



Fig. 1. The technology management process at the Texas Children's Hospital.

Many hospitals are reformulating their technology management process, which starts with the strategic planning process, thus demonstrating clearer support for the management of medical technology. It is a process in which the understanding of the key issues and the critical success factors are usually followed by a more defined task of resource allocation and an assignment of the responsibility for sustained improvement in technology's performance through attainment or progression toward measurable technology utilization goals. This is a planned process that may be unique for each organization and is essentially a prescription for the way we look ahead. Although it may be different for every organization, all are faced with the following five similar questions: What are we? What do we want to be? Where are we going? What will be our role? How will we do it?

Planning and Monitoring the Deployment of Medical Technology

As we developed our medical technology management program model (Figure 1), adoption of the strategically prescribed norms took place, as well as the monitoring in accordance with a well-thought-out plan, equipped with know-how from a multidisciplinary team of users and the implementation of an agreed-upon policy. The multidisciplinary team has a similar approach toward the creation of definition of needs, scope, and objectives for a specific type of technology (i.e., the equipment).

The question is no longer whether a medical technology management plan is worth the effort, but rather, can we afford not to implement it and do we have the adequate tools to execute it? If we do, then the hospital will be able to make informed decisions regarding deployment of new technology as well as monitor its utilization [13].

The need for clinical engineering involvement in such a team became evident when the following problems were repeatedly encountered:

- recently purchased equipment not sufficiently used
- on-going user problems with equipment
- excessive downtime and ownership cost

- lack of compliance with accreditation agencies and regulations
- high percentage of equipment failing and awaiting repair
- maintenance costs emerging as a large single expense
- medical equipment upgrading, replacement, and planning are not intertwined
- use errors and near-miss events.

A further analysis of these symptoms using a system performance analysis technique would likely reveal [14]:

- a lack of a central clearing house to collect, index, and monitor medical technology performance for resolving current issues and for future planning purposes
- the absence of strategy for identifying emerging technologies for potential integration
- the lack of a systematic plan for conducting technology assessment, thereby not being able to maximize the benefits from prioritization of the deployment of available technology
- an inability to benefit from the organization's experience with a particular type of technology or supplier
- the random replacement of medical technologies, rather than a systematic protocol based on a set of well developed criteria
- the lack of integration of technology forecasting into the strategic planning of the hospital
- limited opportunities for interdisciplinary exchange between engineering-related and clinically related professionals.

To address these issues, a continuous technology assessment plan was initiated with the following objectives:

- 1) to accumulate pertinent information regarding decisions about medical equipment
- 2) to develop a multiyear plan for technology replacement and associated costs
- 3) to communicate replacement selection criteria that is supported by users
- 4) to create an ongoing assessment methodology with outcomes measurements
- 5) to improve the capital budget process by integrating the status of current technology with long-term needs relative to surgical-medical services goals
- 6) to integrate the competency of clinical engineering into patient safety goals.

Because the program provides for both the management of the existing inventory of medical equipment aiming at the lowest reasonable life-cycle cost and for the recommendations relating to procurement, it is mandatory to integrate trended operational and utilization information with the projected budget strategy into the technology management plan.

At the Texas Children's Hospital, the Biomedical Engineering Department has been accumulating pertinent information and has developed indicators for measuring medical equipment performance [15]. A medical technology evaluation committee (MTEC), which is chaired by the director of biomedical engineering, began developing analytical selection criteria and life-cycle costs information. The membership of the committee includes representatives of the medical and nursing staff; high-tech users; administration; and equipment planning, risk management, safety, and materials management departments. Another clinical engineer from the same department with nursing training experience serves as the committee's designated coordinator for all evaluation tasks. Once the committee accepts a request for review, it identifies other users who may have an interest in it and authorizes the coordi-