

## ACTIVITY BASED COST TRACKING SYSTEMS

### FIELD OF THE INVENTION

The present invention relates to systems for tracking the costs of medical procedures by monitoring movements of personnel and/or equipment and supplies during the procedure and associating each with a particular cost.

### BACKGROUND OF THE INVENTION

The medical service industry is in need of an improved system for tracking costs. Cost tracking is needed to establish profitable pricing and to monitor expenses and client budgets. Furthermore, cost tracking is needed to evaluate the costs of various alternative approaches to providing a particular medical service, in order to reduce or maintain costs while maintaining or enhancing quality and profitability.

In a typical medical procedure, for example, surgery, a patient is brought into a treatment room and met by a number of caregivers. Supplies, for example a custom procedure tray including specific supplies needed for that procedure, are brought into the room for the procedure. Furthermore, medical equipment is either brought into the room or may be permanently installed there. Upon completion of the procedure, the caregivers and patient depart, the consumed supplies are disposed, and the equipment is prepared for the next procedure.

Each of the persons and objects involved in this typical procedure, i.e., the caregivers, the supplies and the equipment, has a unique cost which can be determined on an hourly or per-use basis. At the present time, only a small fraction of these objects or costs are tracked; for example, the cost of the custom procedure tray may be charged to the patient, and a nurse may keep a count of sponges to ensure that none become lost during the procedure. However, typically there is no system for tracking, for example, the human labor costs of the caregivers, or the costs of equipment used, and as a result these costs cannot be later adequately identified or associated with the procedure performed.

Medical service providers are typically compensated by insurance carriers on the basis of the number of insured lives handled by the service provider. Although actuarial data can predict the number of these insured lives that will present various specific maladies or require specific treatments, typically there is insufficient data to determine the cost of providing these specific treatments or curing the specific maladies, and thus insufficient data to accurately quote pricing on a per-life basis. As a result, medical service providers are often reduced to guessing at their costs when determining pricing for insurers, leading to pricing which is often not commensurate with costs. Furthermore, for the same reasons, it can be difficult or impossible to determine which procedures or maladies are the most costly and in need of cost improvement analysis.

In some service businesses, service providers individually track and account for time spent on various projects, so that this time may be entered into an accounting system and used for billing to clients. However, this kind of system would be challenging to establish in a medical environment as it would require modifying the behaviors of medical personnel. Furthermore, medical services are often provided on an emergency basis and as a result, even under the best conditions, it is not always possible to fully track time spent and supplies consumed on a project by project basis.

In the past it has been proposed to monitor the activities and positions of medical service providers (caregivers) by

providing each caregiver with a coded transponder, and monitoring the movements of the transponders through wireless transmissions. While the primary goal of systems of this kind has been to rapidly locate caregivers in emergency situations, it has also been proposed to use information on the movements of caregivers to provide billing details to patients. Unfortunately, although these proposed systems monitor human movements, they fail to provide accurate cost figures for particular medical services, in that there is no provision for accurately associating the movements or time spent by an individual caregiver with particular services rendered; nor is there any provision for tracking other expenses such as the costs of supplies and rental value of equipment. But without a means for accurately associating procedures performed by caregivers with the costs of caregiver time and related expenses for supplies and equipment, one cannot accurately account for the cost of particular services and thus cannot accurately price medical services or monitor and budget expenses. Thus, there remains a need for a system for tracking the costs accumulated in rendering a particular service.

### SUMMARY OF THE INVENTION

In accordance with principles of the present invention, the movements of personnel, supplies and equipment are monitored and data on these movements is processed to produce detailed and accurate cost accounting records associated with particular medical services rendered. These detailed records can then be used to estimate the costs of future procedures and/or to evaluate the costs of various alternative care regimens to establish best practice guidelines for performing particular procedures or care of particular maladies.

Specifically, in one aspect, an activity-based cost tracking system in accordance with principles of the present invention tracks the costs of activities of persons and objects in a defined space such as a room. A transponder is attached to each person and object, and the transponders transmit an identifying code. A transponder reader located in the defined space reads the code from each of the transponders. A database associates these codes with the objects or persons to which the transponders are attached. A cost computer then uses the times of entry and exit of objects or persons, and/or other information, to compute the costs of the activities of the persons and objects.

In addition to tracking movements of caregivers, the system may track objects such as supplies which are consumed during a patient's care, and equipment which is used but not consumed during a patient's care. Each supply is associated with its replacement cost, and this replacement cost is assigned to the activity in which the supply is consumed. (If the supply is not consumed, a restocking charge may be applied for the cost of returning the supply to inventory.) Each item of equipment is associated with a rental cost, and this rental cost is charged to the activity in which the equipment is used.

Costs may be tracked on a per-use or per-activity basis, or on a time basis, or both, whichever is the most accurate measure of the costs of personnel and/or equipment.

In the disclosed particular embodiment, the reader communicates with the transponders via wireless radio frequency communication, and the readers further communicate with the cost computer via wireless radio frequency communication. This permits the readers to be mobile. Thus, a system in accordance with principles of the present invention is used to temporarily track activities in a defined space. To do so, a portable transponder reader is temporarily