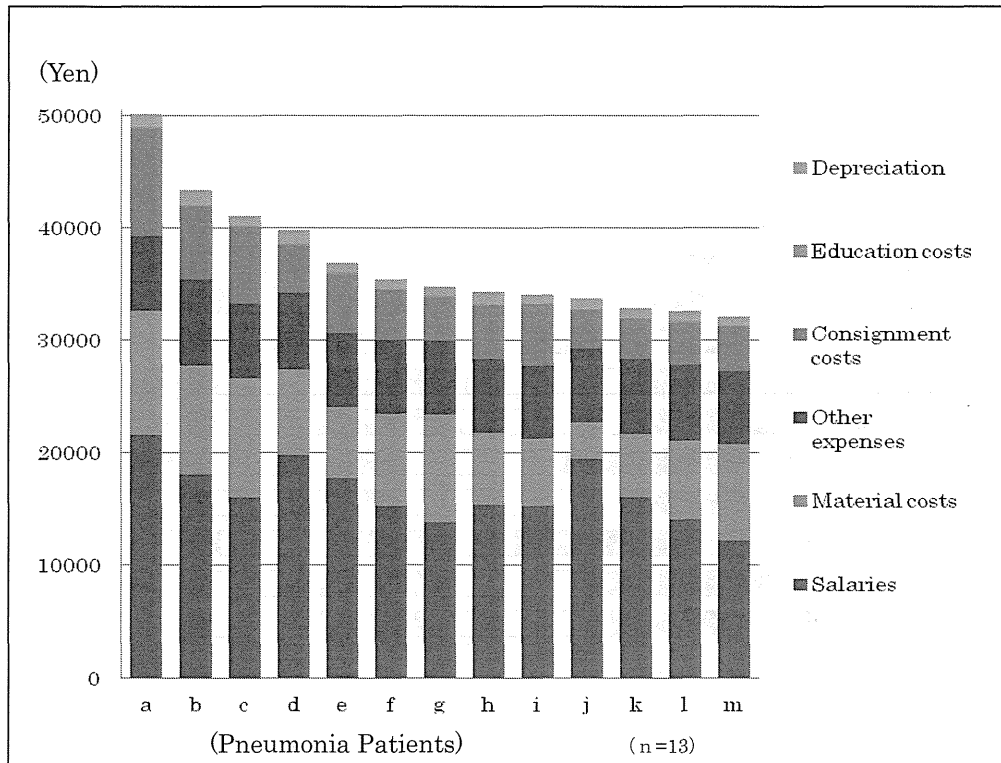
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Model of patient-oriented costing using function tracing



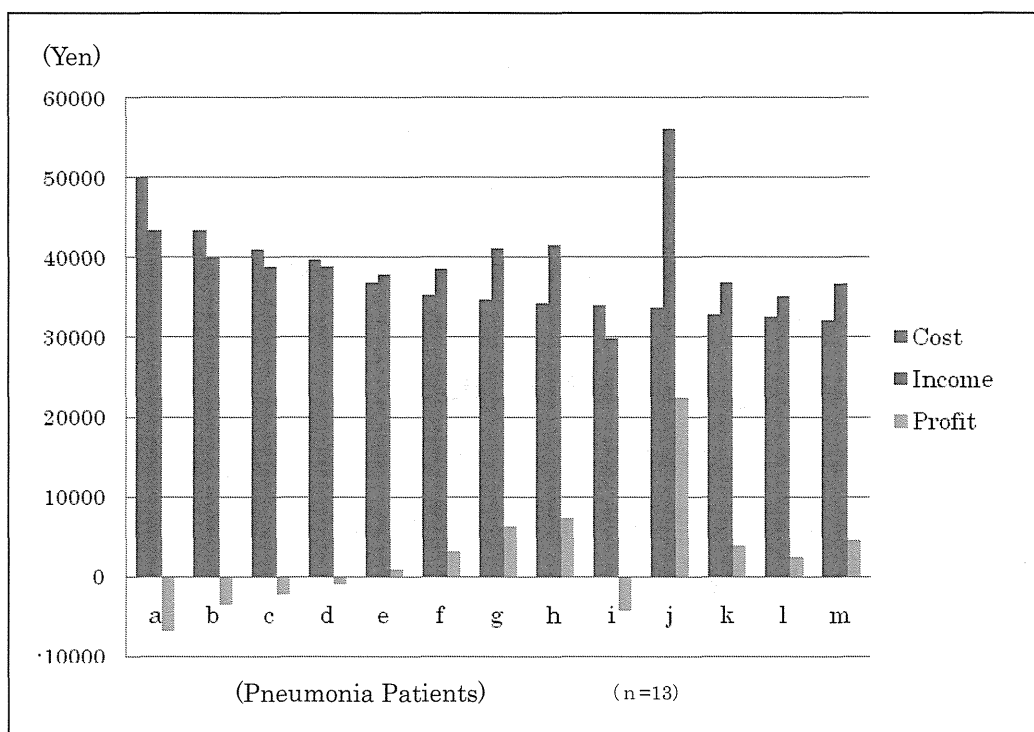
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Mean daily health care costs and cost components of patients with pneumonia



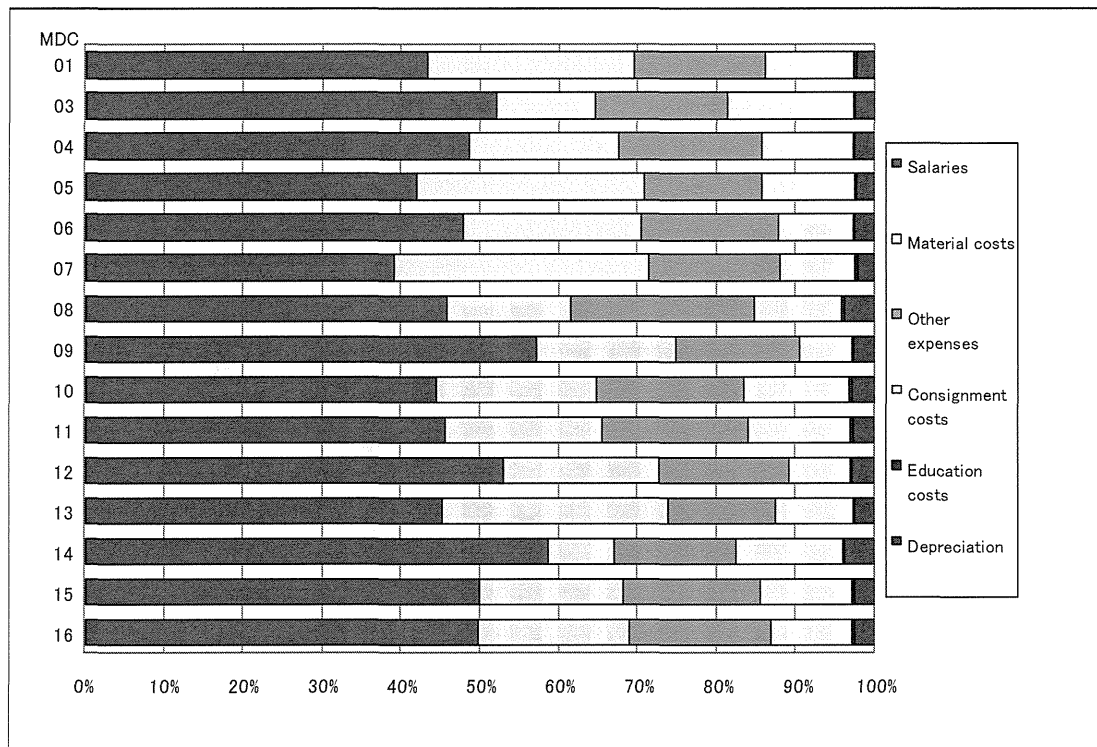
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Mean daily hospital cost, income, and profit of patients with pneumonia



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Mean hospital cost components by Major Diagnostic Category (MDC) in a hospital



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DISCUSSION

- In this study, we have developed a multi-institutional costing database comprising of data from 284 730 patients.
- Using this database, we developed a new patient-level costing system based on function tracing using this database.
- Finally, we applied the new costing system into calculating health care costs for patients in two hospitals.

Advantages of the New Costing System

- Our study has several advantages over existing traditional methods.
 1. The new system can improve the accuracy of patient-level costing.
 2. The new system substantially reduces the time and effort required for data preparation and cost calculation.

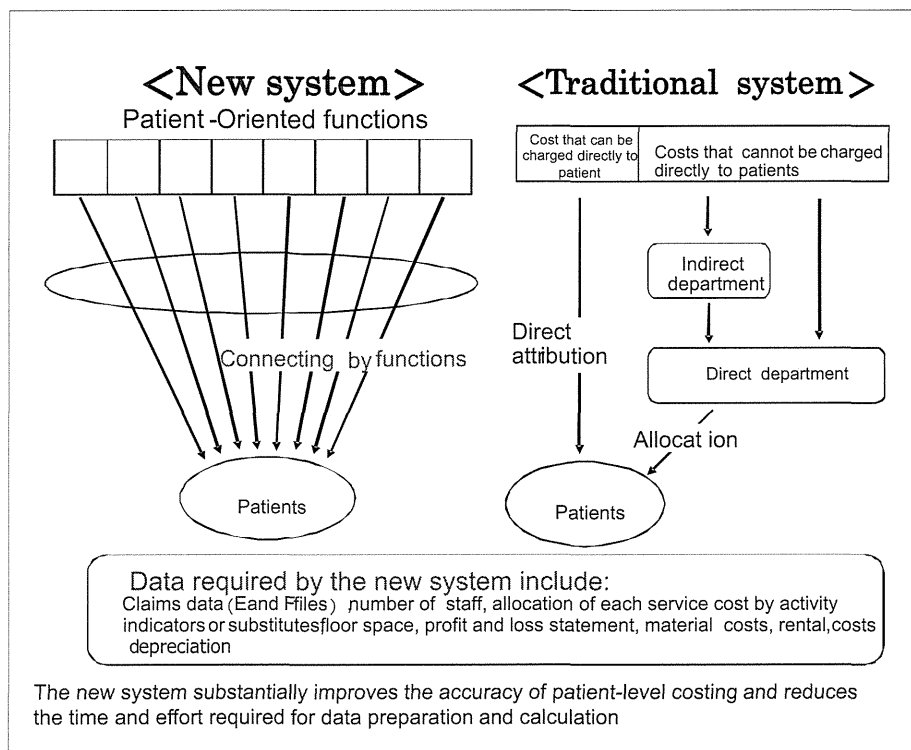
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Driver tracing techniques

- Traditional methods are limited in the identification of specific resources used by individual patients.
- Our use of driver tracing techniques has allowed all resources used to be apportioned into patient-oriented functions according to the MECE principle.
- The function definition database allows quick identification of the resources used and costs incurred by individual patient.

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Differences between the new costing system and the traditional costing system



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Conclusions

- Despite the difficulties in calculating patient-oriented costs, advances in the performance of costing have been achieved by the new "function tracing" methodology.
- Patient-level costs are more accurate than those calculated using traditional costing, and are better suited to support decision-making at the hospital and governmental levels.
- Our system of costing was also shown in practice to have improved efficiency over the traditional method, and this new methodology can be advantageous to hospital management, third-party payers and government policymakers.

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ABSTRACT

[Background]

Understanding patient-oriented costing is extremely important to developing an efficient system for providing high quality health care. However, patients receive treatment and care from various professionals in different settings at different times, and this makes the accurate calculation of patient-level costs extremely difficult. Also, traditional costing methods are highly time- and labor-intensive.

[Objectives]

The aim of this study was to develop a patient-oriented health care costing system that, when compared with traditional costing systems, is able to quantify costs with a greater accuracy using patient-oriented functions, as well as to produce these costs more efficiently with regard to data preparation and calculation.

[Method]

We developed a standard method and a nation-wide, multi-institutional database by traditional hierarchical costing framework utilizing the data sets underlying administrative claims, as the Project of the Ministry of Health, Labour and Welfare, Japan. Based upon this achievement and reviewing the processes, we then created and developed a new patient-oriented costing system using "function tracing", in which all the resources used by a patient were linked to functions of health services before cost calculation. Finally, this new costing method was applied in practice to actual hospitals in order to quantify patient-level health care costs.

[Results]

The database comprised of data from 284,730 hospital patients and individual patient case-level costs. Although traditional costing methods frequently fail to include costs that are not directly associated with an individual patient's care, our new system utilizes a principle of apportioning all resources used into patient-oriented functions. A function definition database was prepared, and resources used by each patient was measured and the ensuing costs calculated. The application of the new costing method showed that the method was able to provide detailed and accurate cost calculations at the patient level, with much less time and labor required in the costing process. The method received favorable feedback from the participating hospitals.

[Conclusion]

We have developed a new patient-oriented costing system with improved accuracy and efficiency using "function tracing" method. This new methodology may be advantageous to hospital management, third-party payers and government policymakers.

BACKGROUND

Understanding patient-oriented costing is extremely important to developing an efficient system for providing high quality health care. The use of patient-oriented costing can also support the improvement of current levels of management efficiency and quality of health care. However, health care is an aggregate service in which patients receive treatment and care from various professionals in different settings and at different times, and it is this myriad of services that makes the accurate calculation of patient-level costs extremely difficult. Despite these difficulties, there has been increasing interest in the development of a standardized patient-oriented costing system from both individual hospitals and the government [1, 2].

At the hospital level, standardized patient-oriented cost calculations are necessary for various aspects of business management, such as budget preparation and control, evaluation of cost and performance, establishment of management master plans. Cost calculations can also be used to support informed negotiations of fund procurement and as reference data for benchmarking. Furthermore, accurate patient-oriented cost calculations may also improve certain attributes of care management, such as the planning and control of care, assessment of cost performance in care, patient safety and infection control [10]. Because hospital managers need to properly assess costs that can be potentially controlled in the context of rising medical expenditures, the importance of the management ability of each hospital is also increasing, [3-5].

From a governmental perspective, standardized hospital cost calculations represent essential information used in the process of health care policy making, such as the development of reimbursement systems, estimation of financial resources required for health care services, and decision making based on economic evaluations. Previous studies have emphasized the need for payments to reflect the necessary costs [6-9].

Although there have been previous studies that have addressed cost calculation for health care in Japan, it is difficult to apply their findings to hospital management and government policy making. A major caveat to the interpretation of the majority of these studies is the limitation of scope: these included limited cost coverage (e.g., personnel costs, which frequently account for the largest portion of the total cost, were not included), limited diagnoses, and limited hospital departments. Furthermore, the traditional cost calculation systems used to quantify hospital costs are extremely time- and labor-intensive.

The aim of this study was to develop a patient-oriented health care costing system that, when compared with traditional costing systems, is able to quantify costs with a greater accuracy using patient-oriented functions, as well as to produce these costs more efficiently with regard to data preparation and calculation.

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Database

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