Risk Management and Measuring Productivity with POAS – Point of Act System –
Masanori Akiyama 1,2

1 Sloan School of Management / Massachusetts Institute of Technology, Cambridge, MA, USA
2 International Medical Center of Japan / Department of Medical Informatics, Tokyo, Japan

Abstract—The concept of our system is not only to manage material flows, but also to provide an integrated management resource, a means of correcting errors in medical treatment, and applications to EBM through the data mining of medical records. Prior to the development of this system, electronic processing systems in hospitals did a poor job of accurately grasping medical practice and medical material flows. With POAS (Point of Act System), hospital managers can solve the so-called, “man, money, material, and information” issues inherent in the costs of healthcare. The POAS system synchronizes with each department system, from finance and accounting, to pharmacy, to imaging, and allows information exchange. We can manage Man (Business Process), Material (Medical Materials and Medicine), Money (Expenditure for purchase and Receipt), and Information (Medical Records) completely by this system. Our analysis has shown that this system has a remarkable investment effect – saving over four million dollars per year – through cost savings in logistics and business process efficiencies. In addition, the quality of care has been improved dramatically while error rates have been reduced – nearly to zero in some cases.

Keywords—POAS (point of act system), hospital management, ERP (enterprise resource Planning), financial management, risk management

I. INTRODUCTION

In September 2001 the Japanese Ministry of Health, Labor and Welfare made public a draft plan of medical system reform because of the need to seriously review the country's medical services. This was brought about both by the harsh economic conditions existing after the collapse of the asset-inflated bubble economy in the early 1990s and the aging of society accompanied by declines in the birthrate. The plan, which not only visualizes reform of the medical insurance system but also pictures an ideal system of medical care for the future, is a comprehensive draft for institutional reform in Japan. The point of that is to foster respect for the options chosen by patients, to provide the information necessary for informed decision making, to establish a system that provides high quality, efficient medical service and to build a foundation for public confidence. Because of these proposals, economic efficiency in medical care is becoming an important public issue. In this context, information technology (IT) can serve as a helpful tool. We have developed a system that, utilizing IT, can accurately calculate costs in a bid to maintaining a balance between efficiency and quality. At the same time, the system can also be used as a yardstick for the measurement and improvement of efficiency.

II. MATERIALS AND METHODS

A. Points that need to be addressed

The traditional hospital information system (HIS), built by connecting order entries and the medical clerical system, takes in information about orders and outputs medical payment requests via a medical accounting system, which is actually a payment system. However, this kind of system has the following problems: 1) Although physicians are supposed to enter correct payment information, the information is often incomplete (occurrence of uncollected balance). 2) The data terminals within divisions and those at the HIS are not integrated. As a result, duplicate entries are required, resulting in unnecessary extra work. 3) While data held in the HIS can be sent to the medical financial system, divisional data necessary for payment cannot be entered due to inconsistencies in the master system. 4) It is difficult or impossible to search the information held by the medical financial or divisional systems via the order systems. 5) A most important problem is that the existing systems have been used primarily for preparing medical payment requests. As a result, data on clinical activities, which have nothing to do with medical insurance, are not received (and could not be handled anyway) by the existing systems.

In these circumstances, when certain expenses are not covered by medical insurance, it has not been possible to make accurate assessments of expenses for materials and personnel through cost calculations based on the data held in the medical financial systems.

B. Outline of the system

To deal with these problems, we have designed a three-tier model [1]. The middle-tier application server is located at the center. We use a Common Object Request Broker Architecture (CORBA) on this application server. A standardized middleware server links all the components of each system to one another. The role of the application
server is to mediate among the components of the various systems. Data and the events generated by medical activities, which take place in different components of the various systems, are sent to the application server. The original data itself is not transmitted; rather it is registered for management purposes in a repository. Queries for system data are made to the application server, not to the server of each division. The application server then collects the required data from the appropriate divisions, and sends it to the client that requested it. Using this “wrapping” technology one can connect specialized legacy-based systems which are customized for each corporation or hospital. The International Medical Center of Japan has integrated it’s existing medical financial systems by routing them through the application server and the CORBA middleware [2].

With the use of three new functions, the collection of data, secondary use of data and improvement of the precision of data has become possible. First, the Clinical Data Repository (CDR) is a large-capacity database that manages problem-oriented data structures and houses all clinical data so that clinical records can be accessed. Data not housed in any other component will be maintained in the CDR. All system data is stored in the CDR in order to guarantee that all data can be accessed from the clinical front line. Secondly, the Act Management System (AMS) has made it possible to support decision-making and manage work on a knowledge basis. The result is that the guidelines and protocols of clinical studies can be executed and managed. The AMS also records all changes in the condition of data, and all accesses to clinical data. This feature can be utilized to discover patterns of use by improving guidelines or recording diagnostic processes by analyzing detailed access logs for the systems. Thirdly, the Resource Management System (RMS) manages all the system resources that are normally available to a corporation. It can keep track of people and organizations – actors – connected to each system, fixed assets and equipment, and such resources as pharmaceuticals, film stock, contrast media and meals. Information obtained from the AMS can be invaluable when used for accurate and efficient distribution of resources.

Each divisional system manages data that has resulted from that division and its clinical work processes. Each division manages and preserves detailed data, including its reports, and provides only the “outlines” of the data to the application server. Thus, the actual data are not sent to or preserved in the application server. Since only outlines of data are held in the central application server, the volume of data stored there will not increase dramatically. Each client communicates with the others via the application server, and a graphic user interface (GUI) is provided for each occupational category.

C. Technologies used for the system

The system was built using state-of-the-art technologies such as CORBA and Java [4]. CORBA is used in the mechanism for data transfer and event distribution. We made a standardized interface using an Interface Definition Language (IDL), which was established by an object management group (OMG) to secure portability, extensibility and scalability of the components in the system. The GUI clients are implemented in Java. We used Extensible Markup Language (XML) to record variable length data. Document data is exchanged between clients and the application server. Meanwhile, CORBA Objects are exchanged between the application server and other components. The application server assembles and resolves XML documents obtained from sources in various divisions. Using CORBA, an application server is implemented as an integrating system to link the servers in the endoscope division, the pathology division and the wrapped, legacy-based medical accounting system. It is possible to search and browse using the database on local area network (LAN) terminals. Orders, images, reports and the medical financial system are all integrated (Fig.1).

D. Calculating medical care costs

Calculating medical care costs, which had posed difficulties that needed to be resolved, has now become possible. POAS, which stands for the Point of Act System, is a design feature of this comprehensive medical information system. Its characteristics are as follows. 1) Information on all medical activities is collected as detailed data at major “action” points, from the time orders are issued on through to their implementation. 2) The system is organically linked to various medical devices, such as medical diagnostic instruments, X-Ray equipment and equipment in the pharmaceutical division. It records information about medical activi-