As the deployment of medical equipment continuously evolves, its impact on the hospital operations and on the consumption rate of its financial resources increases.

and with the synthesizing of clinical needs into a bid request document. This further includes bid specifications, vendor negotiations, installation preparation, acceptance criteria, user training, and servicing of the installed base. The clinical engineer must also be familiar with methods for assuring variances that medical equipment performance and risks are monitored, reported, and managed. The process includes the assigning of criteria (i.e., values reflecting the evaluator or user preference) and measuring the degree to which those criteria are met in the daily routine of the clinical environment [20]. Criteria could be the format and quality of information displayed at the bedside physiological monitor, the set-up of minimum infused volume of an infusion pump, or the amount of work of breathing associated with one particular brand of mechanical ventilator compared with another.

Medical technology policy supported by an organized program of planning, implementing, monitoring, and evaluation results in effective use of resources and reduction in operational risks. Figure 2 outlines such a program. Positive outcomes affect allocation of capital and are dependent on the success of the assets management program, the impact of changes in the technology life cycle, the inherent design and quality of the technology, as well as the environment within which the assets are deployed and serviced.

The methodology for the development and sustainment of a medical technology management program must include properties that demonstrate the impact from each of these parameters on outcomes. Outcomes performance indicators include: cost effectiveness, compliance level, client satisfaction, and service leadership [21]. Performance indicators can include safety-related events such as the elimination or reduction in medical errors. Cost effectiveness can include return-oninvestment analysis, reduction in cost per procedure, or improvement in uptime. Other indicators can represent the result of life-cycle technology planning and the integration of technologies at the point of care measured by the utilization rate and the level of satisfaction the caregivers team has with the environment of care.

The program needs to encompass all involved parties. This may at times extend the evaluation and provide for participation of professionals with different interests, which will require mediation between parties. The acceptance of the process is based on respect for their participation and at times will require a sequence of steps taken to pre-empt escalation of antagonistic attitudes among the parties participating in the evaluation. Often, one party seems to prefer an equipment feature that presents unacceptable conditions to another. The clinical engineer should provide the technical and cultural leadership needed to maintain the progress of the evaluation process in a participatory mode. The individuals participating should be representatives of the user groups, support groups, medical staff, nursing, engineering risk management, finance, and administration.

Factors by which the equipment will be evaluated are selected, agreed upon, and a relative importance weight is assigned to them. Devices that pass the on-site engineering bench test are forwarded to the clinical evaluation stage, which must be preceded by user training that is provided to all shifts by the clinical engineering staff and/or the vendor. During the clinical evaluation, the clinical engineer serves as a focal point for collecting users' problems as an indication for a possible mismatch between the equipments real-life performance and user or system requirements. Following the evaluation, the clinical engineer collects the users' report documenting their experiences and presents it to the committee for a recommendation, while the cost accounting representative reviews the financial alternatives. Generally, to review financial alternatives, information is accumulated and developed into a capital equipment matrix that includes replacement cost, projected retirement, replacement, upgrade, and associated lifecycle dates. Based upon input from clinical engineering, equipment is prioritized regarding their role in the organization. This data is then compiled and provides a useful determination of expected capital costs for future capital budgets and can aid in the development of future strategic planning by providing specific costs by service component. Clinical planning thereby provides options for management in future years despite limited financial resources.

A period of time after equipment has been installed-for example, between six to twelve months-a follow-up study of actual operational costs, service problems, and utilization indicators relative to projections is performed. This activity supports and becomes part of the equipment planning and continuous quality improvement program. Many good lessons are learned this way. It is also important to review the implementation state and determine if it can be further optimized the next time. The clinical engineer, from that point on, continues with managing the other phases of the equipment lifecycle with proper attention to the planning for equipment upgrades, enhancements, and replacement. The skills of the clinical engineer are needed now, more than ever, to manage this new responsibility: a responsibility for managing the medical technology program within guidelines that range from a strategic technology planning phase to the planning for systems replacement.

Appropriate deployment of technological innovation contributes to improvement in the quality of healthcare delivered, the containment of cost, and access to the healthcare system. Hospitals have been allocating a significant portion of their resources to procuring and managing capital assets; they are continuously faced with demands for new medical equipment and are asked to manage existing inventory for which they are not well prepared. To objectively manage their investment,

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